

Bid Documents

For

City of Morris

**North Water Treatment
Plant**

May, 2026



Chamlin & Associates
ENGINEERS • SURVEYORS • PLANNERS

Project No. 09818.02

CITY OF MORRIS
NORTH WATER TREATMENT PLANT

MAY, 2026




ENGINEER'S SEAL & SIGNATURE
5/1/26
DATE

Prepared by
Chamlin & Associates, Inc.
Peru Morris Ottawa
Illinois

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ADVERTISEMENT FOR BIDS

City of Morris
700 N. Division Street
Morris, IL 60450

Separate sealed BIDS for the construction of “North Water Treatment Plant” will be received at the office of the City Clerk at City of Morris, 700 N. Division Street, Morris, IL 60450 at 10:00 a.m. on Thursday, June 18, 2026, and then at said office publicly opened and read aloud.

The work for this project includes but is not limited to: Construction of a new 3.0 MGD ion exchange water treatment plant and all associated site work, electrical, plumbing, instrumentation & controls, and all other associated features. It also includes finishing of wells 8 and 9, associated well houses, finished and raw watermains, and a sanitary sewer.

“Any contract or contracts awarded under this invitation for bids are expected to be funded in part by a loan from the Illinois Environmental Protection Agency (Illinois EPA). Neither the State of Illinois nor any of its departments, agencies, or employees is or will be a party to this invitation for bids or any resulting contract. The procurement will be subject to regulations contained in the Procedures for Issuing Loans from the Public Water Supply Loan Program (35 IAC Part 662), the Davis-Bacon Act (40 USC 276a through 276a-5) as defined by the United States Department of Labor, the Employment of Illinois Workers on Public Works Act (30 ILCS 570), Illinois Works Jobs Program Act (30 ILCS 559/20-1), and the “Build America, Buy America Act” requirements as contained in the federal Infrastructure Investment and Jobs Act, Pub. L. No. 117-58.

This procurement is also subject to the loan recipient’s policy regarding the increased use of disadvantaged business enterprises. The loan recipient’s policy requires all bidders to undertake specified affirmative efforts at least sixteen (16) days prior to bid opening. The policy is contained in the specifications.”

Plans and specifications may be accessed on-line at: www.chamlin.com

Full-size plans and specifications are available from Chamlin & Associates, Inc., 4152 Progress Boulevard, Peru, IL 61354 at the non-refundable cost of \$150 per set.

The CONTRACT DOCUMENTS may be examined at the following locations:

City of Morris, 700 N. Division Street, Morris, IL 60450
Chamlin & Associates, Inc., 4152 Progress Boulevard, Peru, IL 61354
Chamlin & Associates, Inc., 221 W. Washington Street, Morris, IL 60450

The Bid shall be accompanied by a certified check or bid bond, in the amount of five percent (5%) of the gross amount of the bid and be payable to the order of the City of Morris.

A non-mandatory Pre-Bid Meeting has been scheduled for Wednesday, May 27, 2026, at 10:00 a.m. at the City Hall at 700 N. Division Street, Morris, IL 60450.

Bids may be held by the City of Morris for a period not to exceed 90 days from the date of the opening of Bids for the purpose of reviewing the Bids and investigating the qualifications of Bidders, prior to awarding of the Contract.

The Owner reserves the right to accept or reject any or all Bids and to waive any informalities in the bidding.

BY ORDER OF:

MAYOR & CITY COUNCIL
CITY OF MORRIS

INFORMATION FOR BIDDERS

BIDS will be received by the City of Morris (herein called the "OWNER"), at 700 N. Division Street, Morris, IL 60450 until 10:00 A.M. on Thursday, June 18, 2026, and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to Lori Werden, City Clerk at City of Morris, 700 N. Division Street, Morris, IL 60450. Each sealed envelope containing a BID must be plainly marked on the outside as BID for "North Water Treatment Plant" and the envelope should bear on the outside the name of the BIDDER, his/her address, his/her license number if applicable and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at City of Morris, 700 N. Division Street, Morris, IL 60450

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

Any BID may be modified or withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 90 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information that is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him or her from fulfilling any of the conditions of the contract.

A BID bond payable to the OWNER must accompany each BID for five percent of the total amount of the BID. **(BIDDER must use Bid bond form provided.)** As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A performance BOND and a payment BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

Any contract entered into by the loan recipient and any sub-agreement hereunder, shall provide that representatives of the Agency will have access to the work whenever it is in preparation or progress and that the contractor or subcontractor will provide proper facilities for such access and inspection. Such contract or sub-agreement must also provide that the Agency or any authorized representative shall have access to any books, documents, papers, and records of the contractor or subcontractor, which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcriptions thereof.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The necessary Agreement and BOND forms shall accompany the NOTICE OF AWARD. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his or her or her option consider the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER, within ten (10) days of receipt of acceptable performance BOND, payment BOND and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE withdraw his or her signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The OWNER shall issue the NOTICE TO PROCEED within ten (10) days of the execution of the Agreement. Should there be reasons 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 the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR might terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as he or she deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence 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.

A conditional or qualified BID will not be accepted.

Award will be made to the low, responsive, responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout, including the Employment of Illinois Workers on Public Works Act (30 ILCS 570) and the Davis-Bacon Wage Act (40 USC 276a through 276a-5) as defined by the United States Department of Labor.

BIDDERS will comply with the federal Build America, Buy America Act (BABA) which is included in the Infrastructure Investment and Jobs Act, Pub. L. No. 117-58 and specifies that all iron, steel, manufactured products, and construction materials used in the project are produced in the United States.

BIDDER shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

Each BIDDER shall supply a list of all subcontractors that submitted proposals and if requested by the OWNER all major material suppliers.

Inspection trips for prospective BIDDERS will leave from City Hall at 700 N. Division Street, Morris, IL 60450 on Wednesday, May 27, 2026 at 10:30 a.m.

The ENGINEER is Chamlin & Associates, Inc. Their address is 4152 Progress Boulevard, Peru, IL 61354.

SUPPLEMENTAL INFORMATION FOR BIDDERS

BIDDER'S QUALIFICATIONS

It is the intention of this Advertisement for Bids to award a contract to the lowest responsible, responsive bidder who has the experience and qualifications necessary to ensure the Owner that they have the ability to expeditiously carry out all of the work necessary to complete this project in a fully acceptable and timely fashion. Qualified bidders will have the following:

- o Minimum 5 years of experience as a General Contractor, performing heavy construction work such as water and wastewater treatment plants.
- o Successful completion of similar projects in excess of \$5,000,000 within the last ten (10) years.
- o Ability to demonstrate that the company currently has an adequate permanent employee force with the minimum experience in water treatment plant construction as described above.
- o Assign to this project a Project Manager and a Project Superintendent with successful water treatment plant experience on similar projects.

In order to evaluate the Bidder's qualifications, Bidders shall submit with their bids "Statement of Bidder's Qualifications" form, which is included in the bid packet. Failure to adequately complete this form will be grounds for determining that the bid is non-responsive.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By



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National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

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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

- 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

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.

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.

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~~ **certain Specification sections**, 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.

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.

- 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~~ **one** printed ~~copies~~ **copy** of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF), **if requested**. 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 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.

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 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.

- 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 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.
- 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.
- 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 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~~ **Specification sections may** 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~~ **certain Specification sections** 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.

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

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~~ **Specifications**, the cost of all of the following is 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;

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

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~~ **Specification sections may** 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~~ **Specification sections** 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

- 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

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

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

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.

- 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);

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

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.

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.

- 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;

- 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.

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.

- 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.

- 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.

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.

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~~ **may be** 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.

- 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.

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

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.

- 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

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.

- 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.

- 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~~ **Specifications** 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~~ **Specifications**, 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.

- 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.

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.

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~~ **Specifications**, and limitations on the responsibilities thereof will be as provided in the ~~Supplementary Conditions~~ **Specifications** 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~~ **Specifications**.

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.

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.

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.

- 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:

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.

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

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

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

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

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~~ **by the Engineer**. 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.

- 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, expeditors, 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

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

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.

- 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,

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,

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

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.

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;

- 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

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

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.

- 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,

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~~ **Specifications** 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.

- 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,

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

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~~ ***Specifications***;
 - 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~~ ***Specifications*** 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.

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.

SPECIAL CONDITIONS

STANDARD SPECIFICATION REFERENCE

Unless otherwise stated, all work on this project shall be governed by the “Standard Specifications for Water and Sewer Main Construction in Illinois,” latest edition. Any reference to the specifications of the Illinois Department of Transportation (IDOT) included herein shall mean the latest copy of the Standard Specifications for Road and Bridge Construction prepared by the State of Illinois Department of Transportation. Any work relative to this project not covered by specifications, the special provisions or the plan documents shall be covered by the above-mentioned Standard Specifications.

UTILITIES

The Contractor shall be responsible for notifying all utilities prior to any excavation. Locations of utilities shown on these plans are approximate and shall be verified by the Contractor prior to any excavation with no additional compensation.

INSURANCE

The **minimum** limits of the Contractor’s Liability Insurance as indicated in the Standard General Conditions, Article 6.03 – Contractor’s Insurance, shall be as follows:

- A. Claims under workers’ compensation, disability benefits, and other similar employee benefit acts, the limits should be the Statutory Limits.
- B. Claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor’s employees, the **minimum** limits should be \$1,000,000.
- C. Claims for damages because of bodily injury, occupational sickness or disease, or death of any person other than Contractor’s employees, the **minimum** limits should be \$1,000,000.
- D. Claims for damages insured by reasonably available personal injury liability coverage which are sustained by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor or by any other person for any other reason, the **minimum** limits should be \$1,000,000.
- E. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom, the **minimum** limits should be \$1,000,000.
- F. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle, the **minimum** limits should be \$1,000,000.

In addition to the above coverages, the Contractor shall carry an umbrella/Excess Liability policy in the amount of **not less than** \$2,000,000 which should include Employer’s Liability Coverage.

The Contractor shall extend insurance to the Owner, Engineer, and State of Illinois for the liability coverages listed above, by endorsement as **additional primary and non contributory insureds.** A copy of the endorsement which adds the additional insureds to the policy shall also be provided as well as any **Waivers of Subrogation** endorsements for the General Liability and Worker's Compensation policies.

Regarding Commercial General Liability Insurance, Products/Completed Operations Coverage shall be maintained and evidence of continuation provided to the Owner and each other additional insured for **three years** after final payment.

BUILDER'S RISK INSURANCE

- ☐ ~~The Contractor will not be required to provide Builder's Risk Insurance for this project. (Standard unless otherwise noted below.)~~
- ☒ Per Article 6.04 Paragraph A of the General Conditions, the **Contractor** shall purchase and maintain Builder's Risk Insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof. Any deductible will be the responsibility of the Contractor.

VENUE OF LAWSUITS

The parties of this Contract agree that if any dispute arising from the pursuit of said Contract requires the filing of a lawsuit, venue of such lawsuit shall be in the Circuit Court of Grundy County, Illinois. This shall include any cause of action arising out of performance or non-performance of anything required under this contract or any injury suffered by or caused by any party, employee, agent, subcontractor or any other person arising out of the work or conduct required to be performed under this contract.

SUBSTANCE ABUSE PREVENTION PROGRAM

Before the Contractor and any subcontractor commences work, the Contractor and any subcontractor shall have in place a written Substance Abuse Prevention Program for the prevention of substance abuse among its employees which meets or exceeds the requirements in Public Act 95-0635 as enacted by the Illinois General Assembly or shall have a collective bargaining agreement in effect dealing with the subject matter of Public Act 95-0635.

The Contractor and any subcontractor shall file with a public body: a copy of the substance abuse prevention program along with a cover letter certifying that their program meets the requirements of the Act, or a letter certifying that the Contractor or a subcontractor has a collective bargaining agreement in effect dealing with the subject matter of this Act.

The apparent low Bidder, upon notification of contract award by the Owner, shall submit the required documents with the executed contract documents and insurance certificates. The Contractor is responsible for obtaining all appropriate documentation from their subcontractors and submitting to the Engineer.

PREVAILING WAGE RATES

All wages paid by the Contractor and each subcontractor shall be in compliance with the Davis-Bacon Act as defined by the United States Department of Labor. The Contractor shall be responsible to notify each subcontractor of the wage rates set forth in this contract and any revisions thereto. If the Department of Labor revises the wage rates, the revised rate as provided by the public body shall apply to this contract and the Contractor will not be allowed additional compensation on account of said revisions.

The Contractor and each subcontractor shall make and keep, for a period of not less than 3 years, records of all laborers, mechanics, and other workers employed by them on the project; the records shall include each worker's name, address, telephone number when available, social security number, classification or classifications, the hourly wages paid in each period, the number of hours worked each day, and the starting and ending times of work each day.

The Contractor and each subcontractor shall submit monthly, in person, by mail, or electronically, a certified payroll to the public body in charge of the project. The certified payroll shall consist of a complete copy of the records. The certified payroll shall be accompanied by a statement signed by the contractor or subcontractor which avers that:

- (i) such records are true and accurate;
- (ii) the hourly rate paid to each worker is not less than the general prevailing rate of hourly wages required; and
- (iii) the contractor or subcontractor is aware that filing a certified payroll that he or she knows to be false is a Class B misdemeanor.

Upon 2 business days' notice, the Contractor and each subcontractor shall make available for inspection the records to the public body in charge of the project, its officers and agents, and to the Director of Labor and his deputies and agents at all reasonable hours at a location within this State. The Contractor and each subcontractor shall permit his/her employees to be interviewed on the job, during working hours, by compliance investigators of the Department of Labor.

EMPLOYMENT OF ILLINOIS WORKERS ON PUBLIC WORKS

If at the time this Contract is executed, or if during the term of this Contract, there is excessive unemployment in Illinois as defined in the Illinois Workers on Public Works Act, 30 ILCS 570-0.01 *et seq.*, as two consecutive months of unemployment exceeding 5%, the Contractor agrees to employ Illinois laborers. The Act requires the workforce on all public works projects be

composed of a minimum of 90% Illinois resident laborers. An “Illinois laborer” is defined as any person who has resided in Illinois for at least thirty (30) days and intends to become or remain an Illinois resident.

FEDERAL BUILD AMERICA, BUY AMERICA ACT (“BABA”)

This project is subject to the federal “Build America, Buy America Act” requirements contained in the Infrastructure Investment and Jobs Act, Pub. L. No. 117-58. The purpose of BABA is to ensure that federally funded infrastructure projects only utilize iron, steel, manufactured products, and construction materials produced in the United States.

Guidance is available on USEPA’s website:

<https://www.epa.gov/cwsrf/build-america-buy-america-baba>.

OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION RULES & REGULATIONS

All work described herein and as shown on the accompanying plan sheets shall comply in all respects to pertinent articles of the current edition of the State and Federal Governments’ rules and regulations concerning occupational safety and health standards.

Within Section 1926.652(a), OSHA requires that every jobsite with excavations must have a “Competent Person” present to evaluate the potential for hazards to employees. It shall be the responsibility of the Contractor to provide the required “Competent Person” as defined below.

He must ensure that every trench 5’ or more in depth has a protective system. He must ensure that every trench less than 5’ undergoes an inspection to determine whether a collapse hazard to employees exists. If a collapse hazard is detected, an appropriate protective system must be used.

A “Competent Person” is defined as one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous or dangerous to employees and who has the authorization to take prompt corrective measures to eliminate them.

“Competent Person” responsibilities:

- Understand the standards and any and all data provided
- Select proper protective system based on soil type
- Recognize and reclassify soil after changing conditions
- Conduct air test for hazard atmospheres
- Design structural ramps
- Locate underground installations/utilities
- Monitor water removal equipment
- Perform inspections prior to work daily

- Inspect after each hazard-increasing event
- Responsible for ensuring OSHA compliance

RESPONSIBLE BIDDER

Subject to the terms of the Prevailing Wage Act, 820 ILCS 130/1 seq., the City of Morris must comply with 65 ILCS 5/8-9-1, which provides that contracts advertised for bids shall be awarded to the lowest responsible bidder.

“Responsible bidder” has been defined by the City of Morris per Resolution No. R-08-01 dated February 19, 2008 (copy enclosed).

END OF SPECIAL CONDITIONS

RESOLUTION NO. R-08-01

A RESOLUTION DEFINING RESPONSIBLE BIDDER

WHEREAS, in many instances and circumstances the City is required to let contracts to the lowest, responsive, responsible bidder; and

WHEREAS, the City has not heretofore defined the term "responsible bidder";

BE IT RESOLVED, by the Mayor and City Council of the City of Morris for all projects over \$25,000.00 as follows:

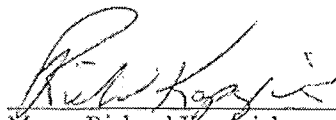
Section 1: That the term "responsible bidder" for construction contracts means a bidder who meets all of the following applicable criteria, and submits evidence of such compliance:

- (1) All applicable laws pre-requisite to doing business in Illinois,
- (2) Evidence of compliance with
 - (a) federal employer tax identification number or social security number (for individuals)
 - (b) provision of Section 2000(e) of Chapter 21, Title 42 of the United States Code and Federal Executive Order No. 11246 as amended by Executive Order No. 11375 (known as the Equal Opportunity Employer provisions)
- (3) Certificates of insurance indicating the following coverage: general liability, worker's compensation, completed operations, automobile, hazardous occupation, product liability and professional liability
- (4) Compliance with all provisions of the Illinois Prevailing Wage Act, including wages, medical and hospitalization insurance and retirement for those trades as covered in the "Act"
- (5) Participation in apprenticeship and training programs approved and registered with the United States Department of Labor's Bureau of Apprenticeship and Training for each of the trades of work contemplated under the awarded contract

BE IT FURTHER RESOLVED, that nothing herein shall be construed to affect any suit or proceeding now pending in any court or any rights accrued or liability incurred or cause or causes of action accrued or existing under any prior Resolution or Ordinance. Nor shall any right or remedy of any character be lost, impaired, or affected by this Resolution.

BE IT FURTHER ORDAINED, that this Resolution shall be in full force and effect immediately upon its adoption.

Dated this 19th day of February, 2008 at Morris, Illinois.



Mayor Richard Kopczick



City Clerk John D. Enger

Ayes: 7
Nays: 0
Abstain: 0
Absent: 0

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DAVIS-BACON WAGE RATES

"General Decision Number: IL20260008 01/09/2026

Superseded General Decision Number: IL20250008

State: Illinois

Construction Types: Building and Residential

Counties: Du Page, Grundy, Kane, Kendall, Lake, McHenry and Will Counties in Illinois.

BUILDING AND RESIDENTIAL PROJECTS (does not include landscape projects).

Modification Number	Publication Date
0	01/02/2026
1	01/09/2026

ASBE0017-005 06/01/2024

	Rates	Fringes
ASBESTOS WORKER/INSULATOR includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems.....	\$ 55.02	35.75
Fire Stop Technician.....	\$ 44.02	32.76
HAZARDOUS MATERIAL HANDLER includes preparation, wetting, stripping, removal, scrapping vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not.....	\$ 41.27	32.76

BOIL0001-003 05/01/2024

DU PAGE, GRUNDY, KANE, KENDALL, LAKE, MCHENRY, AND WILL COUNTIES

	Rates	Fringes
BOILERMAKER.....	\$ 53.10	9.5%+33.50

BRIL0014-001 06/01/2021

DU PAGE, GRUNDY, LAKE, and WILL COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 48.56	34.05

BRIL0021-002 06/01/2021

	Rates	Fringes
MARBLE SETTER.....	\$ 47.71	33.20

BRIL0021-008 06/01/2021

	Rates	Fringes
TERRAZZO WORKER/SETTER.....	\$ 48.38	30.79
TILE FINISHER.....	\$ 42.80	26.97
TILE SETTER.....	\$ 49.75	30.79

BRIL0021-010 06/01/2017

	Rates	Fringes
MARBLE FINISHER.....	\$ 33.95	26.03

BRIL0027-002 06/01/2016

KANE, KENDALL, and MCHENRY COUNTIES

	Rates	Fringes
BRICKLAYER.....	\$ 44.88	26.62

CARP0555-003 06/01/2022

DUPAGE ANE LAKE COUNTIES

	Rates	Fringes
CARPENTER		
Building.....	\$ 52.01	38.85
Heavy & Highway.....	\$ 52.01	38.85

CARP0555-004 10/01/2023

Residential

DU PAGE and LAKE COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 45.61	35.31

CARP0555-006 06/01/2022

WILL COUNTY

BUILDING

	Rates	Fringes
Carpenter; Millwright; Piledrivermen.....	\$ 52.01	41.41

CARP0555-007 10/01/2023

WILL COUNTY

RESIDENTIAL

	Rates	Fringes
CARPENTER.....	\$ 45.61	35.31

CARP0555-009 06/01/2022

KANE, KENDALL, AND McHENRY COUNTIES

BUILDING

	Rates	Fringes
CARPENTER		
Carpenter, Floor Layer, Lather, Millwright, and Piledriver.....	\$ 52.01	38.86

 CARP0555-010 10/01/2023

KANE, KENDALL, and McHENRY COUNTIES

RESIDENTIAL

	Rates	Fringes
CARPENTER.....	\$ 45.61	35.31

 CARP0555-012 10/01/2023

GRUNDY COUNTY

	Rates	Fringes
CARPENTER		
Carpenter, Millwright, Piledriver, and Soft Floor Layer		
Building.....	\$ 52.01	38.86
Residential.....	\$ 45.61	35.31

 ELEC0009-002 05/26/2024

WILL COUNTY

	Rates	Fringes
Line Construction		
Groundman.....	\$ 48.44	60.05%
Lineman and Equipment Operator.....	\$ 62.10	60.05%

 ELEC0117-002 06/02/2025

KANE (Northern Half) and McHENRY COUNTIES

	Rates	Fringes
ELECTRICIAN		
Building.....	\$ 59.11	42.23

 ELEC0117-003 11/03/2025

KANE (Northern Half), and McHENRY COUNTIES

	Rates	Fringes
ELECTRICIAN		
ELECTRICAL TECHNICIAN.....	\$ 48.71	35.87

Work includes the installation, maintenance and removal of

telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

ELEC0117-004 11/04/2024

KANE (Northern Half) and McHENRY COUNTIES

	Rates	Fringes
ELECTRICIAN		
Residential.....	\$ 44.40	34.59

ELEC0150-002 06/02/2025

LAKE COUNTY

	Rates	Fringes
ELECTRICIAN		
Building.....	\$ 51.87	69.79%+15.57
Residential.....	\$ 44.79	82.84%

ELEC0150-003 12/01/2025

LAKE COUNTY

	Rates	Fringes
ELECTRICIAN		
ELECTRICAL TECHNICIAN.....	\$ 48.00	39.85

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

ELEC0176-003 06/01/2023

Grundy and Will Counties

	Rates	Fringes
ELECTRICIAN		
Residential.....	\$ 46.87	33.38

ELEC0176-008 06/01/2023

GRUNDY and WILL COUNTIES

	Rates	Fringes

ELECTRICIAN
 Building.....\$ 52.00 45.01

 ELEC0176-015 06/01/2024

GRUNDY and WILL COUNTIES

Rates Fringes

ELECTRICIAN
 ELECTRICAL TECHNICIAN.....\$ 44.00 37.91

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

 ELEC0461-002 06/02/2025

KANE (Southern Half) AND KENDALL COUNTIES

Rates Fringes

ELECTRICIAN
 Building.....\$ 60.17 43.50
 Residential.....\$ 48.98 32.73

 ELEC0461-005 11/03/2025

KANE (Southern Half), AND KENDALL COUNTIES

Rates Fringes

ELECTRICIAN
 ELECTRICAL TECHNICIAN.....\$ 49.70 38.45

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

 ELEC0701-002 11/04/2019

DUPAGE COUNTY

Rates Fringes

ELECTRICIAN
 Building.....\$ 41.00 105.86%
 Residential.....\$ 39.60 81.43%

 ELEC0701-003 09/01/2025

DU PAGE COUNTY

	Rates	Fringes
ELECTRICIAN		
ELECTRICAL TECHNICIAN.....	\$ 40.90	108.35%

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network). The work shall cover the pulling of wire in raceways, but not the installation of raceways.

 ELEV0002-002 01/01/2025

DU PAGE, KANE, KENDALL, LAKE, & WILL COUNTIES

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 70.68	38.435+a+b

FOOTNOTES:

a) PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Day after Thanksgiving Day; Veterans' Day and Christmas Day.

b) Employer contributes 8% of regular hourly rate as vacation pay credit for employee with more than 5 years of service, and 6% for employee with less than 5 years service

 ELEV0015-002 01/01/2025

McHENRY COUNTY

	Rates	Fringes
ELEVATOR MECHANIC.....	\$ 61.96	38.435+a+b

FOOTNOTES:

a. Employer contributes 8% of regular basic hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for under 5 years of service.

b. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Veterans' Day and Christmas Day.

 ELEV0055-001 01/01/2025

GRUNDY COUNTY

	Rates	Fringes

ELEVATOR MECHANIC.....\$ 57.99 38.435+a+b

FOOTNOTES:

A. Employer contributes 8% of regular basic hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for under 5 years of service.

B. Paid Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Day after Thanksgiving; Veterans' Day & Christmas Day

* ENGI0150-026 06/01/2025

BUILDING and RESIDENTIAL

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1.....	\$ 64.80	51.00
GROUP 2.....	\$ 63.50	51.00
GROUP 3.....	\$ 60.95	51.00
GROUP 4.....	\$ 59.20	51.00

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Mechanic; Asphalt Plant*; Asphalt Spreader; Autograde*; Backhoes with Caisson attachment*;Batch Plant*; Benoto(Requires two Engineers); Boiler and Throttle Valve; Caisson Rigs*; Central Redi-Mix Plant*; Combination Backhoe Front Endloader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted)*; Concrete Conveyor; Concrete Conveyor, Truck Mounted; Concrete Paver over 27E cu. ft.*; Concrete Paver 27E cu ft and Under*; Concrete Placer*; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes*; Cranes, Hammerhead*; Cranes, (GCI and similar type Requires two operators only); Creter Crane; Crusher, Stone, etc; Derricks; Derricks, Traveling*; Formless Curb and Gutter Machine*; Grader, Elevating; Grouting Machines; Highlift Shovels or Front Endloader 2 1/4 yd. and over; Hoists, Elevators, Outside Type Rack and pinion and similar Machines; Hoists, One, Two, and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes*; Hydraulic Boom Trucks; Hydraulic Vac (and similar equipment);Locomotives; Motor Patrol*; Pile Drivers amd Skid Rig*; Post Hole Digger; Pre- Stress Machine; Pump Cretes Dual Ram(Requiring frequent Lubrication and Water); Pump Cretes; Squeeze Cretes-Screw Type Pumps Gypsum Bulker and Pump; Raised and Blind Hole Drill*; Roto Mill Grinder (36" and Over)*; Roto Mill Grinder (Less Than 36")*; Scoops-Tractor Drawn; Slip-Form Paver*; Straddle Buggies; Tournapull; Tractor with Boom, and Side Boom; and Trenching Machines*.

GROUP 2: Bobcat (over 3/4 cu yd); Boilers; Brick Forklift; Broom, Power Propelled; Bulldozers; Concrete Mixer (Two Bag and over); Conveyor, Portable; Forklift Trucks; Greaser Engineer; Highlift Shovels or Front End loaders under 2 1/4 cu yd; Aotomatic Hoists, Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted)*; Rollers; Steam Generators; Tractors; Tractor Drawn Vibratory Roller (Receives an additional \$.50 per

hour); Winch Trucks with ""A"" Frame.

GROUP 3: Air Compressor-Small 250 and Under (1 to 5 not to exceed a total of 300 ft); Air Compressor-Large over 250; Combination-Small Equipment Operator; Generator- Small 50 kw and under; Generator-Large over 50 kw; Heaters, Mechanical; Hoists, Inside Elevators (Remodeling or Renovatin work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Low Boys; Pumps Over 3"" (1 To 3 not to exceed a total of 300 ft); Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches; Bobcat (up to and including 3/4 cu yd)

GROUP 4 - Bobcats and/or other Skid Steer Loaders; Brick Forklifts; Oilers *-Requires Oiler

IRON0001-014 06/01/2025

DU PAGE (Eastern 1/4), LAKE, AND MCHENRY (Hebron, Woodstock, and East thereof) COUNTIES

	Rates	Fringes
IRONWORKER		
Sheeter.....	\$ 62.71	46.58
Structural and Reinforcing..	\$ 62.46	46.58

IRON0063-003 06/01/2025

LAKE, DUPAGE (Eastern 1/4) and MCHENRY (HEBRON, WOODSTOCK & EAST THEREOF) COUNTIES

	Rates	Fringes
IRONWORKER, ORNAMENTAL.....	\$ 59.26	44.81

IRON0063-004 06/01/2025

LAKE, DUPAGE (Eastern 1/4), and MCHENRY (HEBRON, WOODSTOCK & EAST THEREOF) COUNTIES

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 52.25	34.31

IRON0136-002 07/01/2025

LAKE, DUPAGE (Eastern 1/4) and MCHENRY (HEBRON, WOODSTOCK & East thereof) COUNTIES

	Rates	Fringes
IRONWORKER		
Machinery Movers; Riggers;		
Machinery Erectors.....	\$ 54.25	47.38
Master Riggers.....	\$ 56.75	47.38

IRON0393-002 06/01/2021

DUPAGE (REMAINDER), KANE, KENDALL (NORTHERN PART), and MCHENRY
(SOUTHEAST 1/4) COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 48.83	39.84

IRON0444-002 06/01/2022

DUPAGE (ARGONNE & VIC), GRUNDY, KENDALL (Southern Part), and
WILL COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 47.80	42.50

IRON0498-006 06/01/2021

McHENRY COUNTY (Northwest Part)

	Rates	Fringes
IRONWORKER.....	\$ 41.37	44.41

LAB00002-003 06/01/2025

DU PAGE COUNTY

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 51.40	36.94
GROUP 2.....	\$ 51.40	36.94
GROUP 3.....	\$ 51.48	36.94
GROUP 4.....	\$ 51.50	36.94
GROUP 5.....	\$ 51.55	36.94
GROUP 6.....	\$ 51.60	36.94
GROUP 7.....	\$ 51.63	36.94
GROUP 8.....	\$ 51.73	36.94
GROUP 9.....	\$ 51.75	36.94
GROUP 10.....	\$ 51.85	36.94
GROUP 11.....	\$ 51.68	36.94
GROUP 12.....	\$ 52.40	36.94

LABORER CLASSIFICATIONS

GROUP 1: Building laborers, Plasterer tenders, Pumps for
Dewatering & other Unclassified Laborers

GROUP 2: Fireproofing and fire shop laborers

GROUP 3: Cement gun laborers and hose

GROUP 4: Chimney over 40 feet; Scaffold laborers;
Weldman-wreckers Burners

GROUP 5: Cement gun nozzle (gunite) laborers; Windlass and
capstan person

GROUP 6: Stone derrickmen and handlers

GROUP 7: Jackhammermen, Power driven concrete saws and other
power equipment

GROUP 8: Firebrick & boiler laborers

GROUP 9: Chimney on fire brick; Caisson Diggers; Well Point system men

GROUP 10: Boiler setter plastic laborers

GROUP 11: Jackhammermen on fire brick work only

GROUP 12: Dosimeter (any device) monitoring nuclear exposure); Asbestos abatement laborers; Toxic and Hazardous waste removal laborers

LABO0075-001 06/01/2022

GRUNDY AND WILL COUNTIES

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 47.40	33.16
GROUP 2.....	\$ 47.40	33.16
GROUP 3.....	\$ 47.48	33.16
GROUP 4.....	\$ 47.60	33.16
GROUP 5.....	\$ 47.60	33.16
GROUP 6.....	\$ 47.75	33.16
GROUP 7.....	\$ 47.60	33.16

LABORER CLASSIFICATIONS

GROUP 1 - Mortar mixers, handling asphalt shingles; Scaffolds; Sewer and trench work (ground level down to 8 feet); Catch basin and manhole diggers, mesh handling on road work; Cement and mineral filler handler; Concrete puddlers; Batch dumpers (cement & asphalt); Vibrator operators; Sand and stone wheelers to mixer Handlers); Concrete wheelers; Airtamping hammermen; Concrete & paving breakers; Rock drillers/Jackhammermen; Chipping hammermen 1-Bag mixer; Asphalt laborer; Chain and power saws; Pit men; Fencing laborers; Mason tenders (mortar and brick wheeler); Kettlemen & tarmen, tank cleaners; Scaffold and staging laborers; Pot Firemen (tarmen); Heaters tender for any purpose; Water pumps (portable water pumps shall be tended by laborers if the employer determines tending is required); Rip rap; Handling of slab steel road forms in any manner, except road form setting, setting center strips, Contraction and expansion joints (road work); Unloading and handling of lumber, brick, transite materials, cast iron water pipe, reinforced concrete rods, sewer and drain tile, railroad tiles and all other creosoted materials; paving blocks and concrete forms; Handling of insulation of any type; all work involving the unloading of materials, fixtures, or furnishing, whether crated or uncrated; all mortar and composition mixers of sewer work; track laborers; Chimney and silo laborers working at a height of 1 to 48 feet; All laborers working on swinging suspended, or any type or make of scaffolding 1 to 48 feet; All laborers working inside a sphere or any type or make of tank; Working inside a sphere or any type or make of tank from bottom to a height of 48 feet; Form strippers (any type); Mechanical or motorized buggies, for concrete or masons employers; Use of skid steer loads or any other machinery which replaces the wheelbarrow or

buggy; Handling multiple concrete duct or any other type of pipe used in public utility work unless otherwise specified herein; Snapping of wall ties and removal of rods; drilling of anchor bolt holes; Concrete or asphalt clipper type saws and self-propelled saws; Shoulder and grade laborers; All hydraulic electric and air or any other type of tools; Grouting and caulking; Cleaning lumber, Nail pulling, Deck hand; Dredgehand; Shore laborer; Bankmen on Floating Plant; Tool and material checkers; Signalmen and Flagmen on all construction work; Cleaning of debris; Removal of trees; Concrete curing, temporary concrete protection regardless of manner or materials used; Laborers on Apsco; Janitorial; Wrecking and demolition laborers

GROUP 2 - Sewer and drain pipe layers and multiple concrete duct or any other type of pipe used, on public utility work (ground level to 8 feet); Pumpcrete pipe handlers

GROUP 3 - Asphalt rakers; Hod carriers; Plasterer laborers; Gunnite laborers, Slab for setters on roads, highways, streets, airport runaways, and radii (any type of form) stringline men for all aforementioned work; Wagon and tower drillers on land and floating plant used on dredging; Asphalt gunners and plug men (undercoating on road work); Mortar pump laborers; Plaster pump laborers

GROUP 4 - Tunnel miners, and all laborers inside tunnel; Air blow pipemen; Torchmen (burners); Mortaring men on sewer and drain pipe (the applying of mortar and composition mixes); All bottom men on sewer work-all sewer and drain pipelayers-multiple concrete duct or any other type of pipe used on public utility work-8 feet or more below ground level, and all other sewer and trench laborers 8 feet or more below ground level regardless of excavation area; All labor work inside cofferdam; Use of a 10 foot or more drill steel for hand held drills; Caisson laborers ground level down 15 feet; All air tools 8 feet or more below ground level; All laborers working on swinging-suspended or any type or make of scaffolds, 48 feet to 100 feet; All chimney and silo laborers working at a height of 48 to 100 feet; All tamping hammers over 150 lbs.; All laborers working inside of a sphere or any type or make of tank at a height of 48 feet to 100 feet; all hydraulic, electric and air tools or any other type 8 feet or more below ground level; Vibrators-any type-8 feet or more below ground level

GROUP 5 - Gunnite nozzle men; Caisson laborers and all tamping hammers from 150 lbs and over; from 15 feet below ground level down to 50 feet; and all laborers working inside of a sphere or any type of tank for every additional 50 feet or part thereof above 100 feet in height

GROUP 6 - All underground cavern laborers; Caisson laborers 50 feet or more below ground level; Laborers working under radio active conditions (suiting up); Blasting men (Powdermen)

GROUP 7 - Dosimeter (any device) used for monitoring nuclear exposure; Asbestos abatement worker; Toxic and hazardous waste removal laborer; and chimney and silo laborers for every additional 50 feet or any part thereof above 100 feet high

KANE, KENDALL, AND McHENRY COUNTIES

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 51.40	36.94
GROUP 2.....	\$ 51.65	36.94
GROUP 3.....	\$ 51.40	36.94
GROUP 4.....	\$ 51.65	36.94
GROUP 5.....	\$ 51.65	36.94
GROUP 6.....	\$ 52.10	36.94
GROUP 7.....	\$ 52.10	36.94
GROUP 8.....	\$ 51.80	36.94

LABORER CLASSIFICATIONS

GROUP 1 Common Laborer

GROUP 2 Power Vibrator

GROUP 3 Torchman (demolition only), Mortarmen

GROUP 4 Power Tamper

GROUP 5 Jackhammer & Airspade; Chainsaw, Swinging Stage and
Boatswain Chair; Cement Gun Nozzleman; Hod Carrier;
Plasterer Tender, and Tunnel Man

GROUP 6 Tile Layers; Bottom Men

GROUP 7 Caisson Laborers; Dynamiters

GROUP 8 Asbestos abatement laborers, Toxic and hazardous
waste removal laborers, Dosimeter (any device) monitoring
nuclear exposure

 LAB00152-001 06/01/2025

LAKE COUNTY

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 51.40	36.94
GROUP 2.....	\$ 51.48	36.94
GROUP 3.....	\$ 51.50	36.94
GROUP 4.....	\$ 51.60	36.94
GROUP 5.....	\$ 51.60	36.94
GROUP 6.....	\$ 51.63	36.94
GROUP 7.....	\$ 51.73	36.94
GROUP 8.....	\$ 51.75	36.94
GROUP 9.....	\$ 51.60	36.94
GROUP 10.....	\$ 51.95	36.94
GROUP 11.....	\$ 51.60	36.94

LABORER CLASSIFICATIONS

GROUP 1: Building laborers; Plasterer tenders, General
laborers (wrecking and demolition); Fireproofing and fire
shop laborers

GROUP 2: Cement gun laborers and hose

GROUP 3: Chimney over 40 feet; Scaffold laborers; Wall men

or wreckers

GROUP 4: Cement Gun nozzle (gunite) laborers

GROUP 5: Stone derrickmen and handlers

GROUP 6: Jackhammermen (tamperers & vibrators); Power driven concrete saws

GROUP 7: Firebrick & boiler laborer setters

GROUP 8: Chimney laborers (on fire brick); Caisson Diggers; Well Point system men

GROUP 9: Windlass and capstan persons

GROUP 10: Boiler setter plastic laborers

GROUP 11: Dosimeter (any device) monitoring nuclear exposure; Asbestos abatement laborers; Toxic and hazardous waste removal laborers

PAIN0014-002 06/01/2024

GRUNDY, LAKE, and WILL COUNTIES

	Rates	Fringes
PAINTER		
Brush, Decorator, and Paperhanger.....	\$ 53.05	33.91

PAIN0027-003 06/01/2024

	Rates	Fringes
GLAZIER.....	\$ 51.55	44.09

PAIN0030-001 06/01/2024

DE KALB, DU PAGE, KANE, KENDALL AND MCHENRY COUNTIES

	Rates	Fringes
PAINTER		
Brush, Drywall Taper/Finisher, Sandblaster, and Spray.....	\$ 53.05	27.63

PLAS0005-003 07/01/2015

GRUNDY and WILL COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 42.25	26.65

PLAS0005-006 07/01/2015

DU PAGE COUNTY

	Rates	Fringes
PLASTERER.....	\$ 42.25	26.65

 PLAS0011-008 06/01/2023

DE KALB, KANE, KENDALL, AND McHENRY COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 50.70	40.60

PLAS0011-012 06/01/2023

GRUNDY AND WILL COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 46.25	45.10

PLAS0011-014 06/01/2023

LAKE COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 48.50	42.82
PLASTERER.....	\$ 49.65	42.17

PLAS0803-002 08/01/2010

DUPAGE COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 38.00	24.03

PLUM0093-001 06/01/2015

LAKE and McHENRY COUNTIES

	Rates	Fringes
PLUMBER.....	\$ 45.76	26.92

PLUM0130-002 06/01/2025

DUPAGE (Argonne National Laboratories and Fermi National Laboratory), GRUNDY & WILL COUNTIES

	Rates	Fringes
PLUMBER.....	\$ 60.50	39.02

PLUM0501-001 12/01/2013

DUPAGE (excluding Argonne National Laboratory and Fermi National Laboratory), KANE, and KENDALL (except the Mich-Wis Pumping Station in Milbrook, Silicas and Plant and Village of Newark, excludes Yorkville) COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 41.20	29.15

PLUM0597-001 06/01/2023

DUPAGE (Argonne National Laboratories, and Fermi National Laboratory), GRUNDY, LAKE, MCHENRY & WILL COUNTIES

	Rates	Fringes
PIPEFITTER.....	\$ 55.00	38.62

ROOF0011-004 12/01/2024

DUPAGE, KANE, KENDALL, LAKE, MCHENRY, and WILL COUNTIES

	Rates	Fringes
ROOFER.....	\$ 50.25	30.43

ROOF0011-009 12/01/2024

	Rates	Fringes
ROOFER.....	\$ 38.50	27.23

* SFIL0281-002 01/01/2026

DuPAGE, KANE, KENDALL, LAKE, McHENRY, and WILL COUNTIES

	Rates	Fringes
SPRINKLER FITTER.....	\$ 63.20	36.55

SHEE0073-003 06/01/2022

LAKE COUNTY

	Rates	Fringes
Sheet metal worker.....	\$ 49.10	42.91

SHEE0073-004 06/08/2018

LAKE COUNTY

	Rates	Fringes
Sheet Metal Worker ALUMINUM GUTTER WORK.....	\$ 31.32	37.02

SHEE0265-001 06/01/2024

DU PAGE, GRUNDY, KANE, KENDALL, McHENRY, and WILL COUNTIES

	Rates	Fringes
SHEET METAL WORKER.....	\$ 56.35	38.65

* TEAM0179-001 06/01/2025

GRUNDY, KENDALL, and WILL COUNTIES

	Rates	Fringes
TRUCK DRIVER 2 or 3 Axle Trucks.....	\$ 46.12	0.30+a
4 Axle Trucks.....	\$ 46.27	0.30+a

5 Axle Trucks.....	\$ 46.47	0.30+a
6 Axle Trucks.....	\$ 46.67	0.30+a

FOOTNOTES:

- a. \$448.80 Health & Welfare per week, \$562.80 Pension per week.
- b. Lowboy is an additional \$1.50 per hour

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

* TEAM0301-001 06/01/2024

LAKE AND MCHENRY COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2-3 AXLES.....	\$ 44.54	13.40+a
4 AXLES.....	\$ 44.69	13.40+a

5 AXLES.....	\$ 44.89	13.40+a
6 AXLES.....	\$ 45.09	13.40+a

FOOTNOTES:

- a. \$500.00 per week pension.
 b. Lowboy is an additional \$1.50 per hour

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

* TEAM0673-003 06/01/2025

DU PAGE and KANE COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2-3 AXLES.....	\$ 45.31	0.30+a
4 AXLES.....	\$ 45.46	0.30+a
5 AXLES.....	\$ 45.66	0.30+a
6 AXLES.....	\$ 45.86	0.30+a

FOOTNOTE: a.

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Low-Boy is an additional \$1.50 per hour

Health and Welfare: \$453.20 per week

Penson: \$589.90 per week

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the

state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"

"General Decision Number: IL20260013 01/02/2026

Superseded General Decision Number: IL20250013

State: Illinois

Construction Types: Heavy and Highway

Counties: Ford, Grundy, Iroquois, Kankakee, La Salle, Livingston, Marshall, McLean, Putnam and Woodford Counties in Illinois.

HEAVY AND HIGHWAY CONSTRUCTION PROJECTS (does not include landscape projects for GRUNDY COUNTY).

Modification Number	Publication Date
0	01/02/2026

CARP0174-001 05/01/2025

LASALLE, MARSHALL, and PUTNAM COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 40.28	38.95

CARP0237-010 05/01/2021		

WOODFORD COUNTY

	Rates	Fringes
CARPENTER.....	\$ 37.06	31.16
PILEDRIVERMAN.....	\$ 37.06	31.16

CARP0237-016 05/01/2021		

LIVINGSTON, McLEAN, AND FORD COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 37.06	31.16
PILEDRIVERMAN.....	\$ 37.06	31.16

CARP0555-013 06/01/2020		

GRUNDY COUNTY

	Rates	Fringes
CARPENTER.....	\$ 49.76	35.87

CARP0555-015 05/01/2022		

IROQUOIS AND KANKAKEE COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 42.65	38.96

ELEC0009-001 05/26/2024		

GRUNDY and KANKAKEE COUNTIES

	Rates	Fringes
Line Construction		
Groundman.....	\$ 48.44	60.05%
Lineman and Equipment		
Operator.....	\$ 62.10	60.05%

ELEC0034-001 09/01/2025

PEORIA DIVISION - MARSHALL (Area West of Bell Plain & Roberts
TWPS) AND WOODFORD (Area West of Kansas, Linn, Palestine &
Roanoke TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 45.65	26.77

ELEC0051-001 03/04/2024

FORD, IROQUOIS, LASALLE, LIVINGSTON, MCLEAN, MARSHALL, PUTNAM,
and WOODFORD COUNTIES

	Rates	Fringes
Line Construction		
Groundman/Equipment		
Operator (All crawler type equipment larger than D-4, 15 ton crane or larger).....	\$ 55.13	32.5%+7.25
Groundman/Truck Driver.....	\$ 41.82	32.5%+7.25
Lineman and Substation		
Technician.....	\$ 61.36	32.5%+7.25

ELEC0176-001 06/01/2023

	Rates	Fringes
ELECTRICIAN		
Grundy County.....	\$ 52.00	45.01
LaSalle County.....	\$ 51.60	45.00
Putnam County.....	\$ 50.45	44.96

ELEC0176-004 06/01/2023

FORD (Remainder), IROQUOIS (Excluding Artesia, Pegeon Grove,
Loda, Fountain Creek, Lovejoy & Prairie Green TWPS), LA SALLE
(Deer Park, Eden, La Salle, Peru, Utica, & Vermilion) KANKAKEE,
& PUTNAM (Granville, Hennipin & Senachwine TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN		
Ford, Iroquois, and Putnam Counties.....	\$ 50.45	44.96
Kankakee and LaSalle Counties.....	\$ 51.60	45.00

ELEC0197-002 06/01/2024

MCLEAN (Remainder) and WOODFORD (Palestine, El Paso, & Kansas

TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 43.86	23.72

 ELEC0538-001 06/01/2025

 IROQUOIS COUNTY (Fountain Creek, Lovejoy, and Prairie Green
 TWPS)

	Rates	Fringes
ELECTRICIAN.....	\$ 41.00	27.36

 ELEC0601-002 09/01/2025

 FORD (South of Benton TWP), IROQUOIS (Artesia, Pegeon Grove, &
 Loda TWPS), LA SALLE (Southeastern part), LIVINGSTON, McLEAN
 (Cropsey, Anchor, Cheney Grove, & Belleflower TWPS), MARSHALL
 (Roberts, Evans, Bell, Plain, & Bennington TWPS), PUTNAM
 (Magnolia TWP), and WOODFORD (Linn, Clayton, Minonk, Roanoke,
 Green, & Panola TWPS) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 49.63	22.51

 * ENGI0150-007 06/01/2025

 GRUNDY, KANKAKEE, LA SALLE, LIVINGSTON, AND PUTNAM (East and
 south of the Illinois River) COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
Group 1.....	\$ 63.00	51.00
Group 2.....	\$ 62.45	51.00
Group 3.....	\$ 60.40	51.00
Group 4.....	\$ 59.00	51.00
Group 5.....	\$ 57.80	51.00

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Asphalt Plant*; Asphalt Heater and Planer
 combination; Asphalt Heater Scarfire*; Asphalt Spreader;
 Autograder; ABG Paver*; Backhoes with Caisson Attachment*;
 Belt Loader*; Caisson Rigs*; Car Dumper, Central Redi-Mix
 Plant*; Combination Backhoe Front End Loader Machine (1 cu
 yd or over Backhoe bucket with attachments); Concrete
 Breaker (truck mounted)*; Concrete Conveyor; Concrete Paver
 over 27E cu ft*; Concrete Placer*; Concrete Tube Float;
 Cranes, all attachments*; Cranes, Hammerhead, Linden, Peco
 and machines of a like nature*; Creter Crane; Crusher,
 stone etc.; All Derricks; Derrick Boats; Derricks,
 traveling*; Dredges*; Field Mechanic Welder; Formless Curb
 and Gutter Machine; Gradall and machines of a like nature;
 Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto
 Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail
 Post Driver mounted*; Hoists, one, two, and three Drum;
 Hydraulic Backhoes; Locomotive, all Mucking Machine; Pile

Drivers and Skid Rig*; Pre-Stress Machine; Pump Cretes Dual Ram (Requires frequent lubrication and water)*; Rock/Track Tamper; Rock Drill truck mounted; Roto Mill Grinder, 36" and over*; Roto Mill Grinder, less than 36"; Slip- Form Paver*; Soil Test Drill Rig, truck mounted*; Straddle Buggies; Hydraulic Telescoping Form (tunnel); Tractor Drawn Belt Loader*; Tractor Drawn Belt Loader with attached Pusher (two engineers); Tractor with boom; Tractaire with attachments; Raised or Blind Hoe Drill (Tunnel & Shaft)*; Trenching Machine; Truck Mounted Concrete Pump with boom; Underground Boring and/or Mining Machines 5 ft in diameter and over tunnel, etc.*; Underground Boring and/or Mining Machines under 5 ft; Wheel Excavator* & Widener (Apsco)

GROUP 2: Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozer; Car Loader Trailing Conveyors; Combination Backhoe Front End Loader Machine, less than 1 cu yd Backhoe Bucket with attachments; Compressor and Throttle Valve; Compressor, common receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S series to and including 27 cu ft; Concrete Spreader; Concrete Curing Machine, Burlap Machine; Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or similar type); all Drills; Finishing Machine-Concrete; Greaser Engineer; Highlift Shovels or Front End Loader; Hoist-Sewer Dragging Machine; Hydraulic Boom Trucks, all attachments; Hydro-Blaster requires two operators (one Group 4); Hydraulic Boom Trucks (All attachments); Locomotives, Dinky; Off-Road Hauling Units (including articulating); Laser Screed; Pump Cretes, Squeeze Cretes-Screw Type pumps, Gypsum Bulker and Pump; Rock Drill-Crawler or Skid*; Rock Drill-Truck Mounted*; Roller Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc. self-Propelled; Scoops-Tractor Drawn; Self-propelled Compactor; Spreader-Chip-Stone etc; Scraper; Scraper-Prime Mover in Tandem regardless of size (add \$1.00 to to Group 2 hourly rate for each hour and for each machine attached thereto); Tank Car Heater; Tractors, Push, pulling Sheeps Foot, Disc, Compactor, etc; Tug Boats

GROUP 3: Boilers; Brooms, all power propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer, two bag and over; Conveyor, Portable; Farm type Tractors used for mowing, seeding, etc; Fireman on Boilers; Forklift Trucks; Grouting Machines; Hoists, Automatic; Hoists, all Elevators; Hoists, Tugger single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete, Power Driven; Pug Mills; Rollers, other than asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with A-Frame; Work Boats; Tamper-Form motor driven

GROUP 4: Air compressor - Small 250 and under (1 to 5 not to exceed a total of 300 ft); Air Compressor - Large over 250; Combination - Small Equipment Operator; Generators - Small 50 kw and under; Generators - Large, over 50 kw; Heaters, Mechanical; Hydraulic power unit (Pile Driving, Extracting or Drilling); Hydro-Blaster requires two operators (one Group 2); Light Plants All (1 to 5); Pumps, over 3" (1 to 3, not to exceed a total of 300 ft); Tractaire; Welding Machines (2 through 5); Winches, 4 small electric drill winches

GROUP 5: Bobcats (All); Brick Forklifts; Directional Boring Machine Locator; Oilers

*Equipment requires an Oiler

ENGI0649-004 04/01/2025

McLEAN, MARSHALL, PUTNAM (West of the Illinois River), and
WOODFORD COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
Group 1.....	\$ 47.79	43.42+A
Group 2.....	\$ 44.09	43.42+A
Group 3.....	\$ 38.03	43.42+A

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Cranes: Overhead Cranes; Hydro Crane; Shovels; Crane type Backfiller; Tower Cranes-Mobile, Crawler, Stationary; Derricks, Hoist (3 drum); Draglines; Drott Yumbo & similar types considered as Cranes; 360 Degrees Swing Excavator, Backhoe; Derrick Boats; Pile Driver and Skid Rigs; Clam Shell; Locomotive Cranes; Road Pavers (Single Drum, Dual Drum, Tri Batchter); Motor Patrol & Power Blades (Dunmore, Elevating & similar types); Mechanics; Central Concrete Mixing Plant Operator; Asphalt Batch Plant Operator and Plant Engineer; Gradall; Caisson Rigs; Skimmer Scoop, Koehring Scooper; Dredges (all types); Hoptoe; All Cherry Pickers; Work Boat; Ross Carrier; Helicopter; Dozer; Tournadozer; Tournapulls (all & similar types); Concrete and all recycle machines, Multiple Unit Earth Movers; 75 cents per hour for each scoop over one; Scoops (all sizes); Pushcats; Endloaders (all types); Asphalt Surfacing Machine; Slip Form Paver; Rock Crusher; Material Crusher (outside pits and quarries); Screening Plants (outside pits and quarries); Tunnel Boring Machine; Heavy Equipment Greaser (Top Greaser on Spread); CMI, Auto Grade, CMI Belt Placer (3 track & similar types); Side Booms; Starting Engineer on Pipeline or Construction (eleven 11 pieces or more); Asphalt Heater & Planer Combination; Wheel Tractors with Dozer, Hoe or End Loader attachments; CAT Earthwork Compactors and similar types; Blaw Knox Spreader & similar types; Trench Machines; Pump Crete, Belt Crete, Squeeze Crete, Screw Type Pumps & Gypsum; Creter Crane; Concrete Pump Truck; Formless Finishing Machines; Flaherty Spreader or similar types; Screedman on Laydown Machine; Vermeer Concrete Saw; Laser Screed; Span Saw; Dredge Leverman; Dredge Engineer; Lull or similar type; Hydro-Boom Truck; Guard Rail Machine.

GROUP 2: Bulker & Pump; Power Launches; Boring Machine & Pipe Jacking Machine; Dinkeys; Carts, powered haul unit for a boring machine; P-H one Pass Soil Cement Machines and similar types: Wheel Tractor; Back Fillers; Euclid Loader; Fork Lifts; Jeep with Ditching Machines or other attachments; Tuneluger; Automatic Cement & Gravel Batching Plants; Mobile Drills Soil Testing and similar types); Pugmill with Pump; All 1 and 2 Drum Hoists; De-watering Systems; Straw Blower; Hydro Seeder; Bump Grinders, Self Propelled; Assistant Heavy Equipment Greaser; Apsco Spreader Tractors (Track-Type w/o Power Units pulling Rollers); Rollers on Asphalt, Brick, or Macadam; Concrete Breakers; Concrete Spreaders; Cement Strippers; Cement

Finishing Machines & CMI Texture & Reel Curing Machines; Vibro-Tampers & similar types self-propelled; Mechanical Bull-Floats; Self-Propelled Concrete Saw; Truck Mounted Power Saws; Curb Cutters; Mixers over 3 bags to 27E; Winch & Boom Trucks; Tractor pulling Power Blade or Elevating Grader; Porter Rex Rail; Clary Screed; Mule pulling Rollers; Pugmill w/o Pump; Barber Greene or similar Loaders; Track Type Tractor with power unit attached; Fireman; Spray Machine on paving; Curb Machine; Paved Ditch Machine; Power Broom; Self-Propelled Sweepers; Self-Propelled Conveyors; Power Subgrader; Oil Distributor; Straight Tractor; Truck Crane Oiler; Truck Type Oilers; Directional Boring Machine; Horizontal Directional Drill; Articulating End Dump Vehicles; Starting Engineer (6 to 10 pieces).

GROUP 3: Straight Framed Truck and Truck Mounted Vac Unit, Starting Engineer (3 to 5 pieces); Trac Air Machine w/o attachments; Rollers, 5 tons & under on earth & gravel; Form Grader; Bulk Cement Plant; Oilers.

- Escalated Rate on Crane, Derrick Booms, and Tower Cranes: Additional \$1.00 per hour over scale when Crane or Derrick is positioned 50 ft. or more above adjacent ground level or water level. \$.05 per hour, per foot, over 90 feet including jib. \$0.02 per hour, per ton - over 50-ton capacity.

- Operating engineers who operate Lattice Boom Crawler Cranes, Lattice Boom Truck Cranes, Telescopic Boom Cranes less than 17.5 Tons, Tower Cranes, Overhead Cranes and have been Certified by the National Commission for the Certification of Crane Operators on the equipment they operate shall receive \$1.60 per hour over scale.

A. On designated Hazardous Waste jobs, operators shall receive:
Level A add \$4.00 to the appropriate group rate; Levels B and C add \$3.00 to the appropriate group rate; and Level D add \$2.00 to the appropriate group rate.

ENGI0841-002 04/01/2023

FORD and IROQUOIS COUNTIES

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1.....	\$ 45.15	26.00
GROUP 2.....	\$ 30.05	26.00

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Power Cranes, Draglines, Derricks, Shovels, Gradalls, Mechanics, Tractor Highlift, Tournadozer, Concrete Mixers with Skip, Tournamixer, Two-Drum Machine, One-Drum Hoist with Tower or Boom, Cableways, Tower Machines, Motor Patrol, Boom Tractor, Boom or Winch Truck, Winch or Hydraulic Boom Truck, Truck Crane, Tournapull, Tractor Operating Scoops, Bulldozer, Push Tractor, Asphalt Planer, Finishing Machine on Asphalt, Large Rollers on Earth, Rollers on Asphalt Mix, Ross Carrier or Similar Machine, Gravel Processing Machine, Asphalt Plant Engineer, Paver Operator, Farm Tractor with Half Yard Bucket and/or

Backhoe Attachments, Dredge Engineer, or Dredge Operator, Central Mix Plant Engineer, CMI or Similar Type Machine, Truck or Skid Mounted Concrete Pump, Tower Crane, Engine or Rock Crusher Plant, Concrete Plant Engineer, Ditching Machine with Dual Attachment, Tractor Mounted Loaders, Cherry Picker, Hydro Crane, Standard or Dinkey Locomotives, Scoopmobiles, Euclid Loader, Soil Cement Machine, Back Filler, Elevating Machine, Power Blade, Drilling Machines Including Well Testing, Caissons, Shaft or Any Similar Type Drilling Machines, Motor Driven Paint Machine, Pipe Cleaning Machine, Pipe Wrapping Machine, Pipe Bending Machine, Apsco Paver, Boring Machine, (Head Equipment Greaser), Barber- Greene Loaders, Formless Paver, (Well Point System), Concrete Spreader, Hydra Ax, Span Saw and Similar Types, Marine Scoops, Brush Mulcher, Brush Burner, Mesh Placer, Tree Mover, Helicopter Crew (3), Piledriver - Skid or Crawler, Stump Remover, Root Rake, Tug Boat Operator, Refrigerating Machine, Freezing Operator, Chair Cart-Self Propelled, Hydra Seeder, Straw Blower, Power Sub Grader, Bull Float, Finishing Machine, Self-Propelled Pavement Breaker (Backhoe Attached), Lull (or Similar Type Machine), Two Air Compressors, Compressors Hooked in Manifold, Overhead Crane, Chip Spreader, Mud Cat, Sull-Air Fork Lifts (Except When Used For Landscaping Work), Soil Stabilizer (Seaman Tiller, Bo Mag, Rago Gator and Similar Types or Equipment), Tube Float, Spray Machine, Curing Machine, Concrete or Asphalt Milling Machine, Snooper Truck Operator.

GROUP 2: Concrete Mixers Without Skips, Rock Crusher, Ditching Machine Under 6', Curbing Machine, one Drum Machines without Tower or Boom, Air Tugger, Self-Propelled Concrete Saw, Machine- Mounted Post Hole Digger, Two to Four Generators, Water Pumps, or Welding Machines, within 400 ft., Air Compressor 600 cu. ft. and Under, Rollers on Aggregate and Seal Coat Surfaces, Fork Lifts (When Used For Landscaping Work, Concrete and Blacktop Curb Machine, Farm Tractor with less than Half Yard Bucket, One Water Pump, Oilers, Air Valves or Steam Valves, One Welding Machine, Truck Jack, Mud Jack, Gunnite Machine, House Elevators when used for Hoisting Material, Engine Tenders, Wagon Drill, Flex Plane, Conveyor, Siphons and Pulsometer, Switchman, Fireman on Paint Pots, Fireman on Asphalt Plants, Distributor Operators on Trucks, Tampers, Self- Propelled Power Broom, Striping Machine (Motor Driven), Form Tamper, Bulk Cement Plant Equipment Greaser, Deck Hands, Truck Crane Oiler-Driver, Cement Blimps, Form Grader, Temporary Heat, Throttle Valve, Farm Tractor, Super Sucker (and Similar Type of Equipment).

IRON0112-002 05/01/2025

LIVINGSTON, MARSHALL (Southwestern corner), MCLEAN (Western Half), and WOODFORD COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 45.48	34.13

IRON0380-005 05/01/2024

FORD and MCLEAN (Eastern Half) COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 40.40	29.65

IRON0444-001 06/01/2022

GRUNDY COUNTY

	Rates	Fringes
IRONWORKER.....	\$ 47.80	42.50

IRON0444-003 06/01/2022

La Salle, Marshall (Except the Southwestern Part), and Putnman Counties

	Rates	Fringes
IRONWORKER.....	\$ 45.50	38.90

IRON0444-005 06/01/2022

Kankabee County

	Rates	Fringes
IRONWORKER.....	\$ 46.00	39.30

LAB00075-003 06/01/2025

GRUNDY COUNTY

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 51.40	36.94
GROUP 2.....	\$ 51.75	36.94
GROUP 3.....	\$ 51.48	36.94
GROUP 4.....	\$ 51.63	36.94
GROUP 5.....	\$ 51.60	36.94
GROUP 6.....	\$ 51.75	36.94
GROUP 7.....	\$ 51.60	36.94

LABORER CLASSIFICATIONS

GROUP 1 - Mortar mixers; Scaffolds; Sewer and trench work (ground level down to 8 feet); Catch basin and manhole diggers, mesh handling on road to work, Cement and mineral filler handler, concrete puddlers, Batch dumpers (cemt & asphalt); Vibrator operator; Sand and Stone wheelers to mixer (handler); Concrete wheelers; Airtamping hammermen; Concrete & paving breakers; Rock drillers/ Jackhammermen; Chipping hammermen; Asphalt; laborer; Chain and power saws; Pit men; Fencing laborers; Mason tender (mortar and brick wheeler); Kettlemen & tarmen, tank cleaners; Scaffold, staging laborers; Pot Firemen (tarmen); Heaters tender for any purpose; Water pumps (portable water pumps shall be tended by laborers if the employer determines tending is required); Rip rap; Handling of slab steel road forms in any manner (except road form setting); Setting center strips, Contraction and expansion joints (road work); Unloading and handling of lumber, brick, transite materials, cast iron water pipe, reinforced concrete rods,

sewer and drain tile railroad tiles and all other creosoted materials, paving blocks and concrete forms; Handling of insulation of any type, all work involving the unloading of materials, fixtures, or furnishing, whether crated or uncrated; all mortar and composition mixers of sewer work; track laborers; Chimney and silo laborers working at a height of 1 to 48 feet; All laborers working on swing, suspended, or any type or make of scaffolding 1 to 48 feet; All laborers working inside a sphere or any type or make of tank; Working inside a sphere or any type or make of tank from bottom to a height of 48 feet; Form Strippers (any type); Mechanical or motorized buggies, for concrete or masons; Use of skid steer loads or any other machinery which replaces the wheelbarrow or buggy; Handling multiple concrete duct or any other type of pipe used in public utility work unless otherwise specified herein; Snapping of wall ties and removal of rods, drilling of anchor bolt holes; Concrete or asphalt clipper type saws and self-propelled saws; Shoulder and grade laborers; All hydraulic electric and air or any other type of tools; Grouting and caulking; Cleaning lumber, Nail pulling, Deck hand; Dredgehand; shore laborer; Bankmen on Floating Plant; Tool and material checkers; signalmen and Flagmen on all construction work defined herein; Cleaning of debris; Removal of trees; Concrete curing, temporary concrete protection regardless of manner or materials used; Laborers on Apsco; Janitorial; Wrecking and demolition laborers

GROUP 2 - Sewer and drain pipelayers and multiple concrete duct or any other type of pipe used on public utility work (ground level to 8 feet); Pumpcrete pipehandlers;

GROUP 3 - Asphalt rakers; Hod Carriers; Plasterer Laborers; Gunnite laborers, Slab for setters on roads, highways, streets, airports runaways, and radii (any type of form) stringline men for all aforementioned work; Wage and tower drillers on land and floating plant used on dredging; Asphalt gunners and plug men (undercoating on road work); Mortar pump laborers; Plaster pump laborer

GROUP 4 - Tunnel miners, and all laborers inside tunnel; air blown pipemen, torchmen (burners); Mortaring men on sewer and drain pipe (the applying of mortar and composition mixes), all bottom men on sewer work-all sewer and drain pipelayers-multiple concrete duct or any other type of pipe used on public utility work-8 feet or more below ground level, and all other sewer and trench laborers 8 feet or more below ground level regardless of excavation area; All labor work inside cofferdam; Use of a 10 foot or more drill steel for hand held drills; Caisson laborers ground level down 15 feet; All air tools 8 feet or more below ground level; All laborers working on swining-suspended on any type or make of scaffold, 48 feet to 100 feet; All chimney and silo laborers working at a height of 48 to 100 feet; All tamping hammers over 150 lbs.; All laborers working inside of a sphere or any type or make of tank at a height of 48 feet to 100 feet; all hydraulic, electric and air tools or any other type 8 feet or more below ground level; Vibrators-any type-8 feet or more below ground level

GROUP 5 - Gunnite nozzle men; Caisson laborers and all tamping hammers from 150 lbs and over; from 15 feet below ground level down to 50 feet

GROUP 6 - All underground cavern laborers; Caisson laborers

50 feet or more below ground level; Laborers working under radio active conditions (suiting up); Blasting men (Powdermen)

GROUP 7 - Dosimeter (any device) used for monitoring nuclear exposure; Asbestos abatement worker; Toxic and hazardous waste removal laborer

LAB00362-001 05/01/2024

MCLEAN COUNTY

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 37.12	30.06
GROUP 2.....	\$ 38.12	30.06

LABORER CLASSIFICATIONS

GROUP 1 - All classifications not listed below

GROUP 2 - Asbestos Abatement Worker and Hazardous Waste Worker; Lead Base Paint Worker; Dynamite Man

LAB00393-001 05/01/2025

BUREAU, LA SALLE, and PUTNAM COUNTIES

	Rates	Fringes
LABORER		
Group 1.....	\$ 40.54	32.42
Group 2.....	\$ 40.54	32.42
Group 3.....	\$ 40.54	32.42
Group 4.....	\$ 41.54	32.42
Group 5.....	\$ 42.54	32.42

LABORER CLASSIFICATIONS

GROUP 1: UNSKILLED - All classifications not listed below

GROUP 2: SEMI-SKILLED - Handling of materials treated with oil, creosote, asphalt and/or foreign material harmful to skin or clothing; Track laborers; Cement handlers; Chloride handlers; Unloading and laborers with Steel Workers and Re-bars; Concrete Workers (wet); Batch Dumpers; Mason Tenders; Kettle and Tar Men; Tank Cleaners; Plastic Installers; Scaffold Workers; Motorized buggies or motorized unit used for wet concrete or handling of building materials; Laborers with de-watering systems; Sewer workers plus depth; Vibrator Operators; Motor Mixer Operators; Cement Silica, clay, fly ash, lime and plasters, handlers (bulk or bag); Cofferdam workers plus depth; Concrete paving, placing, cutting and tying of reinforcing; Deck hand, dredge hand and shore laborers; Backmen on floating plant; Asphalt workers with machine and layers; Grade checker; Power tools; Driving all stakes, stringlines for all machinery; Setting and building of manholes and catch basins; Stripping of all concrete forms except paving forms; All concrete paving and slope walls, placing, cutting and tying of reinforcing (re-bars and wire mesh)

GROUP 3: SKILLED - Mason Tenders; Caisson Workers plus depth; Gunnite Nozzle Men; Lead Man on Sewer Work; Welders, Cutters, Burners & Torchmen; Chain Saw Operators; Paving Breaker, Jackhammer & Drill Operators; Layout Man and/or tile layer; Steel Form Setters (Street & Hwy); Air Tamping hammerman; Signal man on Crane; Concrete Saw Operator; Screenman on Asphalt Pavers; Front End Man on Chip Spreader; Laborers tending masons with hot materials or where foreign materials are used; Multiple Concrete duct-leadman; Luteman; Asphalt Raker; Curb Asphalt Machine Operator; Ready mix scalemen, permanent, portable or temporary plant; Laborers handling masterplate or similar materials; Laser Beam Operator; Coring Machine Operator; Plasterer Tenders; Underpinning and Shoring of Building; Material selector when working with firebrick or castable materials; Fire Watch; Signalling of all power equipment; Tree Topper or Trimmer

GROUP 4: Dynamite man

GROUP 5: Asbestos Abatement Worker and Hazardous Waste Worker

LAB00751-002 05/01/2024

FORD, IROQUOIS, and KANKAKEE COUNTIES

	Rates	Fringes
LABORER		
Group 1.....	\$ 45.08	34.34
Group 2.....	\$ 46.08	34.34

LABORER CLASSIFICATIONS

GROUP 1: UNSKILLED; SEMI-SKILLED - Handling of materials treated with oil, creosote, asphalt and/or foreign material harmful to skin or clothing; Track laborers; Cement handlers; Chloride handlers; Unloading and laborers with Steel Workers and Re-bars; Concrete Workers (wet); Batch Dumpers; Mason Tenders; Kettle and Tar Men; Tank Cleaners; Plastic Installers; Scaffold Workers; Motorized buggies or motorized unit used for wet concrete or handling of building materials; Laborers with de-watering systems; Sewer workers plus depth; Vibrator Operators; Motor Mixer Operators; Cement Silica, clay, fly ash, lime and plasters, handlers (bulk or bag); Cofferdam workers plus depth; Concrete paving, placing, cutting and tying of reinforcing; Deck hand, dredge hand and shore laborers; Bankmen on floating plant; Asphalt workers with machine and layers; Grade checker; Power tools; Driving all stakes, stringlines for all machinery; Setting and building of manholes and catch basins; Stripping of all concrete forms except paving forms; All concrete paving and slope walls, placing, cutting and tying of reinforcing (re-bars and wire mesh); SKILLED - Caisson Workers plus depth; Gunnite Nozzle Men; Lead Man on Sewer Work; Welders, Cutters, Burners & Torchmen; Chain Saw Operators; Paving Breaker, Jackhammer & Drill Operators; Layout Man and/or tile layer; Steel Form Setters (Street & Hwy); Air Tamping hammerman; Signal man on Crane; Concrete Saw Operator; Screenman on Asphalt Pavers; Front End Man on Chip Spreader; Laborers tending masons with hot materials or where foreign materials are used; Multiple Concrete duct-leadman; Luteman; Asphalt Raker; Curb Asphalt Machine Operator; Ready mix scalemen,

permanent, portable or temporary plant; Laborers handling masterplate or similar materials; Laser Beam Operator; Coring Machine Operator; Plasterer Tenders; Underpinning and Shoring of Building; Material selector when working with firebrick or castable materials; Fire Watch; Signalling of all power equipment; Tree Topper or Trimmer

GROUP 2: Dynamite man; Asbestos Abatement Worker and Hazardous Waste Worker

LAB00996-001 05/01/2024

LIVINGSTON, MARSHALL, AND WOODFORD COUNTIES

	Rates	Fringes
LABORER		
GROUP 1.....	\$ 39.17	28.01
GROUP 2.....	\$ 40.17	28.01

LABORER CLASSIFICATIONS

GROUP 1: All classifications not listed below

GROUP 2: Dynamite Man; Asbestos Abatement Worker and Hazardous Waste Worker; and Lead Base Paint Worker

PAIN0014-005 06/01/2024

GRUNDY COUNTY

	Rates	Fringes
PAINTER.....	\$ 53.05	33.91

PAIN0030-010 06/01/2023

BUREAU, FORD, HANCOCK, LA SALLE, LIVINGSTON, MCDONOUGH, MCLEAN, PUTNAM AND STARK COUNTIES

	Rates	Fringes
PAINTER		
Brush, Roller, Pressure		
Roller, Spray, Airless		
Spray, Sandblasting,		
Taper, Drywall		
Taper/Finisher, Structural		
Steel, and Bridges.....	\$ 40.00	26.90

PAIN0157-001 06/01/2023

FULTON, MARSHALL, MASON, PEORIA, SCHUYLER, TAZEWEEL AND WOODFORD COUNTIES

	Rates	Fringes
PAINTER		
Brush, Spray, Pressure		
Roller, Sandblasting,		
Bridges, & New Structural		

Steel Work.....	\$ 40.00	26.90

 PLAS0011-003 06/01/2023

LASALLE & PUTNAM COUNTIES

Rates	Fringes

CEMENT MASON/CONCRETE FINISHER...	\$ 40.50	33.54

 PLAS0011-011 06/01/2023

IROQUOIS AND KANKAKEE COUNTIES

Rates	Fringes

CEMENT MASON/CONCRETE FINISHER...	\$ 46.00	37.04

 PLAS0018-010 05/01/2017
MARSHALL and WOODFORD (North and West of Routes 116 and 117)
COUNTIES

Rates	Fringes

CEMENT MASON/CONCRETE FINISHER...	\$ 32.11	25.52

 PLAS0018-018 05/01/2017
LIVINGSTON (Southern Part), MCLEAN, and WOODFORD (South of
Route 116) COUNTIES

Rates	Fringes

CEMENT MASON/CONCRETE FINISHER...	\$ 33.46	22.22

 PLAS0018-024 05/01/2017

LIVINGSTON (Northern Part) COUNTY

Rates	Fringes

CEMENT MASON/CONCRETE FINISHER...	\$ 32.11	25.52

 PLAS0143-006 05/01/2015

FORD COUNTY

Rates	Fringes

CEMENT MASON/CONCRETE FINISHER...	\$ 31.51	17.50

 TEAM0026-003 05/01/2025

FORD (Elliot, Gibson City, Harpster, Melvin, Paxton, Roberts & Sibley), IROQUOIS (Fountain Creek, Lovejoy, Milford, Pigeon Grove, Prairie Green & Stockland),MCLEAN (South of a straight line from where Route 24 intersects the Woodford County line in a Southeast direction to the South Southwest corner of Livingston County) COUNTIES

Rates	Fringes

TRUCK DRIVER

Group 1.....	\$ 45.29	25.42
Group 2.....	\$ 45.88	25.42
Group 3.....	\$ 46.15	25.42
Group 4.....	\$ 46.54	25.42
Group 5.....	\$ 47.64	25.42

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hauling more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combination units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

TEAM0050-005 05/01/2025

MARSHALL AND WOODFORD COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1.....	\$ 45.35	25.72
Group 2.....	\$ 45.93	25.72
Group 3.....	\$ 46.25	25.72
Group 4.....	\$ 46.60	25.72
Group 5.....	\$ 47.71	25.72

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hauling more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combination units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

* TEAM0179-006 06/01/2024

FORD (North section the of the County North of a line from the Southeastern corner of Livingston County straight East to the Ford-Irquois County Line), GRUNDY, LIVINGSTON (Avoca, Belle Prairie, Broughton, Charlotte, Chatsworth, Dwight, Eppards Point, Esmen, Fayette, Forrest, Germanville, Indian Grove, Nebraska, Odell, Owega, Pike, Pleasant Ridge, Pontiac, Rooks Creek, Round Grove, Saunemin, Sullivan, Union, & Waldo), MCLEAN (North of a straight line starting at the intersection of McLean-Woodford Counties line & Route 24 in a Southeastern direction to the South Southwest corner of Livingston County), and WOODFORD (Northeast corner east of Route 51/251 & North of Route 24) COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2 or 3 Axle Trucks.....	\$ 44.82	0.25+a
4 Axle Trucks.....	\$ 44.97	0.25+a
5 Axle Trucks.....	\$ 45.17	0.25+a
6 Axle Trucks.....	\$ 45.37	0.25+a

FOOTNOTES:

a. \$1055.60 per week.

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

Low-Boy work classification is an additional \$1.50 per hour

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Aalls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than

self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

* TEAM0179-007 06/01/2024

KANKAKEE AND IROQUOIS (All of Iroquois except the townships of Milford, Stockland, Loda, Pigeon Grove, Fountain Creek, Lovejoy, and Prairie Green) COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2 or 3 axles.....	\$ 44.82	0.25+a
4 axles.....	\$ 44.97	0.25+a
5 axles.....	\$ 45.17	0.25+a
6 axles.....	\$ 45.37	0.25+a

FOOTNOTES:

a. \$1055.60 per week.

Low Boy work classification is an additional \$1.50 per week

An additional \$.20 per axle shall be paid for all vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over;

Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long;

Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicles, such as mounted crane trucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

TEAM0722-004 05/01/2025

LASALLE, LIVINGSTON (all of the Livingston except Amity, Avoca, Belle Prairie, Broughton, Charlotte, Chatsworth, Dwight, Eppards Point, Esmen, Fayette, Flanagan, Forrest, Germansville, Indian Grove, Nebraska Township, Nevada, Newton, Odell, Oswego, Pike, Pleasant Ridge, Pontiac, Rooks Creek, Round Grove, Saunemin, Sullivan, Sunbury, Union & Waldo), PUTNAM COUNTIES

	Rates	Fringes
TRUCK DRIVER		
Group 1.....	\$ 45.29	25.42
Group 2.....	\$ 45.88	25.42
Group 3.....	\$ 46.15	25.42
Group 4.....	\$ 46.54	25.42
Group 5.....	\$ 47.64	25.42

CLASSIFICATIONS:

GROUP 1: Drivers on 2 axles hauling less than 9 tons; air compressor & welding machines and brooms, including those pulled by separate units; Truck Driver Helper, warehouse employees; Mechanic Helpers; greasers and tiremen; pick-up trucks when hauling material, tools, or workers to and from and on the job site; and forklifts up to 6,000 lb capacity.

GROUP 2: 2 or 3 axles hauling more than 9 tons but hauling less than 16 tons; A-frame winch trucks; hydrolift trucks; Vactor Trucks or similar equipment when used for transportation purposes; Forklift over 6,000 lb.capacity; winch trucks; and four axle combination units.

GROUP 3: 2, 3 or 4 Axles hauling 16 tons or more; 5-Axles or more combination units; drivers on water pulls; articulated dump trucks; mechanics and working forepersons.

GROUP 4: Low Boy and Oil Distributors.

GROUP 5: Drivers who require special protective clothing while employed on hazardous waste work.

TEAM0731-003 04/01/2025

GRUNDY and KANKAKEE COUNTIES

	Rates	Fringes

Traffic Control Device Monitor

TRAFFIC SAFETY WORKER:

Primary duties include but are not limited to the delivery, maintenance and pick-up of traffic control devices, the set-up and installation of traffic signs, pavement markings, barricades, crash barrels and glare screens, traffic control surveillance, the repair and maintenance trucks, cars, arrow boards, message signs, barricade and sign fabrication equipment.....\$ 43.40

22.71

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within

the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are

based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7).

Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

=====

END OF GENERAL DECISION

MAJOR ITEMS OF EQUIPMENT

It is hereby expressly agreed that the Contractor shall furnish and install in full compliance with the Plans and Contract Documents, the major items of equipment, as manufactured or supplied by the following listed manufacturers or suppliers:

NO.	DESCRIPTION	MANUFACTURER OR SUPPLIER
1.	Cation Exchange Softeners	KURITA (Tonka)
2.	Forced Draft Aerator	KURITA (Tonka)
3.	Horizontal Split Case Pumps	Grundfos
4.	Dehumidifiers and Condensers	Desert Aire
5.	Standby Generator and ATS	Cummins
6.		
7.		
8.		
9.		
10.		

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered and the data given must be clear and comprehensive. This statement must be *notarized*. If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he or she desires.

1. Name of the Bidder.
2. Permanent main office address.
3. When were you organized?
4. If a corporation, in what state were you incorporated?
5. How many years have you been engaged in the contracting business under your present firm or trade name?
6. Contracts on Hand: *(Please schedule these, showing amount of each contract and the appropriate anticipated dates of completion.)*
7. List water treatment plant projects greater than \$5,000,000 completed within the last ten (10) years. *(Include reference contact and phone number.)*
8. Have you ever failed to complete any work awarded to you?
9. Have you ever defaulted on a contract?
10. List your major equipment that will be made available for this contract.
11. State your experience in construction work similar in importance to this project.
12. List the background and experience of the principal members of your organization, including the officers. Also include resumes of the key individuals who will be assigned to this project.
13. Indicate the present amount of credit available to you: \$_____
14. Please provide a bank credit reference: _____
15. The undersigned hereby authorizes and requests any person, firm or corporation for furnish any information requested by the _____ in verification of the recitals comprising this Statement of Bidder's Qualifications.

Dated at _____, this the _____ day of _____,
_____.

(Name of Bidder)

By: _____

Title: _____

State of _____)
County of _____) ss.

_____ being duly sworn, deposes and says that he/she is
_____ of _____ and that the
answers to the foregoing questions and all statements therein contained are true and correct.

Subscribed and sworn to before me this the _____ day of _____, _____.

(Notary Public)

My Commission expires _____, _____.

CITY OF MORRIS
RESPONSIBLE BIDDER CERTIFICATION
BID PROPOSAL

PROJECT NAME: North Water Treatment Plant

As part of its bid on a Contract for the above-mentioned project, Contractor hereby certifies that said Contractor meets the requirements for "Responsible Bidder" as defined in Section 1 of City of Morris Resolution No. R-08-01, "A Resolution Defining Responsible Bidder", dated February 19, 2008 and shall submit evidence of compliance upon the request of the City of Morris or the Engineer.

Contractor Name:

Address:

BY:

AUTHORIZED AGENT OF CONTRACTOR

Subscribed and sworn to

before me this _____

day of _____, _____

NOTARY PUBLIC

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
 _____ as Principal, and
 _____ as Surety, are hereby held and
 firmly bound unto City of Morris as Owner in the penal sum of
 _____ for the payment of which, well
 and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, _____.

The Condition of the above obligation is such that whereas the Principal has submitted to
City of Morris a certain BID, attached hereto and hereby made a
 part hereof to enter into a contract in writing for:
North Water Treatment Plant
Project is located near 9080 IL-47, Morris, IL 60450

NOW, THEREFORE,

1. If said BID shall be rejected, or
2. If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS, WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

(L.S.)

Principal

Surety

By: _____

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

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20____, by and between _____, hereinafter called "OWNER" and _____ doing business as (an individual) or (a partnership) or (a corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. 1.The CONTRACTOR will commence and complete the construction of:

2. The CONTRACTOR will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the work required by the Contract Documents within _____ calendar days after the date of the NOTICE TO PROCEED and will complete the same within _____ calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.
4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of _____, or as shown in the BID schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:
 - A. ADVERTISEMENT FOR BIDS
 - B. INFORMATION FOR BIDDERS
 - C. BID
 - D. BID BOND
 - E. AGREEMENT
 - F. PAYMENT BOND
 - G. PERFORMANCE BOND
 - H. NOTICE OF AWARD
 - I. NOTICE TO PROCEED
 - J. CHANGE ORDER

K. DRAWINGS

Prepared by: Chamlin & Associates, Inc.

Numbered: 1 through

Dated:

L. SPECIFICATIONS prepared or issued by: Chamlin & Associates, Inc.

Dated:

M. ADDENDA:

No. , dated

No. , dated

No. , dated

6. The OWNER will pay to the CONTRACTOR in the manner and at such times, such amounts as required by the CONTRACT DOCUMENTS.
7. The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.
8. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in (quintuplicate) each of which shall be deemed an original on the date first above written.

OWNER:

By:

Signature

(Please Type)

Name:

Title:

Address:

(SEAL)

ATTEST:

Signature

Name:

Title:

CONTRACTOR:

By:

Signature

(Please Print)

Name:

Title:

Address:

(SEAL)

ATTEST:

Signature

Name:

Title:

ATTACHMENT TO AGREEMENT

1. It is understood that work under this contract shall be performed in accordance with the “Standard General Conditions of the Construction Contract” enclosed herein.
2. **Payment Procedures.** CONTRACTOR shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Application for Payment will be processed by ENGINEER as provided in the General Conditions.
 - 2.1 *Progress Payments; Retainage.* OWNER shall make progress payments on account of the Contract Price on the basis of the CONTRACTOR’s Applications for Payment as recommended by the ENGINEER, on or about the 1st day of each month during construction as provided in paragraphs 2.1.1 and 2.1.2 below. All such payments will be measured by the schedule of values established in paragraph 2.03 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.
 - 2.1.1 Prior to Substantial Completion, progress payments 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 shall determine, or OWNER may withhold, in accordance with Article 15 of the General Conditions.

90 % of Work completed (with the balance being retainage). If Work has been 49% 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 the ENGINEER, may determine that as long as the character and progress of the Work completed, in which case the remaining progress payments prior to Substantial Completion will be in an amount equal to 100% of the Work completed.

90 % (with the balance being retainage) of materials and equipment not incorporated in the Work (but delivered, suitably stored and accompanied by documentation satisfactory to OWNER as provided in paragraph 15.01 of the General Conditions).
 - 2.1.2 Upon 50% Completion, in an amount sufficient to increase total payments to CONTRACTOR to 95 % of the Contract Price (with the balance being retainage), less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with Article 15 of the General Conditions.

- 2.2 *Final Payment.* Upon final completion and acceptance of the Work in accordance with Article 15 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said Article 15.

PERFORMANCE BOND

KNOW ALL MEN AND WOMEN BY THESE PRESENTS: that

(Name of Corporation)

(Address of Corporation)

a _____ hereinafter called Principal and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name of Owner)

(Address of Owner)

hereinafter called OWNER, in the penal sum of _____ Dollars,

\$ (_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he or she shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

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

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

IN WITNESS WHEREOF, this instrument is executed in 4 or 5 counterparts, each one of which shall be deemed an original, this _____ day of _____, 20_____.

ATTEST:

By: _____

Name: _____

Address: _____

(SEAL)

ATTEST: _____

Name: _____

Title: _____

By: _____

Name: _____

Address: _____

(SEAL)

ATTEST: _____

Name: _____

Title: _____

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is Partnership, all partners should execute BOND.

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

PAYMENT BOND

KNOW ALL MEN AND WOMEN BY THESE PRESENTS: that

(Name of Corporation)

(Address of Corporation)

a _____ hereinafter called Principal
and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name of Owner)

(Address of Owner)

hereinafter called OWNER, in the penal sum of _____ Dollars,

\$ (_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

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

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

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

IN WITNESS WHEREOF, this instrument is executed in 4 or 5 counterparts, each one of which shall be deemed an original, this _____ day of _____, 20____.

ATTEST:

By: _____

Name: _____

Address: _____

(SEAL)

ATTEST: _____

Name: _____

Title: _____

By: _____

Name: _____

Address: _____

(SEAL)

ATTEST: _____

Name: _____

Title: _____

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is Partnership, all partners should execute BOND.

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

NOTICE OF INTENT TO AWARD**To:**Contractor's name
Address**Project
Description:**

Name of project & description

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

You are hereby notified that your BID will be accepted, contingent upon Illinois Environmental Protection Agency (Illinois EPA) approval, for items in the amount of _____.

You will be required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of the final Notice to be sent upon Illinois EPA approval, to you.

Dated this day of _____

(OWNER)**By:** _____**Title:** _____

NOTICE OF AWARD

To: Contractor's name
Address

**Project
Description:** Name of project & description

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

You are hereby notified that your BID has been accepted for items in the amount of _____.

You will be required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within ten (10) calendar days from the date of this notice to you.

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

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this day of _____

(OWNER)

By: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged,

by _____,

this the _____ day of _____, 20____.

By: _____

Title: _____

NOTICE TO PROCEED**To:**Contractor's Name
Address**Date:****Project:**

Project name

You are hereby notified to commence WORK in accordance with the Agreement dated _____, on or before _____, and you are to complete the WORK within _____ consecutive calendar days thereafter.

The date of completion of all WORK is therefore _____.

(OWNER)**By:****Title:****ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by

this the _____ day of _____, 20____.

By:**Title:**

CHANGE ORDER NO.: _____

Date of Issuance: _____

Effective Date: _____

Project:	Owner:	Owner's Contact:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

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

Description/Justification:

Attachments (List documents supporting change):

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:
Original Contract Price: _____	Original Contract Times: ☐ Working Days ☐ Calendar Days Substantial Completion (days or date): _____ Ready for Final Payment (days): _____
[Increase][Decrease] from previously approved Change Orders No. _____ to No. _____: _____	[Increase][Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial Completion (days or date): _____ Ready for Final Payment (days): _____
Contract Price prior to this Change Order: _____	Contract Times prior to this Change Order: Substantial Completion (days or date): _____ Ready for Final Payment (days): _____
[Increase][Decrease] of this Change Order: _____	[Increase][Decrease] of this Change Order: Substantial Completion (days or date): _____ Ready for Final Payment (days): _____
Contract Price incorporating this Change Order: _____	Contract Times with all approved Change Orders: Substantial Completion (days or date): _____ Ready for Final Payment (days): _____

RECOMMENDED:By: _____
Engineer (Authorized Signature)

Date: _____

ACCEPTED:By: _____
Owner (Authorized Signature)

Date: _____

ACCEPTED:By: _____
Contractor (Authorized Signature)

Date: _____

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

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to state assisted construction contracts and related subcontracts exceeding \$10,000.)

The state assisted construction contractor certifies that he or she does not maintain or provide for their employees any segregated facilities at any of their establishments, and that they do not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The state assisted construction contractor certifies further that they will not maintain or provide for their employees any segregated facilities at any of their establishments, and that they will not permit their employees to perform their services at any location, under their control, where segregated facilities are maintained. The state assisted construction contractor agrees that a breach of this certification is a violation of 44 Ill. Admin. Code 750, Appendix A – Equal Employment Opportunity Clause; 35 Ill. Admin. Code 360.304 – Equal Opportunity (for state assisted construction grants); and Illinois Procurement Code (30 ILCS 500), which incorporates IDHR nondiscrimination obligations.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated based on race, creed, color, or national origin, because of habit, local custom or otherwise. The state assisted construction contractor agrees that (except where they have obtained identical certifications from proposed subcontractors for specific time periods) they will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions indicated above and that they will retain such certification in their files.

Signature

Date

Name and Title of Signatory (Please type)

Firm Name (Please type)

NOTICE TO LABOR UNIONS OR OTHER ORGANIZATIONS OF WORKERS NONDISCRIMINATION IN EMPLOYMENT

To: _____
(Name of union or organization of workers)

The undersigned currently holds contract(s) with _____
(Name of applicant)

involving funds or credit of the Illinois State or (a) subcontract(s) with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contracts(s) or subcontract(s) and in accordance with Illinois Human Rights Act (IHRA), the Illinois Procurement Code, Illinois Business Enterprise Program (BEP), the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, creed or national origin. This obligation not to discriminate in employment includes, but is not limited to, the following:

HIRING, PLACEMENT, UPGRADING, TRANSFER OR DEMOTION, RECRUITMENT,
ADVERTISING, OR SOLICITATION FOR EMPLOYMENT, TRAINING DURING
EMPLOYMENT, RATES OF PAY OR OTHER FORMS OF COMPENSATION, SELECTION
FOR TRAINING INCLUDING APPRENTICESHIP, LAYOFF OR TERMINATION.

Copies of this notice will be posted by the undersigned in conspicuous places available to employees or applicants for employment.

Name of Organization: _____

Signature: _____

Name & Title of Signatory: _____

Date: _____

Project Number

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
SPRINGFIELD, ILLINOIS

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

In accordance with federal Executive Order 12549, the prospective participant to the best of its knowledge and belief that it and its principles:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any State department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

I understand that a false statement on this certification may be grounds for rejection of this proposal or termination of the award.

(Typed Name & Title of Authorized Representative)

(Signature of Authorized Representative)

(Date)

☐ I am unable to certify the above statements. My explanation is attached.

CONSTRUCTION CONTRACTS OF LOAN RECIPIENT AND OTHER SECTIONS FROM "PROCEDURES FOR ISSUING LOANS FROM THE PUBLIC WATER SUPPLY LOAN PROGRAM"

SECTION 662.420(b)(2) CHANGE ORDERS

- A) When the loan recipient authorizes the contractor to add, delete, or revise the work within the general scope of the contract documents, or authorizes an adjustment in the contract price or contract time, the loan recipient shall submit a change order to the Agency.
- B) For each change order, the loan recipient shall submit to the Agency for approval the following documentation:
 - i) one copy of the fully executed change order signed by the loan recipient, construction engineer, and the contractor; and
 - ii) a description of any changes, with justification for the changes.
- C) Prior approval by the Agency of a change order is required when a change order results in:
 - i) alterations in design scope that require a modification to a construction permit; or
 - ii) an increase in the amount of loan funds needed to complete the project.
- D) Failure to give timely notice of proposed project changes or action by the loan recipient that is not consistent with the Agency's determination on those changes may result in disallowance of loan participation for costs incurred that are attributable to the change.

SECTION 662.620(f) REQUIRED CONSTRUCTION CONTRACT PROVISIONS

Each construction contract shall include the following provisions:

- 1) Audit; access to records:
 - A) The contractor shall maintain books, records, documents, and other evidence directly pertinent to performance on loan work in accordance with Generally Accepted Accounting Principles (GAAP). The contractor shall also maintain the financial information and data used by the contractor in the preparation or support of any cost submissions required under Section 662.420 (b)(2) of the loan rules and a copy of the cost summary submitted to the owner. The Illinois Auditor General, the owner, the Agency, or any of their authorized representatives shall have access to the books, records, papers, documents, and other evidence for purposes of inspection, audit, examination, excerpts, transcriptions, and copying. The contractor shall provide facilities for access and inspection.
 - B) For a formally advertised, competitively awarded, fixed price contract, the contractor shall include access to records as required by subsection (a)(1)(A) for all negotiated change orders and contract amendments in excess of \$25,000 that affect the contract price. In the case of all other prime contracts, the contractor shall agree to include access to records required by subsection (a)(1)(A) in all contracts and all tier subcontracts or change orders in excess of \$25,000 that are directly related to project performance.
 - C) Audits shall be in accordance with auditing standards generally accepted in the United States.
 - D) The contractor shall agree to the disclosure of all information and reports resulting from access to records required by subsection (a)(1)(A). When the audit concerns the contractor, the auditing agency shall afford the contractor an opportunity for an audit exit conference and an opportunity to comment on the pertinent portions of the draft audit report. The final audit report shall include the written comments, if any, of the audited parties.

- E) The records required by subsection (a)(1)(A) shall be maintained and made available during performance of the work under the loan agreement and for 3 years after the date of the final loan audit. In addition, records that relate to any dispute or litigation or the settlement of claims arising out of any performance, costs or items to which an audit exception has been taken, shall be maintained and made available for 3 years after resolution of the dispute, appeal, litigation, claim or exception.
- F) The right of access will generally be exercised with respect to financial records under:
 - i) Negotiated prime contracts;
 - ii) Negotiated change orders or contract amendments in excess of \$25,000 affecting the price of any formally advertised, competitively awarded, fixed price contract; and
 - iii) Subcontracts or purchase orders under any contract other than a formally advertised, competitively awarded, fixed price contract.
- G) The right of access will generally not be exercised with respect to a prime contract, subcontract, or purchase order awarded after effective price competition. In any event, the right of access shall be exercised under any type of contract or subcontract:
 - i) With respect to records pertaining directly to contract performance, excluding any financial records of the contractor; and
 - ii) If there is any indication that fraud, gross abuse, or corrupt practices may be involved in the award or performance of the contract or subcontract.

2) Covenant against contingent fees.

The contractor shall warrant that no person or selling agency has been employed or retained to solicit or secure the contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee. For breach or violation of this warranty, the owner shall have the right to annul the contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

3) Wage provisions.

The Contractor shall pay prevailing wages in accordance with the Davis-Bacon Act (40 USC 3141 through 3148) as defined by the U.S. Department of Labor.

4) Disadvantaged business enterprise requirements.

The contractor shall provide evidence that the contractor has taken affirmative steps in accordance with 40 CFR 33 to assure that disadvantaged business enterprises are used when possible as sources of supplies, equipment, construction, and services, consistent with the provisions of the Agency's Operating Agreement with USEPA.

5) Debarment and suspension provisions.

The contract shall require the successful bidders to submit a Certificate Regarding Debarment, Suspension and Other Responsibility Matters Form showing compliance with federal Executive Order 12549.

6) Nonsegregated facilities provisions

The contractor shall be required to submit a Certification of Nonsegregated Facilities on forms provided by the Agency.

7) Build America Buy America

If applicable, the contractor shall be required to comply with the requirements of the BABA Act.

8) American Iron and Steel

The contractor shall be required to use American Iron and Steel, if required by USEPA for that fiscal year.

9) A clause that provides:

"No contractor or subcontractor shall discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor or subcontractor shall carry out applicable requirements of 40 CFR 33 in the award and administration of contracts awarded under the PWSLP. Failure by the contractor or subcontractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies."

SECTION 662.620(g) SUBCONTRACTS UNDER CONSTRUCTION CONTRACTS

The award or execution of all subcontracts by a prime contractor and the procurement and negotiation procedures used by the prime contractor shall comply with:

- 1) All applicable provisions of federal, State and local law;
- 2) All provisions of this Part 662 regarding fraud and other unlawful or corrupt practices;
- 3) All provisions of this Part 662 with respect to access to facilities, records and audit of records; and
- 4) All provisions of subsection 662.620(f)(5) that require a Certification Regarding Debarment, Suspension, and Other Responsibility Matters.

SECTION 662.620(h) CONTRACTOR BANKRUPTCY

In the event of a contractor bankruptcy, the loan recipient shall notify the Agency and shall keep the Agency advised of any negotiations with the bonding company, including any proposed settlement. The Agency may participate in those negotiations and will advise the loan recipient of the impact of any proposed settlement to the loan agreement. The loan recipient shall be responsible for assuring that every appropriate procedure and incidental legal requirement is observed in advertising for bids and re-awarding a construction contract.

SECTION 662.620(i) ACCESS

Every contract entered by the loan recipient for construction work, and every subagreement, shall provide the Agency representatives with access to the work. The contractor or subcontractor shall provide facilities for such access and inspection.

SECTION 662.640(c) REMEDIES

All claims, counter-claims, disputes and other matters in question between the recipient and the contractor arising out of, or relating to, a subagreement or its breach shall be decided by arbitration if the parties agree, or in a court of competent jurisdiction within the State.

BIDDER CERTIFICATION
In Compliance with Article 33E-11 to the
"Criminal Code of 2012"

I _____, do hereby certify that:
 (Name)

1. I am _____ of the _____
 (Position) (Firm)
 and have authority to execute this certification on behalf of the firm
2. This firm is not barred from bidding on this contract due to a either a Bid-rigging or Bid Rotating violation as set forth in Article 33E-11 to the "Illinois Criminal Code of 2012 [720 ILCS 5/33E-11]."

Name of Firm: _____

Signature: _____

Title: _____

Date: _____

Corporate Seal (where appropriate)

On this _____ day of _____ 20_____, before me appeared
 (Day Number) (Month) (Year)
 _____ to me personally known, who,
 (Name)
 being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by
 _____ to execute the affidavit and did so as
 (Name of Firm)
 his or her free act and deed.

Notary Public: _____ **Commission Expires:** _____

Notary Seal:

SPECIFICATIONS FOR DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION

NAME OF LOAN RECIPIENT: _____ City of Morris _____

1) DISADVANTAGED BUSINESS ENTERPRISE POLICY

- A) It is the policy of the State of Illinois to award a fair share of sub-agreements to disadvantaged businesses (DBEs). In complying with this requirement, contractors are required to take affirmative steps to assure that disadvantaged businesses are used when possible as sources of supplies, equipment, construction, and services as explained herein.
- B) These specifications define the terms, conditions, and requirements of the State Revolving Fund Loan Program, and the (Name of Loan Recipient) _____ City of Morris _____'s policy and procedures for complying with these requirements.
- C) As required by the award conditions of USEPA's Assistance Agreement with Illinois EPA, the fair share percentages are 5% for MBEs and 12% for WBEs.

2) PRE-CONTRACT AWARD OBLIGATIONS

- A) All bidders are required to advertise subcontracting opportunities and to negotiate with disadvantaged businesses prior to bid opening. Failure to document such affirmative efforts shall be deemed, relative to disadvantaged business compliance, non-responsive.
- B) To establish a bid as responsible, the bidder will be required to document the proposed utilization of disadvantaged businesses with letters of intent signed by the bidder and by the disadvantaged business listed in the bid. The documentation requirements are outlined in Section III of this document.
- C) (Name of Loan Recipient) _____ City of Morris _____'s disadvantaged business policy clearly intends for bidders to contact and encourage the participation of disadvantaged businesses prior to bid opening. Affirmative efforts (the written record of conscientious and honest communications between the bidder and disadvantaged business) must be initiated and completed by the bidder prior to bid opening. All bidders must document compliance with the requirements of the disadvantaged business policy.

3) EVALUATION OF DISADVANTAGED BUSINESS UTILIZATION AND AFFIRMATION EFFORTS

- A) As a prerequisite to demonstrate compliance with the (Name of Loan Recipient) _____ City of Morris _____'s disadvantaged business policy, ALL bidders shall provide the following with its bid:

- i) Completed and signed certification from the bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services, in the performance of this contract.

OR

- ii) "Certification of publication," or adequate proof of publication, including an actual copy of the newspaper advertisement from a daily newspaper. **The advertisement must run one day at least (16) days prior to bid opening.** An example advertisement follows this section.

Bidders may publish the advertisement in an established, online bidder's clearinghouse such as the "Dodge Report (<http://construction.com/dodge/>)". If an online advertisement is placed with the "Dodge Report" or an equivalent website, a screenshot of the advertisement along with the webpage address, and a payment receipt is required as documentation. **The advertisement must run one day at least (16) days prior to bid opening.**

- iii) List of all disadvantaged business enterprise (DBE) and non-DBEs that submitted proposals to the bidder along with the date of the proposal. Names, addresses, phone number and/or e-mail are required.
- iv) List of disadvantaged businesses not being utilized and justification for non-utilization.

- v) If DBE subcontractors will be utilized for the project, a completed and signed copy of Illinois EPA DBE Form No. 3 (DBE Subcontractor Utilization Form) or an equivalent "Notice of Intent" is needed from each subcontractor.
- vi) If DBE subcontractors will be utilized for the project, a completed and signed certification from the bidder(s), attesting that the bidder has no controlling or dominating interest or conflict of interest with the disadvantaged business that will be utilized.
- vii) In instances where the bidder(s) does not receive any proposals from disadvantaged businesses prior to bid opening, the bidder(s) must provide a written certification attesting that no proposals were received.

Failure to submit the documentation pursuant to the requirements of A (i-vii) above may cause rejection of the bid as non-responsive.

4) SANCTIONS

- A) The (Name of Loan Recipient) City of Morris has the option to reject one or all bids when the information submitted by the bidder(s) fails to demonstrate compliance with the disadvantaged business requirements (i.e., the bidder fails to place their pre-bid advertisement in a daily newspaper, or approved website, at least 16 days prior to bid opening).
- B) Upon finding that any Party has not complied with the requirements of these specifications, including misrepresenting a firm as a disadvantaged business, any one or a combination of the following actions may be taken.
 - i) Declare the bidder and/or subcontractor non-responsive and therefore, ineligible for contract award.
 - ii) Disallow all contract costs associated with non-compliance.
 - iii) Refer matters which may be fraudulent to the Illinois Attorney General.

5) POST-CONTRACT AWARD COMPLIANCE

- A) As required by the award conditions of USEPA's Assistance Agreement with Illinois EPA, all sub-agreements of the prime contractor must identify that the fair share percentages are 5% for MBEs and 12 % for WBEs.
- B) After award of the prime contract, copies of all disadvantaged business-related sub-agreements between the prime contractor and subcontractors shall be submitted to the owner.
- C) After bid submission, any changes in previously reported disadvantaged businesses utilization shall be handled in accordance with 40 CFR Part 33.302(b-h). If the contractor fails to initiate such actions, the owner may withhold payments and/or institute other appropriate sanctions.

SUGGESTED DISADVANTAGED BUSINESS (DBE) ADVERTISEMENT FOR CONSTRUCTION CONTRACTORS

NOTICE TO DISADVANTAGED BUSINESSES

_____, _____, _____, is
 (Name of Company) (Address of Company) (Phone Number)
 seeking disadvantaged businesses for the _____
 (Name of Loan Recipient)

Project for subcontracting opportunities in the following areas: _____

All disadvantaged businesses should contact, IN WRITING, (certified letter, return receipt requested),
 _____ to discuss the subcontracting opportunities.
 (Company Contact Person)

All negotiations must be completed prior to bid opening _____
 (Date of Bid Opening)

*The advertisement must clearly state the method of evaluating the proposals or quotations, and the relative importance attached to each criterion. Bidders must uniformly and objectively evaluate the proposals submitted by disadvantaged business in response to the advertisement based upon the evaluation criteria stated in the advertisement. The evaluation criteria must not be restrictive or exclusionary.

SUMMARY REPORT OF DISADVANTAGED BUSINESS ENTERPRISE REQUIREMENTS FOR CONTRACTORS

- 1) Completed and signed certification from bidder(s), attesting that the bidder will award no sub-agreements, including the procurement of equipment, materials, supplies and services in the performance of this contract (may use Illinois EPA DBE Form #1).

OR

"Certificate of publication, or adequate evidence of proof of publication, including an actual copy of the newspaper advertisement from a daily publication. For advertisements placed in a construction project clearinghouse such as www.construction.com, a screenshot of the advertisement, link to website, and receipt is required for proof of advertising.

- 2) List of all disadvantaged business enterprises (DBE) and non-DBE's that submitted proposals to the bidder/prime contractor. Specify as DBE or non-DBE, type of DBE, and the other information listed below (DBE Form #4 may be used for this purpose).

Name of Company
Name of Owners
Address of Company
E-mail Address of Company
Telephone Number
Date of Proposal
Type of Business
Type of DBE
Description of work to be performed

- 3) List of disadvantaged businesses that submitted proposals to the bidder but will not be utilized. Justification for non-utilization must be provided (may use Illinois EPA DBE Form #1).
- 4) Completed and signed copies Illinois EPA DBE Form #3 (Subcontractor Utilization Form) or equivalent "Notice of Intent". Only applies if using DBE subcontractors.
- 5) Completed and signed certification from bidder(s) attesting that the bidder has no dominating or conflict of interest with the disadvantaged business to be utilized (Illinois EPA DBE Form #1). Only applies if using DBE subcontractors.
- 6) In instances where the bidder(s) does not receive any proposals from disadvantaged businesses prior to bid opening, the bidder(s) must provide a written certification attesting that no proposals were received (Illinois EPA DBE Form #1).
- 7) **Note:** DBE Form #2 is **not** included in this packet. It is for consultants/engineers to report DBE activity. This form may be found in Illinois EPA's DBE Guidance Manual which is available on the Agency's website or mailed upon request by calling 217-782-2027.

DBE Contractor Certification Form

Illinois EPA Disadvantaged Business Enterprise (DBE) Program Form #1
Contractor Certification Form**(To be completed by all Prime Contractors)**

Please check the appropriate boxes that apply and complete the information on the bottom of the form.

- ☐ This firm will award no subcontracts (including in the procurement of equipment, supplies, or services), in the performance of this contract.
- ☐ This firm advertised for DBE subcontractors according to the good faith efforts outlined in the Illinois EPA DBE Guidance Document.
- ☐ This firm received proposals from DBE(s) that will not be utilized. A list of the DBEs not hired, along with their address, phone number, and reason(s) for non-utilization, is below.

- ☐ This firm did not receive any inquiries from DBEs.

I certify that the above is true. I further certify that this firm and its partners, directors, and officers do not possess a controlling interest in ownership or conflict of interest or any other authority to control the DBE to be used during the performance of the contracts.

BY: _____

NAME: _____

TITLE: _____

COMPANY: _____

DATE: _____

Illinois EPA Disadvantaged Business Enterprise (DBE) Program Form #3

Subcontractor Utilization Form

(Only complete this form if DBE subcontractors or sub-consultants will be working on a project)

This form is intended to capture the DBE subcontractor's description of work to be performed and the price of the work submitted to the prime contractor. All subcontractors must complete this form, and it must be included in the prime contractor's bid package.

Subcontractor Name	Project Name		
Contact Person's Name & Title			
Address			
Telephone	Email		
DBE Certified By:	Select all that apply. At least one is required: MBE WBE SBE DBE		
Prime Contractor Name			
Type of Work to be Performed			Cost Estimate of Work

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to using the subcontractors above. I am aware that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 C.F.R. Part 33 Section 33.302(c).

Prime Contractor Signature:	Print Name:
Date:	Title:
Subcontractor Signature:	Print Name:
Date:	Title:

Illinois EPA Disadvantaged Business Enterprise (DBE) Program Form #4, Bidders List

(Only complete this form if subcontractors or sub-consultants will be working on a project)

Using this form/format is optional. Other formats are acceptable.

Company Name & Contact Person	Address	Phone No. w/ area code	Email	Proposed Work (supplies, paint, etc.)	DBE Status (MBE, WBE, DBE, SBE)
					Check if Hired ☐
					Check if Hired ☐
					Check if Hired ☐
					Check if Hired ☐

**BIDDER CERTIFICATION REGARDING THE USE OF
IRON, STEEL, MANUFACTURED PRODUCTS, AND CONSTRUCTION MATERIALS
PRODUCED IN THE UNITED STATES
(BUILD AMERICA, BUY AMERICA ACT)**

I _____, do hereby certify that:
(Name)

1. I am _____ (title) of the _____
(company, partnership, etc.) and have authority to execute this certification on behalf of the firm.
2. I am aware that all iron, steel, manufactured products, and construction materials used for this project must be produced in the United States per the federal Build America, Buy America Act (BABA) signed by President Biden on November 15, 2021. Pub. L No. 117-58, §§ 70901-52.
3. I understand the term “iron and steel products” refers to the following products made primarily of iron or steel: lined or unlined pipes and fittings manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.
4. I understand that all manufactured products used in the project must be produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product.
5. I acknowledge that all construction materials for this project must be manufactured in the United States. This means all manufacturing processes for the construction materials occurred in the United States.
6. I am aware that this requirement applies to all portions of the project that are subcontracted.

Name of Company: _____

Signature: _____

Title: _____

Date: _____

Corporate Seal (where appropriate)

REQUIREMENTS SPECIFIC TO BUY AMERICA, BUILD AMERICA ACT (BABA)

On November 15, 2021, President Biden signed into law the Infrastructure Investment and Jobs Act (“IIJA”), Pub. L. No. 117-58, which includes the Build America, Buy America Act (“BABA”). The purpose of BABA is to ensure that federally funded infrastructure projects only utilize iron, steel, manufactured products, and construction materials produced in the United States. The requirement to use products produced in the United States applies to all projects for the construction, alteration, maintenance, or repair of publicly owned treatment works (POTW) or public water systems. Since Illinois’ Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF) utilize federal funds, loan recipients must use iron, steel, manufactured products, and construction materials that are produced in the United States. Guidance is available on USEPA’s website: <https://www.epa.gov/cwsrf/build-america-buy-america-baba>. Waivers from the requirements are available under certain circumstances. BABA requires the following:

1. All iron and steel used in the project are produced in the United States. This means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
2. All manufactured products used in the project are produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation.
3. All construction materials are manufactured in the United States. This means that all manufacturing processes for the construction material occurred in the United States.

BABA only applies to items that are consumed in, incorporated into, or affixed to an infrastructure project. It does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at project completion. BABA does not apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of or permanently affixed to the structure. BABA requirements apply to an entire infrastructure project, even if it is funded by both Federal and non-Federal funds under one or more awards.

CONSTRUCTION MATERIALS includes an article, material, or supply that consists primarily of:

- non-ferrous metals;
- plastic and polymer-based products including polyvinylchloride, composite building materials, and polymers used in fiber optic cables;
- glass including optic glass;
- lumber; or
- drywall.

CONSTRUCTION MATERIALS does NOT include items made primarily of iron or steel; manufactured products; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives.

REQUIREMENTS SPECIFIC TO IRON AND STEEL

The existing American Iron and Steel (AIS) Requirements will continue as part of BABA. An iron or steel product is one of the items listed below and is made primarily of iron or steel that is permanently incorporated into the public water system or treatment works.

- Pipes (lined or unlined) and pipe fittings
- Pipe clamps and restraints
- Valves
- Structural steel
- Manhole Covers and other municipal castings such as valves boxes, drainage grates, bollards, etc.
- Construction materials such as trusses, wire, grating, wire, ductwork, fence tubing, wall panels, etc.
- Hydrants
- Flanges
- Tanks
- Reinforced precast concrete

For one of the listed iron or steel products to be considered subject to the BABA requirements, it must be made of greater than 50% iron or steel, measured by the material costs. “Steel” means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels. AIS Guidance is available at: <https://epa.illinois.gov/topics/grants-loans/state-revolving-fund/american-iron-and-steel/american-iron-and-steel-requirements.html>.

RECORDKEEPING AND DOCUMENTING THE COUNTRY OF ORIGIN FOR IRON, STEEL, MANUFACTURED PRODUCTS, & CONSTRUCTION MATERIALS USED IN LOAN FUNDED PROJECTS

Loan recipients with assistance from their general contractor must be able to verify that products used in their projects comply with the BABA requirements. USEPA recommends loan recipients use a “Step Certification” process to ensure that producers adhere to the BABA requirements. Step certification is a process under which each handler (supplier, fabricator, manufacturer, etc.) of the iron, steel, manufactured products, or construction materials certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin.

A certification can be quite simple if it includes the name of the manufacturer, the location of the manufacturing facility (not company headquarters), a description of the product or item being delivered, and a signature by a manufacturer’s responsible party. Certification could be achieved by other methods such as requiring the final manufacturer, who delivers the products to the worksite, to provide certification that all manufacturing processes occurred in the US. While this type of certification is easier and acceptable, it may not provide the same degree of assurance and additional documentation may be needed. USEPA auditors recommend keeping records of when and where the products were delivered. Records from the manufacturer should refer to specific items such as pipes, valves, meters. Try to avoid records containing broad statements such as, “All products delivered were USA made”.

Regardless of the method, documents regarding the country of origin for all covered items should be collected and maintained by the loan recipients. Having a good paper trail is invaluable during an inspection or audit.

SAMPLE CERTIFICATION LETTER

Below is a sample step certification letter for BABA compliance. The completed letter is provided to the construction contractor or loan applicant by the supplier, fabricator, manufacturer, etc. of covered products. Documentation must be provided on company letterhead.

Company Letterhead

Date

Company Name
Company Address
City, State, Zip

Subject: Build America, Buy America Act Step Certification for Project (Identify Project Here xxx)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project are in full compliance with the federal Build America, Buy America Act requirements as required in EPA's State Revolving Fund Programs.

Item, Products, and/or Materials:

1. XXX
2. XXX
3. XXX

Such process took place at the following location (City and State must be included):

If any of the above compliance statements change while providing material to the project we will immediately notify the prime contractor and the engineer.

Signed by Company Representative

ILLINOIS WORKS JOBS PROGRAM ACT – APPRENTICESHIP INITIATIVE INFORMATION FOR CONTRACTORS

Summary: The Illinois Works Jobs Program Act, 30 ILCS 559/Art. 20, is a statewide initiative to ensure that all Illinois residents have access to State capital projects and careers in the construction industry and building trades and to provide contracting and employment opportunities to historically underrepresented populations in the construction industry. This will be accomplished through three programs created by the Illinois Works Jobs Program Act: the [Illinois Works Apprenticeship Initiative](https://dceo.illinois.gov/illinoisworks.html), the Illinois Works Pre-Apprenticeship Program, and the Illinois Works Bid Credit Program. Additional information is available at the following website: <https://dceo.illinois.gov/illinoisworks.html>.

The goal of the Illinois Works Apprenticeship Initiative (“10% apprenticeship goal”) is that for projects estimated to cost \$500,000 or more, apprentices will perform either 10% of the total labor hours actually worked in each prevailing wage classification or 10% of the estimated labor hours in each prevailing wage classification, whichever is less. The 10% apprenticeship goal applies to projects being paid for in whole or in part by appropriated capital funds to construct a public work either through a contract or grant issued by a State agency. A determination was made that this requirement also applies to Illinois EPA loans. The \$500,000 threshold applies to the total project cost and NOT the total cost or value of an individual construction contract.

In July 2023, Governor Pritzker signed into law a new legislated goal that will increase opportunities for graduates, strengthen the pipeline for the program, and more seamlessly integrate the pre-apprenticeship programs into existing apprenticeship goals. The new legislative updates require that (5%), half of the (10%) goal of the apprenticeship hours for each classification must be performed by apprentices who graduated from the Illinois Works Pre-apprenticeship, Climate Works Pre-apprenticeship, or IDOT Highway Construction Careers programs.

Certification: Apprentices are required to be U.S. Dept. of Labor certified (not limited to pre-apprentice program graduates).

APPLICABILITY

If a project is estimated to received \$500,000 or more of State Capital Funding for the Project:

If the state’s contribution to the project amount equals 50% or more of the cost for the project, the 10% apprenticeship requirement applies to all prevailing wage eligible work performed by contractors on the public works project.

If the state’s contribution to the project is less than 50% of the cost for the project, the 10% apprenticeship requirement applies only to prevailing wage eligible work being funded from state funds.

The Project has less than \$500,000 of State Capital Funding, but the Total Estimated Project Cost is \$500,000 or more:

If the state's contribution to the project amount equals 50% or more of the estimated cost for the project, the 10% apprenticeship requirement applies to all prevailing wage eligible work performed by contractors on the public works project.

If the state's contribution to the project is less than 50% of the estimated cost for the project, the 10% apprenticeship requirement does not apply.

Total Estimated Project Cost is less than \$500,000: The 10% apprenticeship requirement does not apply. The \$500,000 threshold applies to the total project cost and NOT the total cost or value of an individual construction contract.

Waivers from the Requirements: If goals cannot be met, the state has discretion to grant waivers, reductions or to hold public hearings on the issue. Factors to be considered include the scale of the project and whether the contractor or subcontractor seeking the action has previously requested reductions or waivers. A waiver form is available on the Illinois EPA website at: <https://epa.illinois.gov/topics/grants-loans/state-revolving-fund/drinking-water-loans.html> or <https://dceo.illinois.gov/illinoisworks/apprenticeship.html>.

Reporting: An example quarterly reporting form is attached. A fillable version is available on the Illinois EPA website. Contractors should coordinate with the loan applicant and their consultant for further instructions regarding these forms. Loan applicants are ultimately responsible for reporting quarterly labor hours to the state, but coordination with their contractor is essential. All loan funded projects are subject to payment of Davis Bacon wages.

For general apprenticeship questions, please contact the Illinois Works Office at: CEO.ILWorks@Illinois.gov.

ILLINOIS WORKS APPRENTICESHIP INITIATIVE PERIODIC REPORT

Organization Name:		FEIN Number:		DUNS/Unique Entity ID Number:	
Grant/Loan Awarding Agency:		Construction Start Date:		Construction End Date:	
Grant/Loan Number:		Project Number:		Estimated Total State Contribution:	
Estimated Total Project Costs:					(including all appropriated funds)

REPORTING PERIOD:

Period Start Date: Period End Date:

APPLICABLE APPRENTICESHIP GOAL (SELECT ALL THAT APPLY):

☐ 10% Total Project Cost

☐ 10% Total State Contribution Only

☐ Waiver Approved by IL DCEO

IL DCEO Waiver Approval Date: _____

(If a waiver was granted for any prevailing wage classification, the Grantee does not need to report on those classifications on this form.)

☐ Reduction Approved by IL DCEO

IL DCEO Reduction Approval Date: _____

(If selected, enter the applicable prevailing wage classification(s) and approved reduced percentage(s).)

ILLINOIS WORKS APPRENTICESHIP INITIATIVE PERIODIC REPORT

As you work towards meeting the 10% apprenticeship goal, you will have to follow the new statutorily mandated Illinois Works compliance requirement (per State Legislative update (30ILCS559/20-20(a)(2)) where half of the 10% apprenticeship goal for each wage classification is to be performed by apprentices who are graduates from the Illinois Works Pre-Apprenticeship Program, Climate Works Pre-Apprenticeship Program, or Highway Construction Career Program (graduates of one of the programs or a combination of graduates from the programs can be used for compliance).

Please provide information in Chart 1 for the apprentices who are graduates of the Illinois Works Pre-Apprenticeship Program, Climate Works Pre-Apprenticeship Program, or Highway Construction Career Program and their contributions to the project. Ideally, the last four digits of their Social Security number, and ID number; however, at a minimum, the ID number must be provided.

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ILLINOIS WORKS APPRENTICESHIP INITIATIVE

PERIODIC REPORT

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ILLINOIS WORKS APPRENTICESHIP INITIATIVE PERIODIC REPORT

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ILLINOIS WORKS APPRENTICESHIP INITIATIVE PERIODIC REPORT

Organization Certification and State Agency Acknowledgement

1. Organization Certification

By signing this form, I certify to the best of my knowledge and belief that the form is true, complete, and accurate and that any false, fictitious or fraudulent information or the omission of any material fact could result in the immediate termination of my contract, grant, and loan award(s).

Institution/Organization Name

Printed Name (Executive Director or equivalent)

Title (Executive Director or equivalent)

Signature (Executive Director or equivalent)

Date/Time Field

2. State Agency Acknowledgement

State Agency

Printed Name

Title

Signature

Date/Time Field

CITY OF MORRIS
NORTH WATER TREATMENT PLANT

MAY, 2026

TECHNICAL SPECIFICATIONS

PREPARED BY
CHAMLIN & ASSOCIATES, INC.
4152 PROGRESS BOULEVARD
PERU, IL 61354

TECHNICAL SPECIFICATIONS

01 1000 SUMMARY	
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05 1200 STRUCTURAL STEEL FRAMING.....	
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05 5300 METAL GRATINGS.....	
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07 2113 BOARD INSULATION	

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07 5323 EPDM ADHERED ROOFING SYSTEM	
07 9000 JOINT PROTECTION	
08 1342 METAL AND FRP DOORS AND FRAMES.....	
08 3323 OVERHEAD COILING DOORS.....	
08 5113 ALUMINUM WINDOWS	
08 7100 DOOR HARDWARE.....	
08 8000 GLAZING	
09 2900 GYPSUM BOARD SYSTEM.....	
09 5123 ACOUSTICAL PANEL CEILINGS	
09 7001 QUARTZ EPOXY FLOORING	
09 9000 PAINTING AND COATING.....	
10 4010 BRONZE PLAQUE AND BUILDING LETTERS	
10 7500 FLAGPOLES	
11 5310 LABORATORY CABINETRY	
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26 1000 ELECTRICAL	
26 2923 VARIABLE FREQUENCY DRIVES.....	
26 3213 STAND-BY GENERATOR SET.....	
27 2623 SCADA SYSTEM	

TECHNICAL SPECIFICATIONS (CONT'D)

31 0510	SUBSURFACE INVESTIGATION.....
	GEOTECH REPORT AND BORINGS
31 0513	SOILS FOR EARTHWORK
31 0516	AGGREGATES FOR EARTHWORK
31 1000	SITE CLEARING
31 2213	ROUGH GRADING
31 2316	EXCAVATION.....
31 2317	TRENCHING.....
31 2318	AGRICULTURAL IMPACT MITIGATION
31 2319	DEWATERING.....
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31 2500	EROSION AND SEDIMENTATION CONTROLS.....
32 3113	CHAIN LINK FENCES AND GATES.....
33 0513	MANHOLES AND STRUCTURES
33 0523	BORING, JACKING AND TUNNELING CONDUITS.....
33 0524	UTILITY HORIZONTAL DIRECTIONAL DRILLING
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33 1223	PACKAGE WELL HOUSE.....
33 2113	PUBLIC WATER SUPPLY WELLS
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40 0513	PIPING.....
40 0523	VALVES AND ACCESSORIES
40 7100	FLOW INSTRUMENTATION.....
40 7200	LEVEL INSTRUMENTATION
40 7300	PRESSURE INSTRUMENTATION.....

TECHNICAL SPECIFICATIONS (CONT'D)

40 7500 CONTINUOUS CHLORINE ANALYZER

43 2113 HORIZONTAL SPLIT CASE CENTRIFUGAL PUMPS

43 2220 FORCED DRAFT AERATOR SPECIFICATION

43 2221 CATION EXCHANGE SYSTEM SPECIFICATION

43 3268 FLUORIDATION CHEMICAL FEED EQUIPMENT

43 3269 PHOSPHATE CHEMICAL FEED EQUIPMENT

43 3276 CHLORINATION EQUIPMENT

SECTION 01 1000 - SUMMARY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Contract description.
 - 2. Contractor's use of Site.
 - 3. Specification conventions.

1.2 CONTRACT DESCRIPTION

- A. The work for this project consists of the construction of a new 3.0 MGD ion exchange water treatment plant and all associated site work, electrical, plumbing, instrumentation & controls, and all other associated features. It also includes finishing of wells 8 and 9, associated well houses, finished and raw watermains, and a sanitary sewer.
- B. The owner is purchasing the ion-exchange vessels and pre-fabricated well houses prior to the project due to long lead time. The Contractor shall be responsible for coordination, unloading, installation, and all associated work for providing a complete functional system using the equipment purchased directly by the Owner.
- C. Contractor shall provide Builder's Risk Insurance as indicated in the Supplemental Conditions.
- D. Time Restrictions for Performing Work: Work shall be substantially complete by February 28, 2028, and ready for final payment by April 30, 2028.
- E. Completed and ready for final payment shall be defined as completion of all work of this Contract.
- F. Contractor shall pay to Owner as liquidated damages \$1,500 per calendar day for not complying with the substantial completion date. Contractor shall pay to the Owner liquidated damages \$3,000 per day for not complying with the final full completion date.
- G. Address of Project: Near 9080 IL - 47, Morris, IL 60450.
- H. Perform Work of the Contract in accordance with the General Conditions and Supplementary Conditions.

1.3 BUILD AMERICA, BUY AMERICA ACT (BABA)

- A. Contractor shall ensure that all equipment, materials, and other selections comply with the standards set forth by the Build America, Buy America Act established on November 15, 2021. The requirements of BABA supersede any other specifications or preferences stated in the Contract Documents, if it is found the specification or preference does not meet BABA. For additional details, refer to Section 01 3300 – Submittal Procedures.

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Limit use of site to allow:
 - 1. Work by Others and Work by Owner.
 - 2. Use of site by the public and Owner as necessary.
- B. Construction Operations: Limited to areas noted on Drawings.

1.5 SPECIFICATION CONVENTIONS

- A. These Specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.
- B. In addition to these Specifications, the following documents shall be considered standard specifications for this project:
 - 1. Illinois Department of Transportation's "Standard Specifications for Road and Bridge Construction," adopted January 1, 2022, and "Supplemental Specifications and Recurring Special Provisions," current edition. These two (2) documents shall herein be referred to as the "Roadway Specifications."
 - 2. Illinois Society of Professional Engineers' "Standard Specifications for Water and Sewer Construction in Illinois," 8th Edition, adopted in 2020. This document shall herein be referred to as the "Water and Sewer Specifications."
- C. In case of conflict between the above-referenced "Standard Specifications" and the Drawings and Specifications for this project, the Drawings and Specifications for this project will govern.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 1500 – PROJECT COORDINATION

PART 1 GENERAL

1.1 CONTRACTOR RESPONSIBILITY

- A. The General Contractor shall be responsible for all project coordination and shall provide a single point of contact, whose name should be included in the package, to the Owner for all issues related to the administration of this construction contract. In addition, the Contractor shall provide a full-time, on-site Project Superintendent whose name and resume should be included in the bid package.

1.2 JOB SITE ADMINISTRATION

- A. At no time will any work be performed on the site without the Project Superintendent being present without the prior approval of the Engineer. The Engineer, as a rule, will not respond to questions relating to the work from sub-contractors, crew foremen, etc. The Project Superintendent will be responsible to keep the Engineer informed of the day-to-day activity schedule, particularly if there are times when on-site work is not continuous, such that observation and resident inspection can be coordinated.

END OF SECTION

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SECTION 01 2000 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Schedule of Values.
- B. Application for Payment.
- C. Change procedures.
- D. Defect assessment.
- E. Alternates.

1.2 SCHEDULE OF VALUES

- A. Submit printed schedule on AIA G703 - Continuation Sheet for G702.
- B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement for review and approval of the Engineer.
- C. Include within each line item, direct proportional amount of Contractor's overhead and profit.
- D. Revise schedule to list approved Change Orders with each Application for Payment.

1.3 APPLICATION FOR PAYMENT

- A. Submit three copies of each Application for Payment on AIA G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702. Contractor's electronic media driven form will be considered and requires Engineer's approval.
- B. Content and Format: List items per the Engineer approved Schedule of Values.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment period: Payment periods shall be one-month intervals. The beginning and ending date of the pay periods will be discussed and determined at the Pre-Construction Conference.
- E. Submit with transmittal letter as specified for Submittals in Section 01 3300 – Submittal Procedures.
- F. Submit partial waivers of lien from the Contractor and his suppliers and subcontractors.
- G. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
 - 1. Partial release of liens from major Subcontractors and vendors.
 - 2. Affidavits/invoices attesting to off-site stored products and associated insurance certificate.

3. Affidavits/invoices attesting to on-site stored products stored but not installed.
4. Construction Progress Schedule, revised and current.

1.4 CHANGE PROCEDURES

- A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions in writing to the Contractor.
- C. Engineer may issue Proposal Request or Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with stipulation of overtime work required and with the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 3 days.
- D. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on the Work by separate or other Contractors. Document requested substitutions in accordance with Section 01 2500 – Substitution Procedures.
- E. Stipulated Sum/Price Change Order: Based on Proposal Request/Notice of Change and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Engineer.
- F. Construction Change Directive: Engineer may issue directive, on Engineer's designated form, signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- G. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. The Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
- H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- I. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.
- J. Change Order Forms: Change Orders shall be processed on the Engineer's provided Change Order Form found in these Specifications.
- K. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

L. Correlation of Contractor Submittals:

1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
3. Promptly enter changes in Project Record Documents.

1.5 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Engineer and Owner.
- D. Defective Work will be partially repaired according to instructions of Engineer and Owner, and unit sum/price will be adjusted to new sum/price at discretion of Engineer and Owner.
- E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Engineer and Owner to assess defects and identify payment adjustments is final.
- G. Non-Payment for Rejected Products: Payment will not be made for rejected products 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 transporting vehicle.
 4. Products placed beyond lines and levels of required work.
 5. Products remaining on hand after completion of the Work.
 6. Loading, hauling, and disposing of rejected products.

1.6 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement. The Owner-Contractor Agreement may identify certain Alternates to remain an Owner option for a stipulated period of time.
- B. Coordinate related Work and modify surrounding Work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance.
- B. Product substitution procedures.

1.2 QUALITY ASSURANCE

- A. Contract is based on products and standards established in Contract Documents.
- B. Products specified define standard of quality, type, function, dimension, appearance, and performance required.
- C. Substitution Proposals: Permitted for specified products except where specified otherwise. Do not substitute products unless substitution has been accepted and approved by the Engineer

1.3 PRODUCT SUBSTITUTION PROCEDURES

- A. Certain major equipment shall be included in the Contractor's Base Bid. Alternate equipment may be offered as a Voluntary Alternate by the Contractor. Major equipment or providers which shall be included in the Base Bid includes:
 - 1. ION exchange softener system – Tonka Water.
 - 2. Aerator – Tonka Water.
 - 3. Dehumidifiers – Desert Aire.
 - 4. Plant integration and SCADA – Micro-Comm.
- B. For all other specified products or manufacturers, prior to the Bid Date:
 - 1. Engineer may consider requests for substitutions submitted no less than 15 days before the Bid Date.
 - 2. Accepted substitutions will be announced via Addendum no less than 5 days before the Bid Date.
 - 3. Substitutions shall be documented in accordance with Paragraph D below.
- C. Following Notice to Proceed:
 - 1. Engineer may consider requests for substitutions only within 15 days after issuance of Notice to Proceed.
 - 2. Substitutions shall be documented in accordance with Paragraph D below.
- D. Document each request with complete data, substantiating compliance of proposed substitution with Contract Documents, including:
 - 1. Manufacturer's name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.
 - 2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance, and other pertinent characteristics.

3. Reference to Article and Paragraph numbers in Specification Section.
 4. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
 5. Changes required in other Work.
 6. Availability of maintenance service and source of replacement parts as applicable.
 7. Certified test data to show compliance with performance characteristics specified.
 8. Samples when applicable or requested.
 9. Other information as necessary to assist Engineer's evaluation.
- E. A request constitutes a representation that Bidder/Contractor:
1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 2. Will provide same warranty for substitution as for specified product.
 3. Will document and coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 5. Will coordinate installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
 6. Will reimburse Owner and Engineer for review or redesign services associated with approved substitutions.
- F. 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 Contract Documents.
- G. Substitution Submittal Procedure:
1. Submit three copies of requests for substitutions for consideration. Limit each request to one proposed substitution.
 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
 3. Engineer will notify Contractor in writing of decision to accept or reject request.
- H. Working Days
1. Working days for this project will not be extended as a result of re-design for substituted equipment.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and Project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Closeout meeting.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various Sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.
- C. After Substantial Completion, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of completed, satisfactory work.

1.3 FIELD ENGINEERING

- A. The Owner shall employ a field engineer (the Engineer). The Contractor shall notify the Engineer a minimum of 3 days prior to the start of work.
- B. The Contractor, at their expense and incidental to the Contract, shall subcontract Midwest Survey, LLC., as the Surveyor to perform construction layout/stakeout for exterior work. This shall only include exterior piping and utilities, buildings, tanks, and concrete pavement. If the Contractor wishes to self-perform the duties of the Surveyor, they may be performed specifically by the general contractor in lieu of subcontracting Midwest Survey, LLC. However, no other entity besides Midwest Survey, LLC, may be subcontracted.
- C. Construction layout/stakeout for all other exterior work not explicitly listed in part B may be provided by Midwest Survey, LLC, or by the general contractor but must be done at the expense of the Contractor and at no additional cost to the Owner.
- D. When construction layout/stakeout is required, the Contractor shall notify the Engineer and Surveyor a minimum of 3 business days prior to the required layout. Requests made for staking/layout with less than 3 business days advanced notice may not be accommodated and any

delay in the Contract time or increase in Contractor's expenses shall be the sole responsibility of the Contractor.

- E. The Engineer, at the Owner's expense, shall prepare and provide stakeout data as needed to the Surveyor once notified by the Contractor. This shall only include exterior piping and utilities, buildings, tanks, and concrete pavement.
- F. The Engineer, at the Owner's expense, shall provide a surface model in the form of a .DWG file containing linework representing major work items as shown on the site plan. Beyond the surface model, the Engineer will not provide layout/stakeout data for asphalt pavement, aggregate roadways, earthwork, or any items not specifically listed previously in part B. Any additional layout/stakeout data requested from and provided by the Engineer shall be at the Contractor's expense at no additional cost to the Owner.
- G. Locate and protect survey control and reference points. Promptly notify Engineer and Surveyor of discrepancies discovered.
- H. Control datum for survey is that shown on the Drawings.
- I. Verify set-backs and easements; confirm drawing dimensions and elevations.
- J. Maintain complete and accurate log of control and survey points as Work progresses.
- K. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- L. Promptly report to Engineer and Surveyor loss or destruction of reference points or relocation required because of changes in grade or other reasons.
- M. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.
- N. Any survey points disrupted or destroyed by the Contractor must be properly replaced at the Contractor's expense.

1.4 PRECONSTRUCTION MEETING

- A. Engineer will schedule and preside over meeting after Notice of Award.
- B. Attendance Required: Engineer, Owner, Resident Project Representative, appropriate governmental agency representatives, Construction Manager, major Subcontractors, and Contractor.
- C. Minimum Agenda:
 - 1. Submission of list of Subcontractors, list of products, schedule of values, and Progress Schedule.
 - 2. Designation of personnel representing parties in Contract.
 - 3. Communication procedures.

4. Procedures and processing of requests for interpretations, field decisions, field orders, submittals, substitutions, Applications for Payments, proposal request, Change Orders, and Contract closeout procedures.
 5. Scheduling.
 6. Critical Work sequencing.
 7. Use of premises by Owner and Contractor.
 8. Safety, security and housekeeping procedures.
- D. Engineer: Record minutes and distribute copies to participants within two days after meeting, with copies to Contractor, Owner, and those affected by decisions made.

1.5 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
1. Engineer will make arrangements for meetings, prepare agenda with copies for participants, and preside over meetings.
- B. Attendance Required: Contractor's Job Superintendent, major subcontractors and suppliers, Engineer, and Owner, as appropriate to agenda topics for each meeting.
- C. Minimum Agenda:
1. Review minutes of previous meetings.
 2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems impeding planned progress.
 5. Review of submittal 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: Record minutes and distribute copies to participants within two days after meeting, with copies to Contractor, Owner, and those affected by decisions made.

1.6 CLOSEOUT MEETING

- A. Schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.
- B. Attendance Required: Contractor, major Subcontractors, Engineer, Owner, and others appropriate to agenda.
- C. Engineer shall provide notification 14 days in advance of meeting date.

D. Minimum Agenda:

1. Start-up of facilities and systems.
2. Operations and maintenance manuals.
3. Testing, adjusting, and balancing.
4. System demonstration and observation.
5. Operation and maintenance instructions for Owner's personnel.
6. Contractor's inspection of Work.
7. Contractor's preparation of an initial "punch list."
8. Procedure to request Engineer inspection to determine date of Substantial Completion.
9. Completion time for correcting deficiencies.
10. Inspections by authorities having jurisdiction.
11. Certificate of Occupancy and transfer of insurance responsibilities.
12. Partial release of retainage.
13. Final cleaning.
14. Preparation for final inspection.
15. Closeout Submittals:
 - a. Project record documents.
 - b. Operating and maintenance documents.
 - c. Operating and maintenance materials.
 - d. Affidavits.
16. Final Application for Payment.
17. Contractor's demobilization of Site.
18. Maintenance.

- E. Engineer: Record minutes and distribute copies to participants within two days after meeting, with copies to Contractor, Owner, and those affected by decisions made.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 ALTERATION PROCEDURES

- A. Entire facility will be occupied for normal operations during progress of construction. Cooperate with Owner in scheduling operations to minimize conflict and to permit continuous usage.
 1. Perform Work not to interfere with operations of occupied areas.
 2. Keep utility and service outages to a minimum and perform only after written approval of Owner.
 3. Clean Owner-occupied areas daily. Clean spillage, overspray, and heavy collection of dust in Owner-occupied areas immediately.
- B. Cut, move, or remove items as necessary for access to Work. Replace and restore at completion.
- C. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- D. Remove debris and abandoned items from area and from concealed spaces.

- E. Prepare surface to permit installation of new Work.
- F. Where new Work abuts or aligns with existing Work, provide smooth and even transition.
- G. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Engineer for review.

END OF SECTION

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SECTION 01 3216 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittals.
- B. Format.
- C. Review and evaluation.
- D. Distribution.

1.2 SUBMITTALS

- A. Within 14 days after date of Notice to Proceed, submit draft of proposed complete bar chart schedule for review. Include written certification that major Subcontractors have reviewed and accepted proposed schedule.
- B. Within 7 days after joint review, submit revised Progress Schedule.
- C. Submit updated schedules with each Application for Payment.
- D. Schedule Updates:
 - 1. Overall percent complete, projected and actual.
 - 2. Completion progress by listed activity and subactivity, to within five working days prior to submittal.
 - 3. Changes in Work scope and activities modified since submittal.
 - 4. Delays in submittals or resubmittals, deliveries, or Work.
 - 5. Adjusted or modified sequences of Work.
 - 6. Other identifiable changes.
 - 7. Revised projections of progress and completion.
- E. Narrative Progress Report:
 - 1. Submit with each monthly submission of Progress Schedule.
 - 2. Summary of Work completed during the past period between reports.
 - 3. Work planned during the next period.
 - 4. Explanation of differences between summary of Work completed and Work planned in previously submitted report.
 - 5. Current and anticipated delaying factors and estimated impact on other activities and completion milestones.
 - 6. Corrective action taken or proposed.

1.3 FORMAT

- A. Bar chart schedule to include at least:

1. Identification and listing in chronological order of those activities reasonably required to complete the Work, including:
 - a. Subcontract Work.
 - b. Major equipment design, fabrication, factory testing, and delivery dates including required lead times.
 - c. Move-in and other preliminary activities.
 - d. Equipment and equipment system test and startup activities.
 - e. Project closeout and cleanup.
 - f. Work sequences, constraints, and milestones.
2. Listings identified by Specification Section number.
3. Identification of the following:
 - a. Horizontal time frame by year, month, and week.
 - b. Duration, early start, and completion for each activity and subactivity.
 - c. Critical activities and Project float.
 - d. Subschedules to further define critical portions of Work.

1.4 REVIEW AND EVALUATION

- A. Participate in joint review and evaluation of schedules with Engineer at each submittal.
- B. Evaluate Project status to determine Work behind schedule and Work ahead of schedule.
- C. After review, revise schedules incorporating results of review, and resubmit within 7 days.

1.5 DISTRIBUTION

- A. Following joint review, distribute copies of updated schedules to Contractor's Project site file, to Subcontractors, suppliers, and Engineer.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 3300 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Definitions.
- B. Submittal procedures.
- C. Build America, Buy America (BABA).
- D. Proposed product list.
- E. Product data.
- F. Use of electronic CAD files of Project Drawings.
- G. Shop Drawings.
- H. Samples.
- I. Design data.
- J. Test reports.
- K. Certificates.
- L. Manufacturer's instructions.
- M. Manufacturer's field reports.
- N. Erection Drawings.
- O. Contractor review.
- P. Engineer review.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's and Contractor's responsive action.
- B. Informational Submittals: Written and graphic information and physical Samples that do not require Engineer's and Contractor's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal to Engineer.
- B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.
- D. 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 according to requirements of the Work and Contract Documents.
- E. Include lead time required for all items being submitted.
- F. Schedule submittals to expedite Project, and submit electronic submittals via email as PDF electronic files. Coordinate submission of related items.
- G. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.
- H. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
- I. Allow space on submittals for Contractor and Engineer review stamps.
- J. When revised for resubmission, identify changes made since previous submission.
- K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- L. Submittals not requested will not be recognized nor processed.
- M. Incomplete Submittals: Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.4 BUILD AMERICA, BUY AMERICA ACT (BABA)

- A. Contractor shall ensure that all equipment, materials, and other selections comply with the standards set forth by the Build America, Buy America Act established on November 15, 2021. The requirements of BABA supersede any other specifications or preferences stated in the Contract Documents, if it is found the specification or preference does not meet BABA.
- B. Contractor Responsibilities:
 - 1. The Contractor must make a good-faith effort to identify and propose products, equipment, and materials that meet BABA requirements.
 - 2. If a product is found not to comply with BABA, the Contractor shall promptly notify the Engineer and submit alternatives for consideration.

- C. For each product not meeting the BABA requirements, the Contractor shall submit a list of the following information:
 - 1. Name of the product
 - 2. Proposed construction material
 - 3. Cost
 - 4. Countries of origin
 - 5. Product Service Code (PSC)
 - 6. North American Classification System (NAICS) code
 - 7. Certification that the Contractor has made a good faith effort to obtain domestic products
 - 8. Any additional information that may be requested
- D. Compliance
 - 1. The Contractor is responsible for providing all necessary certifications and documentation demonstrating compliance with BABA requirements for all equipment and materials.
 - 2. The Engineer reserves the right to reject submittals that fail to comply with BABA standards.
- E. If compliance with BABA requirements is determined to be infeasible, the Contractor must provide sufficient justification to the Engineer and Owner for initiating a waiver request.

1.5 PROPOSED PRODUCT LIST

- A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, model number, and lead time of each product.
- B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation, and reference standards.

1.6 PRODUCT DATA

- A. Product Data: Action Submittal: Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Submit electronic submittals via email as PDF electronic files to Engineer, or as opaque copies (number required by Contractor, plus three copies Engineer will retain).
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute.

1.7 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

- A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.

- B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
1. Use of files is solely at receiver's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Engineer of discrepancy and use information in hard-copy Drawings and Specifications.
 2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
 3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
 4. Receiver shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
 5. Receiver shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
 6. Receiver shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.

1.8 SHOP DRAWINGS

- A. Shop Drawings: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
1. Include signed and sealed calculations to support design.
 2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Submit electronic submittals via email as PDF electronic files to Engineer, or as opaque copies (number required by Contractor, plus three copies Engineer will retain).
- E. After review, produce copies and distribute.

1.9 SAMPLES

- A. Samples: Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

- B. Samples for Selection as Specified in Product Sections:
 - 1. Submit to Engineer for aesthetic, color, and finish selection.
 - 2. Submit Samples of finishes, textures, and patterns for Engineer selection.
- C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.
- D. Include identification on each Sample, with full Project information.
- E. Submit number of Samples specified in individual Specification Sections; Engineer will retain one Sample.
- F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.
- G. After review, produce copies and distribute.

1.10 DESIGN DATA

- A. Informational Submittal: Submit data for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.11 TEST REPORTS

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.12 CERTIFICATES

- A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or 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.

1.13 MANUFACTURER'S INSTRUCTIONS

- A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.

- B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer in quantities specified for Product Data.
- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.14 MANUFACTURER'S FIELD REPORTS

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit report within 7 days of observation to Engineer for information.
- C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.15 ERECTION DRAWINGS

- A. Informational Submittal: Submit Drawings for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit Drawings for information assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.16 CONTRACTOR REVIEW

- A. Review for compliance with Contract Documents and approve submittals before transmitting to Engineer.
- B. Contractor: Responsible for:
 - 1. Determination and verification of materials including manufacturer's catalog numbers.
 - 2. Determination and verification of field measurements and field construction criteria.
 - 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
 - 4. Determination of accuracy and completeness of dimensions and quantities.
 - 5. Confirmation and coordination of dimensions and field conditions at Site.
 - 6. Construction means, techniques, sequences, and procedures.
 - 7. Safety precautions.
 - 8. Coordination and performance of Work of all trades.
- C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.
- D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

1.17 ENGINEER REVIEW

- A. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six or more submittals or items in one day or 20 or more submittals or items in one week. If "mass submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner and Contractor.
- B. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.
- C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.
- D. Submittal approval does not authorize changes to Contract requirements unless accompanied by letter of acceptance and/or Change Order.
- E. Owner may withhold monies due to Contractor to cover additional costs beyond the second submittal review.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

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SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality control.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Testing and inspection services.
- F. Manufacturers' field services.
- G. Examination.
- H. Preparation.

1.2 QUALITY CONTROL

- A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work using persons qualified to produce required and specified quality.
- F. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.
- G. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- H. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current as of date of Contract Documents except where specific date is established by code.
- C. Obtain copies of standards and maintain on Site when required by product Specification Sections.
- D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference in reference documents.

1.5 LABELING

- A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable codes.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.
- C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.6 TESTING AND INSPECTION SERVICES

- A. Owner will employ and pay for specified services of an independent firm to perform testing and inspection.
- B. Independent firm will perform tests, inspections, and other services specified in individual Specification Sections and as required by the Engineer and Owner.
 - 1. Laboratory: Authorized to operate in the State of Illinois.

- C. Reports shall be submitted by independent firm to Engineer and Contractor, indicating observations and results of tests and compliance or noncompliance with Contract Documents.
- D. 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 before expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.
- E. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.
- F. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- G. Agency Responsibilities:
 - 1. Test Samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at Site. Cooperate with Engineer and Contractor in performance of services.
 - 3. Perform indicated sampling and testing of products according to specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or products.
 - 6. Perform additional tests required by Engineer.
 - 7. Attend preconstruction meetings and progress meetings.
- H. Agency Reports: After each test, promptly submit 2 copies of report to Engineer and Contractor. When requested by Engineer, provide interpretation of test results.
- I. Limits on Testing Authority:
 - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency or laboratory may not approve or accept any portion of the Work.
 - 3. Agency or laboratory may not assume duties of Contractor.
 - 4. Agency or laboratory has no authority to stop the Work.

1.7 MANUFACTURER'S 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, startup of equipment, testing, adjusting, and balancing of equipment, and commissioning as applicable, and to initiate instructions when necessary.
- B. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions and substrate are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify 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 utility services are available, of correct characteristics, and in correct locations.

3.2 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 new material or substance in contact or bond.

END OF SECTION

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities:
 - 1. Temporary electricity.
 - 2. Temporary lighting for construction purposes.
 - 3. Temporary heating.
 - 4. Temporary cooling.
 - 5. Temporary ventilation.
 - 6. Communication services.
 - 7. Temporary water service.
 - 8. Temporary sanitary facilities.
- B. Construction Facilities:
 - 1. Contractor's field offices and sheds.
 - 2. Engineer's field office.
 - 3. Vehicular access.
 - 4. Parking.
 - 5. Progress cleaning and waste removal.
 - 6. Project identification.
 - 7. Traffic regulation.
 - 8. Fire-prevention facilities.
- C. Temporary Controls:
 - 1. Barriers.
 - 2. Enclosures and fencing.
 - 3. Security.
 - 4. Dust control.
 - 5. Erosion and sediment control.
 - 6. Noise control.
 - 7. Pollution control.
 - 8. Pest and rodent control.
- D. Removal of utilities, facilities, and controls.

1.2 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from utility source as needed for construction operation.
- B. Provide or pay for all necessary feeders, wiring, or cords required to operate the required equipment.
- C. Provide, maintain, and pay for electrical service to field offices at time of project mobilization.

1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations.
- B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas and portions of site required after dark for security purposes.
- C. Maintain lighting and provide routine repairs.

1.4 TEMPORARY HEATING

- A. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations.
- B. Before operating permanent equipment for temporary heating purposes, verify 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. Replace filters at Substantial Completion.
- C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress unless indicated otherwise in individual product Sections.
- D. Provide, maintain and pay for heating of field offices at time of project mobilization.

1.5 TEMPORARY COOLING

- A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations.
- B. Before operating permanent equipment for temporary cooling purposes, verify 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. Replace filters at Substantial Completion.
- C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress unless indicated otherwise in individual product Sections.
- D. Provide, maintain, and pay for cooling of field offices at time of project mobilization.

1.6 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Provide, maintain, and pay for ventilation of field offices at time of project mobilization.

1.7 COMMUNICATION SERVICES

- A. Internet Service: Provide, maintain, and pay for High-Speed Internet service to field offices at time of Project mobilization. Provide wifi as well as high-speed ethernet connection.

1.8 TEMPORARY WATER SERVICE

- A. Provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations.

1.9 TEMPORARY SANITARY FACILITIES

- A. Provide, pay for, and maintain required facilities and enclosures. Provide facilities at time of Project mobilization.

1.10 FIELD OFFICES AND SHEDS

- A. The Contractor shall provide a field office as required for his Work. The use of a field office and any associated utility costs are the Contractor's option and are not required as a part of the Contract, and any costs associated with these items shall be considered incidental to the Contract.
- B. The Contractor shall provide a field office for the Engineer and/or Owner's representative. The office shall be equipped with desk and chair and conference table with chairs able to seat 8 people. High-speed internet connection is also required. The Engineer's field office will be separate from the Contractor's and tool storage shall not be allowed.
- C. Storage Areas and Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01 6000 – Product Requirements. The Contractor shall provide storage areas and sheds as required for his Work. The use of a storage area and sheds and any associated utility costs are the Contractor's option and are not required as a part of the Contract, and any costs associated with these items shall be considered incidental to the Contract.
- D. Preparation: Fill and grade site for temporary structures sloped for drainage away from structures.
- E. Removal: At completion of Work remove buildings, foundations utility services, and debris. Restore areas.

1.11 VEHICULAR ACCESS

- A. Use existing on-site roads for construction traffic.
- B. If necessary for timely, efficient progress of the Work, construct temporary all-weather access roads to serve construction area, of width and load-bearing capacity to accommodate unimpeded traffic for construction purposes, Owner's access, and emergency vehicles.
- C. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.

- D. Provide unimpeded access for emergency vehicles. Maintain 20 foot wide driveways with turning space between and around combustible materials.
- E. Provide means of removing mud from vehicle wheels before entering streets.
- F. Temporary vehicular access shall be incidental to the Contract.

1.12 PARKING

- A. Provide temporary gravel surface parking areas to accommodate construction personnel.
- B. Locate as approved by the Engineer and Owner.
- C. If Site space is not adequate, provide additional off-Site parking.
- D. Do not allow heavy vehicles or construction equipment in parking areas.
- E. Designate one parking space each for Owner and Engineer.
- F. Permanent Pavements and Parking Facilities:
 - 1. Bases for permanent roads and parking areas may be used for construction traffic.
 - 2. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.
 - 3. Use of approved permanent parking structures is permitted.
- G. Maintenance:
 - 1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, ice, and the like.
 - 2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.
- H. Removal, Repair:
 - 1. Remove temporary materials and construction at Substantial Completion.
 - 2. Repair existing permanent facilities damaged by use, to original condition.
- I. Mud from Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.
- J. Temporary parking as described shall be incidental to the Contract.

1.13 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, before enclosing spaces.

- C. Broom and vacuum clean interior areas before starting surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from Site as required and dispose of off-Site.

1.14 PROJECT IDENTIFICATION

- A. None required.

1.15 TRAFFIC REGULATION

- A. Haul Routes:
 - 1. Consult with authorities having jurisdiction and establish public thoroughfares to be used for haul routes and Site access.
- B. Traffic Signs and Signals:
 - 1. Provide signs at approaches to Site and on Site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
 - 2. Relocate signs and signals as Work progresses, to maintain effective traffic control.
- C. Removal:
 - 1. Remove equipment and signs when no longer required.
 - 2. Repair damage caused by installation.
 - 3. Remove post settings to depth of 2 feet.

1.16 FIRE-PREVENTION FACILITIES

- A. Prohibit smoking within buildings under construction and demolition. Designate area on Site where smoking is permitted. Provide approved ashtrays in designated smoking areas.
- B. Establish fire watch for cutting, welding, and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.
- C. Portable Fire Extinguishers: NFPA 10; 10-pound capacity, 4A-60B: C UL rating.
 - 1. Provide one fire extinguisher at each stairway on each floor of buildings under construction and demolition.
 - 2. Provide minimum of one fire extinguisher in every construction trailer and storage shed.
 - 3. Provide minimum of one fire extinguisher on roof during roofing operations using heat-producing equipment.

1.17 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition. Owner's access to site shall be maintained at all times.
- B. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.

1.18 ENCLOSURES AND FENCING

- A. Construction: Commercial-grade chain-link fence.
- B. Provide 6-foot-high fence around construction Site as needed to supplement existing Site fencing; equip with vehicular and pedestrian gates with locks.
- C. Exterior Enclosures:
 - 1. Provide temporary weathertight 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 self-closing hardware and locks.
- D. Interior Enclosures:
- E. Security Program:
 - 1. Protect Work, existing premises and Owner's operations from theft, vandalism, and unauthorized entry.
 - 2. Restrict entrance of persons and vehicles into Project Site and existing facilities, allowing only authorized persons.
 - 3. Maintain program throughout construction period until directed by Engineer.

1.19 DUST CONTROL

- A. Execute Work by methods that minimize raising dust from construction operations.
- B. Provide positive means to prevent airborne dust from dispersing into atmosphere.

1.20 EROSION AND SEDIMENT CONTROL

- A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.
- B. Protect Site from puddles or running water. Provide water barriers and/or silt fence as required to protect Site from soil erosion.
- C. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.
- D. Minimize surface area of bare soil exposed at one time.
- E. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.
- F. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- G. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

H. Comply with sediment and erosion control plan indicated on Drawings.

1.21 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise produced by construction operations.

1.22 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.

B. Comply with pollution and environmental control requirements of the Illinois Environmental Protection Agency.

1.23 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials before Final Application for Payment inspection.

B. Remove underground installations to minimum depth of 2 feet. Grade Site as indicated on Drawings.

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.

1.24 YARD MAINTENANCE

A. During the Contract times, the Contractor shall provide regular yard maintenance to prevent excessive weed growth.

B. At least once per month during the growing season, the Contractor shall mow the entire area within the work area.

C. Once the final lawns have been installed and until the date of Final Completion, the Contractor shall provide at least weekly mowing during the growing season.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

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SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.

1.2 PRODUCTS

- A. At minimum, comply with specified requirements and reference standards.
- B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.
- C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.
- D. Domestic Products: Except where specified otherwise, domestic products are preferred and interpreted to mean products mined, manufactured, fabricated, or produced in United States or its territories.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products according to manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products according to manufacturer's instructions.
- B. Store products with seals and labels intact and legible.
- C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.
- D. For exterior storage of fabricated products, place products on sloped supports aboveground.

- E. Provide secure, insured 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 well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products; use 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.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and complying with Specifications; no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to Section 01 2500 - Substitution Procedures.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 7000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting, and balancing.
- F. Protecting installed construction.
- G. Project record documents.
- H. Operation and maintenance data.
- I. Manual for materials and finishes.
- J. Manual for equipment and systems.
- K. Spare parts and maintenance products.
- L. Product warranties and product bonds.
- M. Maintenance service.

1.2 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 required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean debris from the site.

- C. Clean site; sweep paved areas, rake clean landscaped surfaces.
- D. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Engineer and Owner seven days prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturers' 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 3300 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. 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.
- E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

- G. Required instruction time for each item of equipment and system is specified in individual sections.

1.6 TESTING, ADJUSTING AND BALANCING

- A. The Contractor shall provide and pay for the required independent firm or manufacturer's representatives required to perform testing, adjusting, and balancing specified in individual product Sections.
- B. Reports will be submitted by independent firm/manufacturer's representative to Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.7 PROTECTING INSTALLED CONSTRUCTION

- 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. Prohibit traffic from landscaped areas.

1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents which the originals will be turned over to the Owner; 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 future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- 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.

1.9 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring capacity expansion binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, 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 process flow 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.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 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 and bonds.
- F. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

- G. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy to be reviewed and returned after final inspection, with Engineer comments. Revise content of document sets as required prior to final submission.
- H. Submit three sets of revised final volumes in final form within 10 days after final inspection.

1.10 MANUAL FOR MATERIALS AND FINISHES

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. 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 one copy of completed volumes 15 days prior to final inspection. Draft copy to be reviewed and returned after final inspection, with Engineer comments. Revise content of document sets as required prior to final submission.
- D. Submit three sets of revised final volumes in final form within 10 days after final inspection.
- E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.
- F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- H. Additional Requirements: As specified in individual product specification sections.
- I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. 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 one copy of completed volumes 15 days prior to final inspection. Draft copy to be reviewed and returned after final inspection, with Engineer comments. Revise content of document sets as required prior to final submission.

- D. Submit three sets of revised final volumes in final form within 10 days after final inspection.
- E. 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.
- F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- G. Include color coded wiring diagrams as installed.
- H. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.
- I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- J. Include servicing and lubrication schedule, and list of lubricants required.
- K. Include manufacturer's printed operation and maintenance instructions.
- L. Include sequence of operation by controls manufacturer.
- M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- N. Include control diagrams by controls manufacturer as installed.
- O. Include Contractor's coordination drawings, with color coded piping diagrams as installed.
- P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- R. Include test and balancing reports as specified in Section 01 4000 - Quality Requirements.
- S. Additional Requirements: As specified in individual product specification sections.
- T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish 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.

1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time Of Submittals:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
 - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.14 MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections during warranty period.
- B. Examine system components at 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 manufacturer of original component.
- D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of Owner.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 03 1000 - CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in-place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Form accessories.
 - 4. Form stripping.

1.2 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 347 to conform to design and applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

1.3 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347, 301, 318, 350, and International Building Code.
- B. Perform Work in accordance with these Specifications and the Roadway Specifications.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Section 01 6000 – Product Requirements: Products storage and handling requirements.
- B. Deliver forms and installation instructions in manufacturer's packaging.
- C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.6 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Lumber Forms:
 - 1. Application: Use for edge forms and unexposed finish concrete.
 - 2. Boards: 6 inches or 8 inches in width, shiplapped or tongue and groove, "Standard" Grade Douglass Fir, conforming to WCLIB Standard Grading Rules for West Coast Lumber. Surface boards on four sides.
- B. Plywood Forms:
 - 1. Application: Use for exposed finish concrete.
 - 2. Forms: Conform to PS 1; full size 4 x 8 feet panels; each panel labeled with grade trademark of APA/EWA.
 - 3. Plywood for Surfaces to Receive Membrane Waterproofing: Minimum of 5/8 inch thick; APA/EWA "B-B Plyform Structural I Exterior" grade.
 - 4. Plywood where "Smooth Finish" is required, as indicated on Drawings: APA/EWA "HD Overlay Plyform Structural I Exterior" grade, minimum of 3/4 inch thick.

2.2 PREFABRICATED FORMS

- A. Manufacturers:
 - 1. Aluma-Systems, Inc., Burke Co.
 - 2. Economy Forms Corp.
 - 3. Molded Fiber Glass Concrete Forms Co.
 - 4. Perma Tubes
 - 5. Sonoco Products Co.
 - 6. Symons Corp.
 - 7. Western Forms, Inc.
 - 8. Substitutions: Section 01 6000 – Product Requirements
- B. Preformed Steel Forms: Minimum 16 gauge matched, 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. Steel Forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings.
- E. Framing, Studding and Bracing: Stud or No. 3 structural light framing grade.

2.3 FORMWORK ACCESSORIES

- A. Form Ties:
 - 1. Removable type, galvanized metal, cone type, with waterproofing washer, free of defects, capable of leaving holes larger than 1 inch in concrete surface.

- B. Spreaders: Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. Wire ties, wood spreaders or through bolts are not permitted.
- C. Form Anchors and Hangers:
 - 1. Do not use anchors and hangers on exposed concrete leaving exposed metal at concrete surface.
 - 2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member.
 - 3. Penetration of structural steel members is not permitted.
- D. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- E. Dovetail Anchor Slot: Galvanized steel, 22 gauge thick, foam filled, anchors for securing to concrete formwork.
 - 1. Manufacturers:
 - a. Heckmann, Model 100
 - b. Hohmann & Barnard, Model DA 100
 - c. Substitutions: Section 01 6000 – Product Requirements
- F. Vapor Retarder: Where indicated on Drawings, 8 mil thick polyethylene sheet.
- G. Bituminous Joint Filler: Not allowed.
- H. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.
- I. Water Stops: Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50° F to plus 175° F working temperature range, width as indicated on Drawings, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.
- J. Corners: Fillet or chamfer, rigid plastic or wood strip type; 3/4 x 3/4 inch size minimum; maximum possible lengths.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Engineer.

3.2 INSTALLATION

- A. Earth Forms:
 - 1. EARTH FORMS ARE NOT PERMITTED.
- B. Formwork – General:
 - 1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
 - 2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
 - 3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
 - 4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
 - 5. Complete wedging and bracing before placing concrete.
- C. Forms for Smooth Finish Concrete:
 - 1. Concrete surfaces exposed to view in the finished work or surfaces to receive finishes of any type (paint, textured paint, etc.) shall have a smooth form finish as defined by ACI 301. Set and maintain forms so finished concrete dimensions shall conform to the tolerances of ACI 347.
 - 2. Use steel, plywood, or lined board forms.
 - 3. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
 - 4. Install form lining with close-fitting square joints between separate sheets without springing into place.
 - 5. Use full size sheets of form lines and plywood wherever possible.
 - 6. Tape joints to prevent protrusions in concrete.
 - 7. Use care in forming and stripping wood forms to protect corners and edges.
 - 8. Level and continue horizontal joints.
 - 9. Keep wood forms wet until shipped.
- D. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.
- E. Framing, Studding and Bracing:
 - 1. Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood.
 - 2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
 - 3. Construct beam soffits of material minimum of 2 inches thick.
 - 4. Distribute bracing loads over base area on which bracing is erected.
 - 5. When placed on ground, protect against undermining, settlement or accidental impact.
- F. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301, ACI 318, and ACI 350.
- G. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

- H. Obtain Engineer's approval before framing openings in structural members not indicated on Drawings.
- I. Install chamfer strips on all external corners.
- J. Install void forms in accordance with manufacturer's recommendations.

3.3 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 are indicated to receive finishes that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION – INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to 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. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install water stops continuous without displacing reinforcement. Heat seal joints watertight. Water stops shall be installed at all construction joints.
- 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.
- H. Form Ties:
 - 1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
 - 2. Leave inner rods in concrete where forms are stripped.
 - 3. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.

- I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- J. Construction Joints:
 - 1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
 - 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
 - 3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
 - 4. Arrange joints in continuous line straight, true and sharp.
- K. Embedded items:
 - 1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
 - 2. Do not embed wood or uncoated aluminum in concrete.
 - 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
 - 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
 - 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- L. Openings for Items Passing Through Concrete:
 - 1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
 - 2. Coordinate work to avoid cutting and patching of concrete after placement.
 - 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- M. Screeds:
 - 1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
 - 2. Slope slabs to drain where required or as shown on Drawings.
 - 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
- N. Screed Supports:
 - 1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membranes.
 - 2. Staking through membrane is not permitted.
- O. Cleanouts and Access Panels:
 - 1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
 - 2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. 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.

3.6 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Engineer.
- B. Loose forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347. Forms and shoring for elevated beams and floor slabs shall remain in place until the specified concrete compressive strength is obtained and documented by tests.

3.7 ERECTION TOLERANCES

- A. Construct formwork to maintain tolerances by ACI 301 and ACI 318.

3.8 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

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SECTION 03 2000 - CONCRETE REINFORCING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing bars.
 - 2. Welded wire fabric.
 - 3. Reinforcement accessories.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 – Specifications for Structural Concrete.
 - 2. ACI 318 – Building Code Requirements for Structural Concrete.
 - 3. ACI 503.1 – Specifications for Masonry Structures.
 - 4. ACI SP-66 – ACI Detailing Manual.
 - 5. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures.
- B. ASTM International:
 - 1. ASTM A185 – Standard Specification for Steel Welded Wire, Plain, for Concrete Reinforcement.
 - 2. ASTM A615/A615M – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. American Welding Society:
 - 1. AWS D1.4 – Structural Welding Code – Reinforcing Steel.
- D. Concrete Reinforcing Steel Institute:
 - 1. CRSI – Manual of Standard Practice.
 - 2. CRSI – Placing Reinforcing Bars.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.
- C. Certificates: Submit AWS qualification certificate for welders employed on the Work.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
 - 1. Submit certified copies of mill test report of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301, ACI, 318, ACI 350, and CRSI – Manual of Standard Practice.
- B. Prepare shop drawings in accordance with ACI SP-66.
- C. Perform Work in accordance with these Specifications and the Roadway Specifications.
- D. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Welders: AWS qualified within previous 12 months.

1.6 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M; 60 ksi yield strength, deformed billet steel bars, unfinished.
- B. Welded Plain Wire Fabric: ASTM A185; in flat sheets; unfinished.
- C. Epoxy Coated Reinforcing Steel: To be used where indicated on the Drawings. ASTM A775/AASHTO M284; 60 ksi yield strength.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gauge annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers; Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic-coated steel type; size and shape to meet Project conditions.
- D. Reinforcing Splicing Devices: Full mechanical type. Splice shall develop at least 125% of the specified yield strength of the bar. The mechanical connection shall be a positive butt splice utilizing lock shear bolts and internal serrated grip rails within the coupling sleeve manufactured

from high quality steel. The heads of the lock shear bolts shall be designed to shear off at a prescribed torque to ensure proper installation. Install per manufacturer's recommendations.

2.3 FABRICATION:

- A. Fabricate concrete reinforcement in accordance with ACI 318, ACI 350, and the CRSI – Manual of Standard Practice.
- B. Form standard hooks as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Do not weld reinforcement.
- F. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with Engineer.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
 - 1. Do not weld crossing reinforcement bars for assembly.
- B. Do not displace or damage vapor retarder.
- C. Accommodate placement of formed openings.
- D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318.
- E. Maintain concrete cover around reinforcement in accordance with ACI 318 and as indicated on Drawings.
- F. Splice reinforcing where indicated on Drawings and in accordance with splicing device manufacturer's instructions.

3.2 ERECTION TOLERANCES

- A. Section 01 4000 – Quality Requirements: Tolerances.
- B. Install reinforcement within the following tolerances for flexural members, walls, and compression members:

Reinforcement Depth:	Depth Tolerance:	Concrete Cover Tolerance:
Greater than 8 inches	Plus or minus 3/8 inch	Minus 3/8 inch
Less than 8 inches	Plus or minus 1/2 inch	Minus 1/2 inch

- C. Install reinforcement for masonry within the tolerances specified in ACI 530.1.

3.3 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements.
- B. Provide free access to Work and cooperate with appointed firm.
- C. Reinforcement Inspection:
1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
 2. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.
 3. Welding: Inspect welds in accordance with AWS D1.1.
 4. Weldability Inspection. Inspect for reinforcement weldability when formed from steel other than ASTM A706.

END OF SECTION

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes, but not limited to, cast-in-place concrete for the following:
 - 1. Building frame members.
 - 2. Walls.
 - 3. Foundation walls.
 - 4. Supported slabs.
 - 5. Slabs on grade.
 - 6. Control, expansion and contraction joint devices.
 - 7. Equipment pads.
 - 8. Light pole base.

1.2 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on joint devices, and attachment accessories.
- C. Design Data:
 - 1. Submit concrete mix design for each concrete strength.
 - 2. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - b. Air-entrained concrete work.
 - 3. Identify mix ingredients and proportions.
 - 4. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
 - 5. Submit compressive strength test results obtained on a test batch using each mix design to be used on this project.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.
- E. Maintain one copy of each document on site.

1.6 COORDINATION

- A. Section 01 3000 – Administration Requirements: Coordination and project conditions.
- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I – Normal, Portland type; Type II – Moderate Heat of Hydration; Type III – High Early Strength; or Type IV – Low Heat of Hydration as needed to meet requirements. Use one brand of cement throughout project, unless approved by Engineer.
- B. Aggregates: ASTM C33, normal weight.
 - 1. Fine and Coarse Aggregate
 - a. In accordance with Sections 1003.02 and 1004.02 of the Roadway Specifications.
 - b. Maximum size in accordance with ACI 318.
- C. Water: ACI 318; potable, not detrimental to concrete or steel.

2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260.
 - 1. Manufacturers:
 - a. W. R. Grace – Darex AEA.
 - b. Sika Chemical Corp. – Sika AER
 - c. Master Builders Co. – MB-VR
 - d. Substitutions: Section 01 6000 – Product Requirements.
- B. Water Reducing: ASTM C494/C494M
 - 1. Use only with approval of Engineer.
- C. Calcium Chloride: NOT PERMITTED

- D. Fibers for fiber reinforced concrete slabs shall be FiberMesh 650 or W. R. Grace STRUX BT50 or W. R. Grace STRUX 90/40 or Engineer-approved equal.

2.3 ACCESSORIES

- A. Non-Shrink Grout: ASTM C1107, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
 - 1. Manufacturers:
 - a. Master Builders – Masterflow
 - b. U.S. Grout Corp. – Five Star Grout
 - c. W. R. Meadows – 588 Grout
 - d. Substitutions: Section 01 6000 – Product Requirements.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler: ASTM D1751; Premolded flexible, lightweight, non-staining, polyethylene, and closed cell; 1/2” inch thick; Deck-O-Foam manufactured by W. R. Meadows or approved equal.
- B. Sealant: ASTM D6690, Type I.

2.5 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94.
- B. Concrete mix design shall be per the following schedule:
 - 1. PCC Pavement Patches: Class PP-1 per the requirements of Section 1020 of the Roadway Specifications.
 - 2. Pavement: Class PV per the requirements of Section 1020 of the Roadway Specifications.
 - 3. Structures, Sidewalks, Curb and Gutter, and Interior Floor Slabs: Class SI per the requirements of Section 1020 of the Roadway Specifications.
- C. Average Compressive Strength Reduction: Not permitted.
- D. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M and ASTM C685/C685M.
- E. Heat of hydration shall be controlled in accordance with Section 1020.15 of the Roadway Specifications. Revise the first paragraph of Section 1020.15 to read: “The contractor shall comply with all of the following requirements related to the control of heat or hydration of concrete structures when the least dimension of a wall, or slab, or footing exceeds 35-1/2 inches.

F. Provide concrete to the following criteria:

<u>Unit</u>	<u>Measurement</u>
For Structures (unless noted otherwise):	
Compressive Strength (14 day)	4000 psi
For Sidewalk, Pavement, Curb & Gutter,	
Building floor slabs on aggregate fill (14 day)	3500 psi
Brine Tanks	5000 psi

- G. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.
- H. Use set retarding admixtures during hot weather only when approved by Engineer.
- I. The addition of reinforcing fibers for slabs on grade shall be at a rate recommended by the manufacturer to act as a replacement for temperature and shrinkage reinforcement in each slab.
- J. Add air entraining agent to normal weight concrete mix for work exposed to exterior.
- K. Workability: Concrete shall have a workability such that it will fill the forms without voids or honeycombs with proper ventilation without permitting materials to separate or excess water to collect on the surface.
- L. Concrete Temperatures: Temperatures for concrete placement shall be in accordance with Section 1020.14 of the Roadway Specifications.
1. Maintain concrete temperature above 50° F for minimum of 7 days following placement.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Verify requirements for concrete cover over reinforcements.
- C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials. Remove concrete splatter from reinforcing bars.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301, ACI 318, and ACI 350.
- B. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and all other pre-placed items are not disturbed during concrete placement.
- D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by taping edges and ends.
- E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Separate slabs on grade from vertical surfaces with joint filler.
- G. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- H. Extend joint filler from bottom of slab to within ½ inch of finished slab surface. Conform to finish joint sealer requirements.
- I. Apply sealants in joint devices.
- J. Deposit concrete at final position. Prevent segregation of mix.
- K. Place concrete in continuous operation for each panel or section determined by predetermined joints. Provide adequate numbers of conveyors or pumping devices to ensure cold joints do not occur.
- L. Consolidate concrete.
- M. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- N. Place concrete continuously between predetermined expansion, control, and construction joints. Provide adequate numbers of conveyors or pumping devices to ensure cold joints do not occur.
- O. Do not interrupt successive placement; do not permit cold joints to occur.
- P. The consistency of concrete must be plastic and cohesive, not fluid, yet sufficiently soft to flow freely to fill the crevices. Work around reinforcement without excessive puddling or spading and without permitting materials to segregate, or free water to collect on the surfaces.
- Q. Concrete not placed within 90 minutes of initial mix will be rejected.

- R. Concrete from its point of release to mixers, hoppers, or conveyances, shall not be permitted to drop more than 5 feet. Deposit concrete directly into conveyances and directly from conveyances to final points of deposit. Sufficient transportation equipment in good working order shall be on hand before work begins. All conveying equipment shall be clean and kept clean during concreting operations. Take every possible precaution to prevent separation or loss of ingredients.
- S. Deposit concrete in wall forms in layers not greater than 24 inches in depth. Each layer shall be compacted before succeeding layer is placed. No water or foreign materials shall be left in forms during concrete placement.
- T. Consolidation of concrete shall conform to ACI 309. Place concrete as near as possible to final position to prevent segregation. Do not use vibrators to transport concrete within forms. Consolidate concrete in walls, columns, beams and slabs or joists construction thicker than 8 inches with internal vibrators (8000 to 12000 V.P.M.). Slabs less than 8 inches thick may be consolidated with internal vibrators (9000 to 13500 V.P.M.) or vibrating screeds supported on forms, screed boards, boards or rails, approved by the Structural Engineer. Supplement vibration by forking or hand spading along surface adjacent to forms and construction joints.
- U. Retempering of concrete will not be permitted. Concrete that has obtained its initial set shall be discarded.
- V. At exterior concrete surfaces, except slabs, strip forms and cut tie-wires to depth of 3/4 inch. Dampen tie holes and all honeycombed areas with clean water and patch flush with patching mortar. Add one part bonding agent to three parts clean water and mix with patching mortar. Mix and apply heavy first coat at two pounds per square yard. Apply second brush coat at same rate after finish has set. When finish coat has set, float it to uniform texture with a sponge float.
- W. Saw cut joints in slabs on grade within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/3 depth of slab thickness.
- X. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/8 inch in 10 ft.

3.4 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed (concrete walls, columns, beams, and joists) with smooth rubbed finish. Rubbing shall be performed with a stone specifically designed for rubbing concrete. The use of power tools and/or the use of a burlap sack for rubbing are not acceptable. Rubbing shall be performed to the approval of the Engineer. Rubbing shall extend 6 inches below the finished grade of exterior exposed walls or for the full height of interior walls.
- B. Sidewalks, stairs, and curb and gutter shall receive a light broom finish perpendicular to the direction of traffic.
- C. Pavements and driveways shall receive a heavy broom finish perpendicular to the direction of traffic.
- D. Building interior slabs shall receive a smooth, steel troweled finish.

- E. In areas with drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on Drawings.

3.5 CURING AND PROTECTION

- A. 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.
- C. Protect exposed surfaces from premature drying.
- D. Protect freshly placed concrete against wash by rain.
- E. Protect concrete surface from drying for seven (7) continuous days after placement, including weekends and holidays (3 days if Type III Portland cement is used); alternate cycles of wetting and drying not permitted.
- F. All floor areas and foundation walls shall receive two (2) coats of membrane curing compound; comply with manufacturer's instructions. Membrane curing compound: ASTM C309 Type I, acrylic type, clear, containing a minimum 18 percent solids.
- G. At end of water cure period, before allowing concrete to dry, rinse and flush surface to remove reaction products.
- H. Protect freshly placed concrete from all traffic, including Contractor's vehicles, until 100% of design strength is attained.
- I. Do not allow flowing water to contact concrete while it is in a plastic state. Do not allow flowing water to contact formwork edges or joints.
- J. Concrete other than structures shall be protected from low air temperatures in accordance with Section 1020.13(c) of the Roadway Specifications.
- K. Concrete structures shall be protected from low air temperatures in accordance with Section 1020.13(d) of the Roadway Specifications with the exception that only protection Method II will be permitted for vertical elements (walls or columns) or slabs supported above grade.

3.6 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements and Section 01 7000 – Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318 and ACI 350.
- C. Provide free access to Work and cooperate with appointed firm.

- D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- E. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- F. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured.
 - 3. Sample concrete and make one set of three cylinders for every 50 cu yds or less of each class of concrete placed each day.
 - 4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
 - 5. Make one additional cylinder during cold weather concreting, and field cure.
- G. Field Testing:
 - 1. Slump Test Method: ASTM C143/C143M.

3.7 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections as directed by Engineer.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

END OF SECTION

SECTION 03 4113 - PRECAST CONCRETE HOLLOW CORE PLANKS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Roof planks.
 - 2. Grouting plank joint keys.

1.2 SUBMITTALS

- A. Product Data: Standard component configuration, design loads, deflections, camber, bearing requirements, and fire ratings.
- B. Shop Drawings: Plank layout, unit identification marks, connection details, edge conditions, bearing requirements, support conditions, dimensions, openings, openings intended to be field cut, and relationship to adjacent materials.
- C. Fabricator's Certificate: Products meet or exceed specified requirements.
- D. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.
- E. Delegated Design Submittals: Submit signed and sealed, by an Illinois Licensed Structural Engineer, Shop Drawings with design calculations and assumptions for loadings of planks, prestressing and connections.
- F. Fabricator Instructions: Special procedures, perimeter conditions requiring special attention.
- G. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- H. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- I. Qualifications Statements:
 - 1. Qualifications for fabricator, erector, welder, and licensed professional.
 - 2. Welders: Qualify procedures and personnel according to AWS D1.1/D1.1M, AWS B2.1/2.1M, and AWS D1.4/D1.4M.

1.3 QUALITY ASSURANCE

- A. Design planks according to following:
 - 1. PCI MNL-120.
 - 2. PCI MNL-126.
 - 3. PCI MNL-124.
 - 4. ACI 318.
 - 5. ACI 301.

- B. Design connections according to PCI MNL-123.
- C. Plank Production:
 - 1. Comply with PCI MNL-116.
 - 2. Maintain plant records and quality-control program during production of precast planks.
 - 3. Make records available upon request of Engineer.
- D. Fire-Rated Roof Construction:
 - 1. Rating: As indicated 2 hours MNL-124 may be used to determine fire rating.
- E. Perform work according to ACI 318 standards.
- F. Fabricator: The precast Prestressed Concrete Institute (PCI) Plant Certification Program and shall be certified in category C2.
- G. Erector: Precast Prestressed Concrete Institute (PCI) Qualified Erector Program and regularly engaged for at least five (5) years in erection of precast structural concrete similar to the requirements of this project.
- H. Welder: AWS qualified within previous 12 months for employed weld types.
- I. Licensed Professional: Professional Structural Engineer experienced in design of specified Work and licensed in State of Illinois.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials according to manufacturer instructions.
- B. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.
 - 3. Protect members to prevent staining, chipping, or spalling of concrete.
- C. Handling:
 - 1. Handle precast members in position consistent with their shape and design.
 - 2. Mark each member with date of production and final position in structure.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Structural performance: Provide structural precast concrete members and connections capable of withstanding design loads indicated within limits and under conditions indicated on drawings.
- B. Design structural precast concrete framing system and connections to maintain clearance at openings to allow for fabrication and construction tolerances, to accommodate live-load

deflection, shrinkage, and creep of primary building structure and other building movements, maintain structural precast concrete deflection limits of ACI 318.

- C. Design members exposed to weather to allow movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
- D. Design components to accommodate construction tolerances, deflection of other building structural members, and clearances of intended openings.
- E. Grouted Keys: Capable of transmitting horizontal shear force of 300 lb./ft.

2.2 FABRICATORS AND MANUFACTURERS

- A. Fabricators:
 - 1. County Prestress and Precast, LLC.
 - 2. Mid-States Concrete Industries.
 - 3. Substitutions: Permitted.

2.3 MATERIAL

- A. Concrete:
 - 1. As specified in Section 03 3000 Cast-In-Place Concrete.
- B. Tensioning Steel Tendons:
 - 1. Comply with ASTM A416/A416M, Grade 250 ksi /270 ksi, uncoated, 7-wire, LowLax strand.
 - 2. Diameter: Appropriate to member design.
- C. Deformed Reinforcement:
 - 1. Description: Steel bars.
 - 2. Comply with ASTM A615, Grade 60.
- D. Nonshrink Grout:
 - 1. Type: Nonmetallic.
 - 2. Minimum Compressive Strength: Appropriate to member design.
- E. Cement Grout: Minimum compressive strength: Appropriate to member design.

2.4 FABRICATION

- A. Planks:
 - 1. Description: Plant cast, prestressed, hollow core.
 - 2. Comply with PCI MNL-126 and ACI 318.
- B. Dimensions: As indicated.
- C. Weld reinforcing according to AWS D1.4/D1.4M.

- D. Embed anchors, inserts, plates, angles, and other items at indicated locations.
- E. Fabricate openings required by other Sections for indicated locations.
- F. Cut exposed ends flush.
- G. Plant Finish: Comply with PCI MNL-116, exposed or visible unformed surface finish, prepared for paint.
- H. Connecting and Supporting Steel Devices: Do not paint surfaces in contact with concrete or surfaces requiring field welding.
- I. Tolerances:
 - 1. Conform to PCI MNL-126.

2.5 ACCESSORIES

- A. Connecting and Supporting Devices: As shown on the Drawings.
- B. Bearing Pads: As specified by fabricator.
- C. Sill Seal: As specified by fabricator.

2.6 SOURCE QUALITY CONTROL

- A. Inspection and Testing:
 - 1. Testing of Concrete and Grout Materials and Mix Designs: As specified in Section 03 3000 - Cast-in-Place Concrete.
 - 2. Inspect stressing tendons before delivery for compliance with indicated standards.
- B. Certificate of Compliance:
 - 1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 2. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 – EXECUTION

3.1 ERECTION

- A. Temporary Bracing and Support:
 - 1. Maintain temporary bracing in place until final connections are made.
 - 2. Protect members from staining.
 - 3. Provide temporary lateral support to prevent bowing, twisting, or warping of members.
- B. Install bearing pads and sill seal at bearing ends of planks as indicated.
- C. Adjust differential camber between precast members to indicated tolerance before final attachment and grouting.

- D. Adjust differential elevation between precast members to indicated tolerance before final attachment.
 - E. Install hanger tabs as shown on Fabricator Drawings.
 - F. Welding:
 - 1. Comply with AWS D1.1/D1.1M and AWS D1.4/D1.4M.
 - 2. Do not tack-weld reinforcing.
 - G. Completely Grout longitudinal keys as indicated without seepage to other surfaces.
 - H. Adjoining Planks:
 - 1. Make plank-to-plank joints smooth using grout, troweled smooth.
- 3.2 TOLERANCES
- A. Erect members level and plumb within allowable tolerances according to PCI MNL-126.
- 3.3 FIELD QUALITY CONTROL
- A. Inspect welds according to AWS D1.1/D1.1M and AWS D1.4/D1.4M.
- 3.4 PROTECTION
- A. Protect members from damage caused by field welding or erection operations.
 - B. Use noncombustible shields during welding operations to protect adjacent Work.

END OF SECTION

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SECTION 04 0513 - MASONRY MORTARING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Mortar for masonry.
- B. Related Requirements:
 - 1. Section 04 2013 - Single-Wythe Unit Masonry: Installation of mortar.
 - 2. Section 04 2723 - Cavity Wall Unit Masonry: Installation of mortar.

1.2 REFERENCE STANDARDS

- A. American Concrete Institute:
 - 1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.
- B. ASTM International:
 - 1. ASTM C5 - Standard Specification for Quicklime for Structural Purposes.
 - 2. ASTM C91 - Standard Specification for Masonry Cement.
 - 3. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
 - 4. ASTM C150 - Standard Specification for Portland Cement.
 - 5. ASTM C199 - Standard Test Method for Pier Test for Refractory Mortars.
 - 6. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
 - 7. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
 - 8. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar.
 - 9. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 - 10. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry.
 - 11. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
 - 12. ASTM C1329 - Standard Specification for Mortar Cement.
 - 13. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength.

1.3 SUBMITTALS

- A. Section 01 3300 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit two samples of mortar, illustrating mortar color and color range.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Design Data: Submit required environmental conditions, admixture limitations, and design mix.
- E. Test and Evaluation Reports:
 - 1. Indicate compliance of component mortar materials to requirements of ASTM C270.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.4 QUALITY ASSURANCE

A. Comply with ACI 530/530.1.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.7 AMBIENT CONDITIONS

- A. Section 01 5000 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Cold Weather Requirements: Comply with ACI 530/530.1 if ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: Comply with ACI 530/530.1 if ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 MORTAR

- A. Portland Cement/Lime per ASTM C270, Type M.
 - 1. Color: Gray.
- B. Water: Clean and potable.
- C. Mortar Color:
 - 1. Description: Mineral oxide pigment.

2. Color: To match masonry.
3. Calcium Chloride: Not allowed.

2.2 MIXES

- A. Mortar Mixes:
 1. Mortar for Structural Masonry: Comply with ASTM C270, Type M using proportion specification.
 2. Mortar for Non-Structural Masonry: Comply with ASTM C270, Type M using proportion specification.

PART 3 EXECUTION

3.1 PREPARATION

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Mortar Mixing:
 1. Thoroughly mix mortar ingredients according to ASTM C270 in quantities needed for immediate use.
 2. Achieve uniformly damp sand immediately before mixing process.
 3. Retemper only within two hours of mixing.

3.2 INSTALLATION

- A. According to ACI 530/530.1.

3.3 FIELD QUALITY CONTROL

- A. Section 01 4000 - Quality Requirements: Requirements for inspecting and testing.
- B. Establish mortar mix according to ASTM C270.

END OF SECTION

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SECTION 04 0516 - MASONRY GROUTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Grout for masonry.
- B. Related Requirements:
 - 1. Section 04 2013 - Single-Wythe Unit Masonry: Installation of grout.
 - 2. Section 04 2723 - Cavity Wall Unit Masonry: Installation of grout.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 2000 - Price and Payment Procedures: Contract Sum/Price modification procedures.
- B. Grout Materials:
 - 1. Basis of Payment: Includes grout materials and preparation ready for placement.
- C. Grout in Place – Brick and Concrete Masonry Unit:
 - 1. Basis of Payment: Includes grout placement, tooled.

1.3 REFERENCE STANDARDS

- A. American Concrete Institute:
 - 1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.
- B. ASTM International:
 - 1. ASTM C94 - Standard Specification for Ready-Mixed Concrete. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - 2. ASTM C150 - Standard Specification for Portland Cement.
 - 3. ASTM C150M - Standard Specification for Portland Cement.
 - 4. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
 - 5. ASTM C476 - Standard Specification for Grout for Masonry.
 - 6. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
 - 7. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - 8. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
 - 9. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
 - 10. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.

1.4 SUBMITTALS

- A. Section 01 3300 - Submittal Procedures: Requirements for submittals.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Test and Evaluation Reports: Submit compliance with grout property requirements according to ASTM C476, component grout materials according to ASTM C476, and test and evaluation reports according to ASTM C1019.

D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.5 QUALITY ASSURANCE

A. Perform Work according to ACI 530/530.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 6000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

2. Provide additional protection according to manufacturer instructions.

1.7 AMBIENT CONDITIONS

A. Section 01 5000 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.

B. Cold Weather Requirements: According to ACI 530/530.1 if ambient temperature or temperature of masonry units is less than 40 degrees F.

C. Hot Weather Requirements: According to ACI 530/530.1 if ambient temperature is greater than 100 degrees F or if ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 MASONRY GROUT

2.2 MATERIALS

A. Portland Cement: Comply with ASTM C150, Type I.

B. Grout Aggregate: Comply with ASTM C404, fine and coarse.

C. Water: Clean and potable.

D. Calcium Chloride: Not allowed.

2.3 MIXES

A. Grout:

1. Grout for Non-Structural Masonry:
 - a. Compressive Strength: 2,000 psi at 28 days.
 - b. Slump: 8 to 11 inches.
 - c. Mixing: According to ASTM C476, fine, coarse.
2. Grout for Structural Masonry:
 - a. Compressive Strength: 2,000 psi at 28 days.
 - b. Slump: 8 to 11 inches.
 - c. Mixing: According to ASTM C476, fine, coarse.
3. Application:
 - a. Coarse Grout: Grouting spaces with minimum 4-inch dimension in each direction.
 - b. Fine Grout: Grouting other spaces.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Request inspection of spaces to be grouted.

3.2 INSTALLATION

- A. Mixing:
 1. Mix grout according to ASTM C94, as modified to use ingredients complying with ASTM C476.
- B. Comply with ACI 530/530.1.

3.3 FIELD QUALITY CONTROL

- A. Section 01 4000 - Quality Requirements: Requirements for inspecting and testing.
- B. Testing:
 1. Mix: Comply with ASTM C1019 for compressive strength, and comply with ASTM C143 for slump.
 2. Compressive Strength of Mortar, Grout, and Masonry: Comply with Unit Strength Method per ACI 530.1.

END OF SECTION

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SECTION 04 2013 - SINGLE-WYTHE UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Reinforcement, anchorage, and accessories.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Product Data:
 - 1. Submit data for prefaced masonry units, fabricated wire and deformed bar reinforcement, anchors, mortar, and other accessories.
 - 2. Indicate initial rate of absorption for CMU units.
 - 3. Indicate compressive strengths of masonry units.

1.3 QUALITY ASSURANCE

- A. Perform Work according to ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures and Related Commentaries.

1.4 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this Section with minimum five years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept prefaced units on-Site. Inspect for damage.

1.6 AMBIENT CONDITIONS

- A. Do not store reinforcing material directly on ground. Use blocking and other methods to prevent rust on accessories prior to installation.
- B. Cold Weather Requirements: According to ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: According to ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

1.7 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN REQUIREMENTS

- A. Concrete Masonry Compressive Strength (f'm): 1,500 psi; determined by unit strength method.
 - 1. CMU: 1900 psi minimum net area compressive strength.

2.2 SINGLE-WYTHE UNIT MASONRY

- A. Manufacturers:
 - 1. Northfield Block Co.
 - 2. Substitutions: Permitted. (Engineer's approval required.)

2.3 CONCRETE MASONRY UNITS

- A. Hollow Load-Bearing CMU: ASTM C90, standard block units; normal weight.
 - 1. General: Provide shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 - 2. Provide bull-nose units at all window sills, window jambs, and door jambs.
 - 3. Size and Shape: Normal modular size 8 inch by 8 inch by 16 inch.
 - 4. Maximum Absorption: 7.5%
 - 5. Units shall be manufactured in one continuous run to achieve color consistency.
 - 6. All units shall be manufactured with chamfered edge to ensure a straight break on the face shell of the unit.
 - 7. Units shall be a minimum of 90 days old when delivered, with manufacturer's certification as verification.

2.4 ACCESSORIES

- A. Single-Wythe Joint Reinforcement: ASTM A951; truss or ladder type; steel; 0.188-inch-diameter side rods with 0.188-inch-diameter cross ties; mill galvanized.
- B. Reinforcing Steel: ASTM A615, 60 ksi yield grade, plain billet bars, uncoated finish.
- C. Mortar:
 - 1. Per Section 04 0513 – Masonry Mortaring.
 - 2. Color to match surrounding block as approved by Engineer.
- D. Grout: Peru Section 04 0516 – Masonry Grouting.
- E. Building Paper: ASTM D226; Type II, No. 30 unperforated asphalt felt.
- F. Cleaning Solution: Non-acidic, not harmful to masonry Work or adjacent materials.

2.5 SOURCE QUALITY CONTROL

- A. Testing: Test brick efflorescence according to ASTM C67. Brick rated greater than "slightly effloresced" is not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that:
 - 1. Field conditions are acceptable and are ready to receive Work.
 - 2. Items provided by other Sections of Work are properly sized and located.
 - 3. Built-in items are in proper location and ready for roughing into masonry support.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Furnish temporary bracing during installation of masonry Work. Maintain in place until building structure provides permanent support.

3.3 INSTALLATION

- A. Coursing of CMU:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 16 inches.
 - 3. Mortar Joints: Concave.
- B. Placing and Bonding:
 - 1. Lay solid masonry units in full bed of mortar, with full head joints.
 - 2. Lay hollow masonry units with face shell bedding on head and bed joints.
 - 3. Buttering corners of joints and excessive furrowing of mortar joints are not permitted.
 - 4. Remove excess mortar as Work progresses.
 - 5. Interlock intersections and external corners.
 - 6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
 - 7. Perform Site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
 - 8. Cut mortar joints flush where bitumen dampproofing is applied.
 - 9. Isolate masonry from vertical structural framing members with movement joint as indicated.
- C. Joint Reinforcement and Anchorage:
 - 1. Install horizontal joint reinforcement 16 inches o.c.
 - 2. Place masonry joint reinforcement in first and second horizontal joint above and below openings. Extend minimum 16 inches each side of opening.
 - 3. Place joint reinforcement continuous in first and second joint below top of walls.
 - 4. Lap joint reinforcement ends minimum 12 inches.

D. Lintels:

1. Install loose steel lintels as scheduled.
2. Install reinforced unit masonry lintels over miscellaneous openings more than 12 inches wide where lintels are not scheduled or indicated.
3. Do not splice reinforcing bars.
4. Support and secure reinforcing bars from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Allow masonry lintels to attain specified strength before removing temporary supports.
7. Maintain minimum 8 inch bearing on each side of opening unless longer bearing is specified on Drawings.

E. Grouted Components:

1. Reinforce bond beams and pilasters as indicated. Maintain minimum of 1-inch clearance from masonry core surfaces.
2. Lap splices bar diameters as required by code. Discuss and receive approval from Engineer.
3. Support and secure reinforcing bars from displacement.
4. Place and consolidate grout fill without displacing reinforcing.
5. At bearing locations, fill masonry cores with grout for minimum distance indicated in Drawings on both sides of opening.

F. Reinforced Masonry:

1. Lay masonry units with cells vertically aligned, clear of mortar, and unobstructed.
2. Place reinforcement bars as indicated.
3. Splice reinforcement as indicated.
4. Support and secure reinforcement from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Place grout according to ACI 530.1 Specification for Masonry Structures.

G. Built-in Work:

1. As Work progresses, install built-in metal door frames, fabricated metal frames, metal window frames, wood nailing strips, anchor bolts, plates, electrical boxes, and other items to be built in the Work and furnished by other Sections.
2. Install built-in items plumb and level.
3. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout or mortar. Fill adjacent masonry cores with grout, minimum 12 inches from framed openings, or as indicated in lintel details.
4. Do not build in materials subject to deterioration.

H. Cutting and Fitting:

1. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other Sections of Work to provide correct size, shape, and location.
2. Obtain Engineer approval prior to cutting or fitting masonry Work not indicated or where appearance or strength of masonry Work may be impaired.

3.4 TOLERANCES

A. Maximum Variation from Alignment of Columns and Pilasters: 1/4 inch.

B. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.

- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- H. Maximum Variation for Steel Reinforcement:
 - 1. Install reinforcement within the tolerances specified in ACI 530.1.
 - 2. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.
 - 3. Plus or minus 1 inch when distance is between 8 and 24 inches.
 - 4. Plus or minus 1-1/4 inch when distance is greater than 24 inches.
 - 5. Plus or minus 2 inches from location along face of wall.

3.5 FIELD QUALITY CONTROL

- A. CMU: Test each type according to ASTM C140.
- B. Prism Tests: Not required.

3.6 CLEANING

- A. Clean soiled surfaces with cleaning solution. Coordinate with Work of specified water repellent or surface coating.

3.7 PROTECTION

- A. Protect tops of masonry Work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when Work is not in progress. Maintain protection on tops of completed exterior walls until installation of permanent waterproof cap materials.

END OF SECTION

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SECTION 04 2723 - CAVITY WALL UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Facebrick exterior wythe.
 - 2. Concrete masonry interior wythe.
 - 3. Reinforcement, anchorages, and accessories.
- B. Related Requirements:
 - 1. Section 03 2000 - Concrete Reinforcing: Type requirements for reinforcing steel.
 - 2. Section 04 0513 - Masonry Mortaring: Product requirements for mortar.
 - 3. Section 04 0516 - Masonry Grouting: Product requirements for grout.
 - 4. Section 05 1200 - Structural Steel Framing: Product requirements.
 - 5. Section 07 2113 - Board Insulation: Insulation for cavity spaces.
 - 6. Section 07 9000 - Joint Protection: Rod and sealant at control and expansion joints.

1.2 REFERENCE STANDARDS

- A. American Concrete Institute:
 - 1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures and Related Commentaries.
- B. ASTM International:
 - 1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 2. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 3. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 4. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
 - 5. ASTM A580 - Standard Specification for Stainless Steel Wire.
 - 6. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 8. ASTM A951 - Standard Specification for Steel Wire for Masonry Joint Reinforcement.
 - 9. ASTM A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement.
 - 10. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
 - 11. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 - 12. ASTM C55 - Standard Specification for Concrete Building Brick.
 - 13. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
 - 14. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
 - 15. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.

16. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
17. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
18. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
19. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
20. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
21. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.3 COORDINATION

- A. Section 01 3000 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work of this Section with installation of window and door frame anchors and installation of structural framing supported by masonry.

1.4 SUBMITTALS

- A. Section 01 3300 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 1. Submit data for pre-faced masonry units, fabricated wire reinforcement, wall ties, anchors, cavity insulation, and other accessories.
 2. Indicate initial rate of absorption for brick.
- C. Samples:
 1. Submit two full-size samples of pre-faced units, to illustrate color, texture, and extremes of color range.
 2. Submit two mounted sample panels of facebrick to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Qualifications Statements:
 1. Submit qualifications for installer.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Extra Stock Materials:
 1. Furnish 40 of each size, color, and type of pre-faced units.

1.6 QUALITY ASSURANCE

- A. Perform Work according to ACI 530/530.1.

1.7 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this Section with minimum five years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept pre-faced units on-Site and inspect for damage.
- C. Metallic Components:
 - 1. Do not store reinforcing material directly on ground.
 - 2. Use blocking and other methods to prevent rust on accessories prior to installation.

1.9 AMBIENT CONDITIONS

- A. Section 01 5000 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Cold Weather Requirements: According to ACI 530/530.1, when ambient temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: According to ACI 530/530.1, when ambient temperature is greater than 100 degrees F or when ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Clay Masonry Compressive Strength (f'm):
 - 1. 1,000 psi.
 - 2. Determined by unit strength method.
 - 3. Clay Masonry Units Minimum Net Area Compressive Strength: 2,500 psi (individual).
3,000 psi (average of five).
- B. Concrete Masonry Compressive Strength (f'm):
 - 1. 1,500 psi.
 - 2. Determined by unit strength method.
 - 3. CMU Minimum Net Area Compressive Strength: 1900 psi.

2.2 CAVITY WALL MASONRY ASSEMBLIES

- A. Manufacturers:
 - 1. Northfield Block Company
 - 2. Substitutions: Permitted.

2.3 MATERIALS

- A. Facing Brick:
 - 1. Comply with ASTM C216.
 - 2. Type: FBS.
 - 3. Grade: SW.
 - 4. Color: As selected.
- B. Nominal Brick Size: 4 by 2 by 8 inches.
- C. Special Brick Shapes:
 - 1. Furnish special units for 90-degree corners and bullnose corners.
 - 2. Shape to profile indicated.
 - 3. Surface Texture: On sides and ends.
- D. Hollow Load-Bearing CMU:
 - 1. Comply with ASTM C90.
 - 2. Weight: Normal.
- E. CMU:
 - 1. Nominal Modular Size: 8 by 8 by 16 inches.
- F. Special CMU Shape:
 - 1. Furnish special units for 90-degree corners, lintels, and bullnose corners.
 - 2. Shape to profile indicated.
 - 3. Surface Texture: On sides and ends.

2.4 MASONRY STONE VENEER

- A. Waterford Stone, Artisan masonry stone full depth veneer as manufactured by Echelon.
 - 1. Color and Texture: Copper Stone
 - 2. Shape and Size: 4", 7" and 11 ½ height
Lengths range from 7" to 20 ½
 - 3. Layout Pattern: 25% solid jumper ration

2.5 STONE TRIM

- A. Continuous Band: Cordova Stone – Chamfer #6624SC (6" single chamfer), rockface finish.
- B. Window Sill: Cordova Stone – Sill #6624WS (6" window sill), rockface finish.

2.6 MIXES

- A. Grout: As specified in Section 04 0516 - Masonry Grouting

2.7 ACCESSORIES

- A. Multiwythe Joint Reinforcement:
1. Comply with ASTM A951.
 2. Type: Truss with moisture drip.
 3. Material: Steel.
 4. Side Rods Diameter: 0.188 inch.
 5. Cross Ties Diameter: 0.188 inch.
 6. Finish: ASTM A153, hot-dip galvanized.
- B. Reinforcing Steel: As specified in Section 03 2000 – Concrete Reinforcing.
- C. Wall Ties:
1. Description:
 - a. Material: Steel, ¼” dia. flattened and serrated for embedment in face brick mortar joint.
 - b. Finish: ASTM A153, hot-dip galvanized.
 - c. Type: Adjustable, hook into eyes integral with horizontal joint reinforcement.
- D. Self-Stick SBS-Type Flashing:
1. Description: Composite sheet of self-adhesive rubberized asphalt bonded to high-density polyethylene (HDPE) film.
 2. Thickness:
 - a. Composite Sheet: 40 mils.
 - b. HDPE Film: 2 mils.
- E. Preformed Control Joints:
1. Material: Rubber.
 2. Profile: As indicated on Drawings.
- F. Joint Filler:
1. Description: Closed-cell polyurethane, oversized 50 percent to joint width.
 2. Type: Self-expanding.
- G. Cavity Board Insulation: As specified in Section 07 2113 - Board Insulation.
- H. Building Paper:
1. Comply with ASTM D226.
 2. Material: Type II, No. 30 unperforated asphalt felt.
- I. Weeps: Preformed plastic tubes, hollow, or cotton rope.
- J. Cleaning Solution: Nonacidic and not harmful to masonry work or adjacent materials.

2.8 SOURCE QUALITY CONTROL

- A. Section 01 4000 - Quality Requirements: Requirements for testing, inspection, and analysis.
- B. Efflorescence:
 - 1. Test brick efflorescence according to ASTM C67.
 - 2. Brick rated greater than "slightly effloresced" is not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that field conditions are acceptable and are ready to receive Work of this Section.
- C. Verify that items provided by other Sections of Work are properly sized and located.
- D. Verify that built-in items are in proper location and are ready for roughing into masonry work.

3.2 PREPARATION

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Direct and coordinate placement of metal anchors supplied to other Sections of Work.
- C. Temporary Bracing:
 - 1. Furnish temporary bracing during installation of masonry work.
 - 2. Maintain in place until building structure provides permanent support.
- D. Wet clay and shale brick before laying if initial rate of absorption is greater than 30 g per min/30 sq. in. when tested according to ASTM C67.

3.3 INSTALLATION

- A. Establish lines, levels, and coursing indicated, and protect from displacement.
- B. Masonry:
 - 1. Maintain masonry courses to uniform dimension.
 - 2. Form bed and head joints of uniform thickness.
- C. Coursing of CMU:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.

D. Coursing of Brick Units:

1. Bond: Running.
2. Coursing: Three units and three mortar joints to equal 8 inches.
3. Mortar Joints: Concave.

E. Masonry Placement and Bonding:

1. Lay solid masonry units in full bed of mortar, with full head joints.
2. Lay hollow masonry units with face shell bedding on head and bed joints.
3. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
4. Remove excess mortar as Work progresses.
5. Interlock intersections and external corners.
6. Adjusting:
 - a. Do not shift or tap masonry units after mortar has achieved initial set.
 - b. If adjustment is required, remove mortar and replace.
7. Perform Site cutting of masonry units with proper tools to ensure straight, clean, and unchipped edges.
8. Isolate masonry from vertical structural framing members with movement joint as indicated on Drawings.
9. Isolate top of masonry from horizontal structural framing members, and slabs or decks, with compression joint filler.

F. Stone Trim:

1. Set sill trim units where indicated on Drawings, and set in full-mortar bed joints and head joints in conjunction with indicated flashing assemblies and anchors.
2. On head joints of cap units, rake mortar back after initial set to a depth of 1/2 inch, in preparation for application of sealants.

G. Weeps and Vents:

1. Furnish weeps and vents in outer wythe in continuous strip at 24 inches o.c. horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

H. Cavity Wall:

1. Do not permit mortar to drop, accumulate into cavity air space, or plug weeps.
2. Install cavity drain material continuously at bottom of each cavity, continuously for full height of cavity, and above through-wall flashing.

I. Joint Reinforcement and Anchorages:

1. Install horizontal joint reinforcement 16 inches o.c.
2. Place masonry joint reinforcement in first and second horizontal joint above and below openings.
3. Extend masonry joint reinforcement minimum 16 inches each side of opening.
4. Place joint reinforcement continuous in first and second joint below top of walls.
5. Lap joint reinforcement ends minimum 12 inches.
6. Embedment:
 - a. Embed anchors in concrete and attached to structural steel members.
 - b. Embed anchorages in every second block joint.

J. Masonry Flashings:

1. Extend flashings horizontally through outer wythe at foundation walls, above ledge or shelf angles and lintels, and at bottom of walls; turn down on outside face to form drip.
2. Turn flashing up minimum 8 inches and bed into mortar joint of masonry, seal to concrete, and seal to sheathing over framed backing.
3. Lap end joints minimum 6 inches and seal watertight.
4. Turn flashing, fold, and seal at corners, bends, and interruptions.

K. Concrete Masonry Lintels:

1. Install concrete masonry lintels over openings.
2. Install reinforced unit masonry lintels over miscellaneous openings less than 12 inches wide where steel or precast concrete lintels are not scheduled.
 - a. Do not splice reinforcing bars.
 - b. Support and secure reinforcing bars from displacement.
 - c. Place and consolidate grout fill without displacing reinforcing.
 - d. Allow masonry lintels to attain specified strength before removing temporary supports.
3. Maintain minimum 8 inch bearing on each side of opening.

L. Grouted Components:

1. Reinforce bond beams and pilasters as shown on Drawings.
2. Maintain minimum of 1-inch clearance from bottom web.
3. Lap splices bar diameters as required by code.
4. Support and secure reinforcing bars from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. At bearing locations, fill masonry cores with grout for minimum 12 inches on both sides of opening.

M. Reinforced Masonry:

1. Lay masonry units with core vertically aligned and cavities between wythes clear of mortar and unobstructed.
2. Place reinforcement bars as indicated on Drawings.
3. Splice reinforcement as indicated on Drawings.
4. Support and secure reinforcement from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Place grout according to ACI 530/530.1.

N. Control Joints:

1. Install control joints at following maximum spacings, unless otherwise indicated on Drawings:
 - a. Exterior Walls: 20 feet o.c. and within 24 inches on one side of each interior and exterior corner.
 - b. Interior Walls: 30 feet o.c.
 - c. At changes in wall height.
2. Do not continue horizontal joint reinforcement through control joints.
3. Control Joints:
 - a. Form control joints as shown on Drawings.
 - b. Fill resultant core with grout fill.
 - c. Rake joint at exposed unit faces for placement of backer rod and sealant.

- 4. Control Joints:
 - a. Install preformed control joint device in continuous lengths.
 - b. Seal butt and corner joints.

- O. Expansion Joints:
 - 1. Form expansion joints as indicated on Drawings.

- P. Built-In Work:
 - 1. As Work progresses, install built-in metal door frames, fabricated metal frames, metal window frames, anchor bolts, and other items to be built into the Work and furnished by other Sections.
 - 2. Install built-in items plumb and level.
 - 3. Door and Frames:
 - a. Bed anchors of metal door frames in adjacent mortar joints.
 - b. Fill frame voids solid with grout or mortar.
 - c. Fill adjacent masonry cores with grout, minimum 12 inches from framed openings.
 - 4. Do not build in materials that are subject to deterioration.

- Q. Cutting and Fitting:
 - 1. Cut and fit for pipes, conduit, sleeves, and grounds.
 - 2. Coordinate with other Sections of Work to provide correct size, shape, and location.
 - 3. Obtain Engineer's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.4 TOLERANCES

- A. Section 01 4000 - Quality Requirements: Requirements for tolerances.
- B. Maximum Variation from Alignment of Columns: 1/4 inch.
- C. Maximum Variation from Unit to Adjacent Unit: 1/16 inch.
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- E. Maximum Variation from Plumb: 1/4 inch per story noncumulative; 1/2 inch in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 feet, 1/4 inch in 10 feet, and 1/2 inch in 30 feet.
- G. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.
- H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- I. Maximum Variation for Steel Reinforcement:
 - 1. Install reinforcement within the tolerances according to ACI 530/530.1 for foundation walls.
 - 2. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.

3. Plus or minus 1 inch when distance from centerline of steel to opposite face of masonry is between 8 and 24 inches.
4. Plus or minus 1-1/4 inch when distance from centerline of steel to opposite face of masonry is greater than 24 inches.
5. Plus or minus 2 inches from location along face of wall.

3.5 FIELD QUALITY CONTROL

- A. Section 01 4000 - Quality Requirements: Requirements for inspecting and testing.
- B. Testing:
 1. Brick Units:
 - a. Test each type according to ASTM C67.
 - b. Test five random units for each 50,000 units installed.
 2. CMU: Test each type according to ASTM C140.
 3. Prism Tests: Not required.

3.6 CLEANING

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Remove excess mortar and mortar smears as Work progresses.
- C. Replace defective mortar.
- D. Match adjacent Work.
- E. Clean soiled surfaces with cleaning solution.
- F. Use nonmetallic tools in cleaning operations.

3.7 PROTECTION

- A. Section 01 7000 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect exposed external corners subject to damage.
- C. Protect base of walls from mud and mortar splatter.
- D. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.
- E. Coverings:
 1. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry.
 2. Provide coverings where masonry is exposed to weather when Work is not in progress.
 3. Maintain protection on tops of completed exterior walls until installation of permanent waterproof cap materials.

3.8 ATTACHMENTS

- A. Exterior Wall: Cavity wall masonry with exterior wythe of facebrick veneer, bonded with wire ladder reinforcement to inner wythe of CMU with 2-inch space for insulation.

END OF SECTION

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SECTION 05 1200 - STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes, but not limited to:
 - 1. Structural shapes.
 - 2. Channels and angles.
 - 3. Structural pipe.
 - 4. Structural plates.
 - 5. Bolts, connectors, and anchors.
 - 6. Grout.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and bolts.
 - 2. Connections.
 - 3. Indicate welded connections with AWS A2.4 welding symbols, and indicate net weld lengths.
- C. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.3 QUALITY ASSURANCE

- A. Perform Work according to following:
 - 1. Structural Steel: AISC 360.
 - 2. Architecturally Exposed Structural Steel: AISC 303, Section 10.
 - 3. High-Strength Bolted Connections: RCSC - Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

1.4 QUALIFICATIONS

- A. Fabricator:
 - 1. Company specializing in fabricating products specified in this Section with minimum three years' documented experience with following current AISC Certification:
 - a. Standard Steel Building Structures (STD).
 - b. Conventional Steel Building Structures (SBD).
- B. Erector:
 - 1. Company specializing in performing Work of this Section with minimum three years' documented experience with following current AISC Certification:
 - a. Certified Steel Erector (CSE).

- C. Shop Painter:
 - 1. Company specializing in performing Work of this Section with minimum three years' documented experience with following current AISC Certification:
 - a. Sophisticated Paint Endorsement - Enclosed (P1).
 - b. Sophisticated Paint Endorsement - Covered (P2).
- D. Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

- A. Channels and Angles: ASTM A36/A36M. Free of defects impairing strength, durability or appearance.
- B. Steel Pipe: ASTM A53, Type E or S, Grade B.
- C. Steel W Shapes: ASTM A992.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Bolts: Heavy-hex, structural type, ASTM A325.
- B. Nuts: ASTM A563; heavy hex type.
 - 1. Finish: Plain.
- C. Washers: ASTM F436; circular.
 - 1. Finish: Plain.
- D. Shear Connectors: ASTM A108; Grade 65, headed, unfinished and in accordance with AWS D1.1; Type B.
- E. Anchor Rods:
 - 1. ASTM F1554, Grade 36.
 - a. Shape: Straight.
 - b. Plate Washers: ASTM A36/A36M.
 - 2. ASTM A193, Grade 8
 - a. Shape: Straight
 - b. Plate Washers: ASTM A240
- F. Threaded Rods: ASTM F1554, Grade 36.
 - 1. Finish: Unfinished:

2.3 WELDING MATERIALS

- A. Welding Materials: AWS D1.1; type required for materials being welded.
 - 1. Use E70 electrodes.

2.4 FABRICATION

- A. Place shear stud connectors as indicated on Drawings.
- B. Continuously seal joined membranes by intermittent welds and plastic filler OR continuous welds (as indicated in the structural details). Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.

2.5 FINISHES

- A. Prepare structural component surfaces according with SSPC SP10 or SP11.
- B. Shop-prime structural steel members. Do not prime surfaces that will be part of a slip critical connection.

2.6 ACCESSORIES

- A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 7,000 psi at 28 days.
- B. Shop Primer:
 - 1. Type: SSPC Paint 15, Type 1, red oxide, 10-99 Tnemec primer or Rustoleum Number 5769 primer or approved equal.
 - 2. Thoroughly clean structural steel, removing all loose mill scale, grease, dirt, and foreign matter by scraping or sandblasting.
 - 3. Apply the specified paint to a dry film thickness not less than 2.5 dry mils.
- C. Touchup Primer: Match shop primer.

2.7 SOURCE QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements: Testing, inspection and analysis requirements.
- B. Shop test bolted and welded connections as specified for field quality control tests.
- C. When fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until satisfactory conditions are correct.

- B. Verify elevations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates and other embedments with steel erector present, for compliance with requirements.

3.2 ERECTION

- A. Surveys:
 - 1. Establish permanent benchmarks necessary for accurate erection of structural steel.
 - 2. Check elevations of concrete surfaces, and locations of anchor bolts and similar times, before erection proceeds.
- B. Temporary shoring and bracing:
 - 1. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
 - 2. Provide temporary guy lines to achieve proper alignment of the structure as erection proceeds.
 - 3. Remove temporary connections and members when permanent members are in place and final connections are made.
- C. Anchor bolts:
 - 1. Install anchor bolts and other connectors required for securing structural steel to adjacent work.
 - 2. Provide templates and other devices as needed for pre-setting bolts and other anchors to accurate locations.
 - 3. Where anchor bolts are imbedded in the cast-in-place concrete, it shall be the Contractor's responsibility to ensure that anchor bolts are installed precisely in locations as will be required to receive proposed equipment. No burning of baseplate holes will be allowed to compensate for poor anchor bolt alignment.
 - 4. Install nuts on anchor bolts snug tight – do not torque.
- D. Setting bases and bearing plates:
 - 1. Clean concrete bearing surfaces free from bond-reducing materials, and then roughen to improve bond to surface.
 - 2. Clean the bottom surface of base and bearing plates.
 - 3. Set loose and attached base plates and bearing plates for structural members using wedges and other adjusting devices.
 - 4. Tighten anchor bolts after supported members have been positioned and plumbed.
 - 5. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.
 - 6. Pack grout solidly between bearing surfaces and bases or plates to assure that no voids remain.
 - 7. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's recommendations as approved by the Engineer.
- E. Grout installation:
 - 1. Shim bearing plates and equipment supports to proper elevation, and snug-tighten anchor bolts.
 - 2. Fill void under bearing surface with grout; install and pack grout to remove air pockets.
 - 3. Moist-cure grout.

4. Remove forms after grout is set; trim grout edges to form smooth surface, splayed 45 degrees.
5. Tighten anchor bolts after grout has cured for a minimum of three days.

F. Field assembly:

1. Set structural frames accurately to the lines and elevations indicated.
2. Align and adjust the members forming part of a complete frame or structure before fastening permanently.
3. Clean the bearing surfaces and other surfaces which will be in permanent contact before assembly.
4. Adjust as required to compensate for discrepancies in elevation and alignment.
5. Level and plumb individual members of the structure within specified AISC tolerances.
6. Establish required leveling and plumbing measurements on the mean operating temperatures of the structure, making allowances for the difference between temperature at time of erection and the mean temperature at which the structure will be then completed and in service.
7. Comply with AISC specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to welds.

G. Gas cutting:

1. Do not use gas cutting torches for correcting fabricating errors in structural framing, except on secondary members where acceptable to the Engineer.
2. When gas cutting is permitted, finish the gas cut section to a sheared appearance acceptable to the Engineer.

3.3 PAINTING

- A. Secure all required approvals of welds and connections prior to application of field primer.
- B. Notify the Engineer when the work of this Section is ready to receive primer.
- C. Prime coat structural steel and fittings, except galvanized items, which will not be enclosed or concealed in the finished work.
 1. Prepare surfaces by removing loose rust, loose mill scale, and spatter, slag, and flux deposits.
 2. Clean steel in accordance with Steel Structures Painting Council SP-3, "Power Tool Cleaning."
 3. After erection, clean spots and surfaces where paint has been removed, damaged, or burned off, and clean field bolts and other field connections not concealed in the finished work.
 4. Remove dirt, oil, and grease.
 5. Apply a spot coat of the approved primer.
 6. Do not apply paint to wet, damp, oily, or improperly prepared surfaces.
 7. Spray apply the primer, filling joints and corners, and covering surfaces with a smooth, unbroken film of at least 2.5 dry mils thickness.
- D. Finish coat per Section 09 9000: Painting and Coating.

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SECTION 05 5100 - METAL STAIRS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes, but not limited to:
 - 1. Steel stair frame of structural sections, with open risers.
 - 2. Open grate stair treads and landings.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for review.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.3 QUALITY ASSURANCE

- A. Perform railing work according to ASTM E985.
- B. Finish joints according to NOMMA Guideline 1.

1.4 QUALIFICATIONS

- A. Welders and Welding Procedures: AWS D.1 qualified within previous 12 months for employed weld types.
- B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.
- C. Erector: Company specializing in performing Work of this Section with minimum three years' documented experience.
- D. Licensed Professional: Structural Engineer experienced in design of specified Work and licensed in State of Illinois.

1.5 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Fabricate stair assembly to support uniform live load of 100 lb./sq. ft. and concentrated load of 300 lb. with deflection of stringer or landing framing not to exceed 1/240 of span. Concentrated load is to be applied non-concurrent with the uniform load.
- B. Railing assembly, wall rails, and attachments to resist lateral force of 200 lb. at any point without damage or permanent set.
- C. Fabricate stair assembly to NAAMM AMP 510, industrial class.

2.2 MATERIALS

- A. Structural Steel: As described in Section 05 1200 – Structural Steel Framing.
- B. Aluminum Sections & Plates: Alloy 6061-T6
- C. Aluminum Pipe and Tubing: Alloy 6061-T6
- D. Bolts: Stainless Steel or Aluminum, unfinished.
- E. Nuts: hex type, unfinished.
- F. Washers: Neoprene or non-galvanic.
- G. Welding Materials: AWS; type required for materials being welded.
- H. Gratings: As specified in Section 05 5300 – Metal Gratings.
- I. Handrails: As specified in Section 05 5200 – Metal Railings and Handrails.

2.3 FABRICATION

- A. Fit and shop-assemble components in largest practical sections, for delivery to Site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.

- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small, uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Accurately form components required for anchorage of stairs landings to each other and to building structure.
- H. Open Grating Stair Treads and Landings:
 - 1. Match grating specified in Section 05 5300 – Metal Gratings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive Work.
- B. Verify that concealed blocking and reinforcement is installed and correctly located.

3.2 PREPARATION

- A. Supply items required to be cast into concrete and/or embedded in masonry with setting templates.

3.3 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Install anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. Allow for erection loads. Install sufficient temporary bracing to maintain framing safe, plumb, and in alignment.
- D. Field-bolt to match shop bolting. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- E. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- F. Obtain approval of Engineer prior to Site cutting or creating adjustments not scheduled.

3.4 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, noncumulative.
- B. Maximum Offset from Alignment: 1/4 inch.

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SECTION 05 5200 - METAL RAILINGS AND HANDRAILS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum pipe railings, balusters, fittings and toe kicks.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Samples: Submit one 6-inch-long sample of handrail. Submit one sample of elbow, tee, wall bracket, escutcheon, and end stop.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

- A. Perform Work for structural aluminum according to AA ADM 1.
- B. Perform Work of this Section according to ASTM E985.
- C. Finish joints according to NOMMA Guideline 1.

1.4 QUALIFICATIONS

- A. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.
- B. Erector: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.5 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in good condition and properly protected against damage to finished surfaces.
- B. Storage on site:

1. Store material in a location and in a manner to avoid damage. Stacking shall be done in a way that will prevent bending.
 2. Store material in a clean, dry location away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin, or polyethylene sheeting in a manner that will permit circulation of air inside the covering.
- C. Keep handling on site to a minimum. Exercise particular care to avoid damage to finishes or material.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Design handrail, guardrail, and attachments to resist forces as required by ASTM E985 code. Apply loads non-simultaneously to produce maximum stresses.
1. Guard Top Rail and Handrail Concentrated Load: 200 lb. applied at any point in any direction.
 2. Guard Top Rail Uniform Load: 50 plf, applied in any direction.
 3. Intermediate Rails, Panels, and Baluster Concentrated Load: 50 lb. applied to 1 sq. ft. area.
- B. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in engineering, fabricating, and installing of joints, overstressing of components and connections, and other detrimental effects. Base engineering calculations on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
1. Temperature Change (Range): 120 degree F ambient; 180 degree F material surfaces.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

2.2 MATERIALS

- A. Aluminum Railing System:
1. Rails and Posts: 1-1/2 inch diameter, extruded tubing conforming to ASTM B241.
 2. Fittings: Elbows, T-shapes, wall brackets, escutcheons; aluminum.
 3. Mounting: Brackets and flanges; prepare backing plate for mounting in wall construction.
 4. Splice Connectors: Concealed spigot; aluminum.
 5. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
 6. Aluminum Surfaces: AAMA A41 anodized, prepared with pretreatment, anodized to clear color.
 7. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.3 FABRICATION

- A. Fit and shop-assemble components in largest practical sizes for delivery to Site.

- B. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate Site assembly and installation.
- C. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- F. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations not encouraging water intrusion.
- G. Interior Components: Continuously seal joined pieces by continuous welds.
- H. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- I. Accurately form components to suit stairs and landings, to each other and to building structure.
- J. Accommodate expansion and contraction of members and building movement without damage to connections or members.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive Work.
- B. Verify that concealed blocking and reinforcement are installed and correctly located to receive wall-mounted handrails.

3.2 PREPARATION

- A. Supply items required to be cast into concrete and embedded in masonry with setting templates to appropriate Sections.

3.3 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Anchor railings to structure with anchors, plates, angles and other shapes as required. Core drilling and embedding in concrete is not allowed.

- C. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- D. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

3.4 TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, noncumulative.
- B. Maximum Offset from Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 5300 - METAL GRATINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formed floor and stair tread gratings.

1.2 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Requirements for coordination.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit span and deflection tables.
- C. Shop Drawings: Indicate details of gratings, plates, component supports, anchorages, openings, perimeter construction details, and tolerances. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- D. Samples: Submit one sample, 6 by 6 inch, illustrating surface finish, color, and texture.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for gratings.
- G. Manufacturer's Instructions: Submit special requirements of openings, perimeter framing, and embedments, and standard installation details.

1.4 QUALIFICATIONS

- A. Licensed Professional: Structural Engineer experienced in design of specified Work and licensed in State of Illinois.

1.5 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Design Live (Pedestrian) Load: Uniform load of 100 lb./sq. ft. minimum; concentrated load of 500 lb. and distributed over a 1 square foot area.
- B. Maximum Allowable Deflection under Live Load: $1/240$ of span; size components for single span, in no case greater than $1/4$ " under 100 psf uniform load.
- C. Maximum Fiber Stress: 12,000 psi

2.2 GRATINGS AND FLOOR PLATES

- A. Manufacturer List:
 - 1. BarnettBates Corporation
 - 2. McNichols Company
 - 3. Ohio Gratings, Inc.
 - 4. Substitutions: Section 01 6000 – Product Requirements.

2.3 MATERIALS

- A. Bearing Bars and Banding: ASTM B221, Alloy 6063T6 extruded aluminum alloy.
- B. Crossbars: ASTM B211, Alloy 6063-T1
- C. Welding Materials: Type as required for materials being welded.

2.4 FABRICATION

- A. Fabricate grates to accommodate design loads.
- B. Mechanically clinch joints of intersecting metal sections.
- C. Fabricate support framing for openings.
- D. Top Surface: Flush.
- E. Removability: Fabricate pieces in weights no larger than 50 lbs.

2.5 FINISHES

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Aluminum: Clear anodized, NAAMM, AA-M12C22A41 finish.

2.6 ACCESSORIES

- A. Fasteners and Saddle Clips: Stainless steel or aluminum for holding grating down

- B. Perimeter Closure: Same material as grating.
- C. Aluminum angle frame with optional anchors. Provide protection from dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to grating installation, Contractor shall inspect supports for correct size, layout and alignment. Any inconsistencies between Contract Drawings and supporting structure deemed detrimental to grating placement shall be reported in writing to the Engineer prior to grating placement.

3.2 INSTALLATION

- A. Install grating in accordance with shop drawings and standard installation clearances as recommended by NAAMM Metal Bar Grating Manual.
- B. Cutting, Fitting and Placement:
 - 1. Perform all cutting and fitting required for installation. Grating shall be placed such that cross bars align.
 - 2. Wherever grating is pierced by pipes, ducts and structural members, cut openings neatly and accurately to size and weld a rectangular band bar of the same height and material as bearing bars.
 - 3. Cutouts for circular obstructions are to be at least 2" larger in diameter than the obstruction. Cutouts for all piping 4" or less shall be made in the field.
 - 4. All rectangular cutouts are to be made in the next bearing bar beyond the penetration with a clearance not to exceed bearing bar spacing.
 - 5. Utilize standard panel widths wherever possible.
- C. Protection of Aluminum from Dissimilar Materials:
 - 1. Where aluminum surfaces come into contact with dissimilar metals, surfaces shall be kept from direct contact by painting the dissimilar metal with one coat of bituminous paint or other approved insulating material.
 - 2. Where aluminum surfaces come into contact with dissimilar materials such as concrete, masonry or lime mortar, exposed aluminum surfaces shall be painted with one coat of bituminous paint or other approved insulating material.

3.3 TOLERANCES

- A. Conform to NAAMM MBG 531.
- B. Maximum Space Between Adjacent Sections: 1/4 inch.
- C. Maximum Variation from Top Surface Plane of Adjacent Sections: 1/8 inch.

END OF SECTION

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SECTION 06 1000 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural roof framing.
 - 2. Roof sheathing.
 - 3. Preservative treatment of wood.
 - 4. Miscellaneous framing and sheathing.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit technical data on water resistive barrier sheathing, wood preservative materials, and application instructions. Include data on air/moisture infiltration protection based on testing according to referencing standards.

1.3 QUALITY ASSURANCE

- A. Perform Work according to the following:
 - 1. Lumber Grading Agency: Certified by DOC PS 20.
 - 2. Wood Structural Panel Grading Agency: Certified by APA - The Engineered Wood Association.
 - 3. Lumber: DOC PS 20.
 - 4. Wood Structural Panels: DOC PS 1 or PS 2.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 – Product Requirements: Requirements for transporting, handling, storing and protecting products.
- B. Outdoor Storage: Comply with manufacturer's recommendations.
 - 1. Set panel bundles on supports to keep off ground.
 - 2. Cover panels loosely with waterproof protective material.
 - 3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
 - 4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.

PART 2 PRODUCTS

2.1 ENGINEERED WOOD PRODUCTS

- A. Engineered Wood Products:

1. Manufactured with an exterior-type adhesive according to ASTM D2559.
2. Evaluated and monitored according to ASTM D5456.

B. Types:

1. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths.

2.2 LUMBER MATERIALS

A. Lumber Grading Rules: Comply with SPIB.

B. Framing and Studs:

1. Species: Southern pine
2. Grade: Minimum No. 2 grade
3. Moisture Content: Maximum 19%

2.3 SHEATHING MATERIALS

A. Manufacturers:

1. Drywood Products
2. Huber Engineered Woods, Zip System Products.
3. Substitutions: Section 01 6000 – Product Requirements.

B. Roof Sheathing: 5/8" thick (min.)

1. Wood Structural Panel Roof Sheathing: oriented strand board; Min. Span Rating 40/20; Exposure Durability 1. With factory laminated integral water resistive barrier.
 - a. Air Leakage: Maximum .0072 cfm/sq. ft. infiltration at a pressure differential of 1.57 psf.
 - b. Perm Rating: 12-16
 - c. Exposure Rating: Minimum 90 days

C. Telephone and Electrical Panel Boards: APA plywood.

1. Size and thickness as required by telephone and electrical panel manufacturers.
2. Minimum 3/4" thickness and 6" larger than panels.

2.4 FACTORY WOOD TREATMENT

A. Wood Preservative (Pressure Treatment): AWP A U1, commodity specification A-sawn products of F-wood composites using waterborne ACQ or SBX preservative.

2.5 ACCESSORIES

A. Fasteners and Anchors:

1. Fasteners: ASTM A153, hot-dip galvanized steel for high-humidity and treated wood locations, unfinished steel elsewhere.
2. Nails and Staples: ASTM F1667.
3. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorage to steel.

- B. Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, proprietary seam tape consisting of polyolefin film with acrylic adhesive.
1. Thickness: 0.012 inch.
 2. Width: 6 inch.

PART 3 EXECUTION

3.1 APPLICATION

- A. Framing:
1. Carefully select all members. Select individual pieces so that knots and defects will not interfere with placement of bolts, when nailing or making connections. Discard defective pieces.
 2. Set structural members level and plumb, in correct position.
 3. Fasten framing according to applicable code.
 4. Make provisions for erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
 5. Place horizontal members crown side up.
 6. Construct load-bearing framing and curb members full length without splices.
 7. Double members at openings over 24 inches wide. Space short studs over and under opening to stud spacing.
 8. Coordinate installation of glue-laminated structural units and prefabricated wood trusses.
 9. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
 10. Coordinate curb installation with installation of decking and support of deck openings.
- B. Sheathing:
1. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
 2. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
 3. Securely attach to substrate by fastening as indicated.
 - a. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
 4. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- C. Wood Structural Panel Installation:
1. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
 2. Fastening Methods: Fasten panels as indicated below:
 - a. Wall and Roof Sheathing
 - 1) Nail to wood framing.
 - 2) Screw to cold-formed metal framing.
 - 3) Space panels 1/8 inch apart at edges and ends.

- 4) Install fasteners 3/8 inch to 1/2 inch from panel edges.
- 5) Space fasteners to satisfy IBC 2018 Table 2304.10-1.

D. Sheathing Joint Treatment

1. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - a. Apply seam tape to joints between sheathing panels.
 - b. Utilize tape gun or hard rubber roller provided by manufacturer to ensure tape is completely adhered to substrates.

E. Flexible Flashing Installation

1. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - a. After flashing has been applied, roll surfaces with a hard rubber to ensure that flashing is completely adhered to substrates.
 - b. Width for Flexible Flashing: 6 inch.

3.2 TOLERANCES

- A. Framing and Furring Members to Receive a Finished Wall or Ceiling: Align finish surface to vary not more than 1/8 inch from a theoretical plane or surfaces of the room or space.
- B. Other Framing Members: 1/4 inch from indicated position, maximum.

SECTION 07 2113 – BOARD INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes rigid board insulation at exterior wall behind wall finish.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on product characteristics, performance criteria, limitations, adhesives, and thermal values.
- C. Manufacturer's Installation Instructions: Submit special environmental conditions required for installation, installation techniques.

1.3 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 6000 – Product Requirements.
- B. Do not install adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.1 BOARD INSULATION

- A. Extruded Polystyrene Insulation: CW25 (XPS) Owens Corning Foamular Rigid Foam Insulation, ASTM C578 Type IV, cellular type, conforming to the following:
 - 1. Board Thickness: 2 inches.
 - 2. Thermal Resistance: R of 5.0 per inch minimum.
 - 3. Water Absorption: In accordance with ASTM D2842; 0.3 percent by volume maximum.
 - 4. Compressive Strength: Minimum 25 psi.
 - 5. Board Edges: Square edges.

2.2 ACCESSORIES

- A. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.

- B. Verify substrate, adjacent materials, and insulation boards are dry and ready to receive insulation and adhesive.
- C. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials or substances affective adhesive bond.

3.2 INSTALLATION – FOUNDATION PERIMETER

- A. Install boards on foundation wall perimeter.
 - 1. Place boards in method to maximize contact bedding.
 - 2. Butt edges and ends tight to adjacent board and to protrusions.
- B. Extend boards over control joints.
- C. Cut and fit insulation tight to protrusions or interruptions to insulation plane.

3.3 INSTALLATION – EXTERIOR WALLS

- A. Apply adhesive in three continuous beads per board length. Daub adhesive tight to protrusions.
- B. Install boards on wall surface, vertically.
- C. Place boards in method to maximize contact bedding. Stagger end joints. Butt edges and ends tight to adjacent board and to protrusions.
- D. Cut and fit insulation tight to protrusions or interruptions to insulation plane.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Do not permit damage to insulation prior to covering.

END OF SECTION

SECTION 07 5323 - EPDM ADHERED ROOFING SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Contract description.
 - 2. References.
 - 3. Submittals.
 - 4. Quality Assurance
 - 5. Delivery, Storage and Handling.
 - 6. Warranty.
 - 7. Manufacturers.
 - 8. Roofing System Description.
 - 9. EPD Membrane Materials
 - 10. Roof Insulation and Cover Boards.
 - 11. Metal Accessories
 - 12. Accessory Materials.

1.2 CONTRACT DESCRIPTION

- A. This work shall consist of a installation of a roof system. Roof system shall be 0.060 inch, 20-year EPDM, fully adhered roof membrane over 5-1/4" (min.) R30 polyisocyanurate, fully adhered, rigid foam insulation. The work shall also require metal coping, roof penetrations for mechanical piping, roof drains and relief scuppers.
- B. The project specification herein is based on a complete Firestone Building Products RubberGard EPDM adhered membrane roofing system. This specification is to be used as a guide to the requirements of the roofing system. Other roofing manufacturer and EPDM systems will be accepted if it is determined they meet or exceed the project specification herein. It will be at the Engineer's discretion to waive or allow variations if deemed necessary.
- C. Furnish and install elastomeric sheet roofing system, including:
 - 1. Roofing manufacturer's requirements for the specified warranty.
 - 2. Preparation of roofing substrates.
 - 3. Wood nailers for roofing attachment.
 - 4. Insulation.
 - 5. Elastomeric EPDM membrane roofing.
 - 6. Metal roof edging and copings.
 - 7. Flashings.
 - 8. Other roofing-related items specified or indicated on the drawings or otherwise necessary to provide a complete weatherproof roofing system.
- D. Disposal of debris and construction waste is the responsibility of Contractor. Perform disposal in manner complying with all applicable federal, state, and local regulations.

- E. Comply with the published recommendations and instructions of the roofing membrane manufacturer.
- F. Commencement of work by the Contractor shall constitute acknowledgement by the Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. Any modification of the Contract Sum will be made in accordance with the stipulations of the Contract Documents stated elsewhere.

1.3 REFERENCES

- A. Referenced Standards: These standards form part of this specification only to the extent they are referenced as specification requirements.
 - 1. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2013.
 - 2. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
 - 3. ASTM D 4637 - Standard Specification for EPDM Sheet used in Single-Ply Roof Membrane; 2004.
 - 4. ASTM D 4811 - Standard Specification for Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing; 2004.
 - 5. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
 - 6. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
 - 7. FM 1-28 - Design Wind Loads; Factory Mutual System; 2007.
 - 8. FM 1-29 - Roof Deck Securement and Above Deck Roof Components; Factory Mutual System; 2006.
 - 9. FM 4470 - Approval Standard - Class I Roof Covers; current version.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
 - 2. Where UL or FM requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.
 - 3. Installation Instructions: Provide manufacturer's instructions to installer, marked up to show exactly how all components will be installed; where instructions allow installation options, clearly indicate which option will be used.
- B. Shop Drawings: Provide:
 - 1. The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.

- C. Pre-Installation Notice: Copy to show that manufacturer's required Pre Installation Notice (PIN) has been accepted and approved by the manufacturer (if applicable).
- D. Executed Warranty as a requirement of project close-out.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Roofing installer shall have the following:
 - 1. At least five years' experience in installing specified system.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
- B. Store materials clear of ground and moisture with weather protective covering.
- C. Keep combustible materials away from ignition sources.

1.7 WARRANTY

- A. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.
- B. Warranty: Manufacturer's 20-year Limited Warranty covering membrane, roof insulation, and membrane accessories or equal per specific manufacturer's roof system.

Warranty Duration	Membrane Thickness, required minimums
20 year	.060 RubberGard EPDM

- 1. Scope of Coverage: Repair leaks in the roofing system caused by:
 - a. Ordinary wear and tear of the elements.
 - b. Manufacturing defect in brand materials.
 - c. Defective workmanship used to install these materials.
 - d. Damage due to winds up to manufacturer's system limitations.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer - Roofing System: Firestone Building Products Co., Carmel, IN.
www.firestonebpco.com or approved equal.
 - 1. Roofing systems manufactured by others may be acceptable provided the roofing system is equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
 - a. Specializing in manufacturing the roofing system to be provided.

- b. Minimum ten years of experience manufacturing the roofing system to be provided.
- c. Able to provide a no dollar limit, single source roof system warranty.
- d. ISO 9002 certified.

B. Manufacturer of Insulation and Cover Board:

C. Manufacturer of Metal Roof Edging:

D. Substitution Procedures:

1. Submit evidence that the proposed substitution complies with the specified requirements.

2.2 ROOFING SYSTEM DESCRIPTION

A. Roofing System:

1. Membrane: Ethylene propylene diene monomer (EPDM).
2. Thickness: As specified elsewhere.
3. Membrane Attachment: Fully adhered.
4. Slope: Deck is not sloped.
5. Comply with applicable local building code requirements.
6. Provide assembly having Underwriters Laboratories, Inc. (UL) Class A Fire Hazard Classification.

B. Vapor Barrier:

1. V-Gard with self-adhesive bituminous backing/reinforced aluminum foil vapor control layer.
Prime deck prior to installation per manufacturer.

C. Insulation:

1. Total System R Value: 30
2. Maximum Board Thickness: 2.6 inches; stagger joints in adjacent layers.

Total Iso Insulation Thickness, nominal	System R Value
5.25 inches	30R

3. Base Layer: Polyisocyanurate foam board, non-composite.
 - a. Attachment: Polyurethane adhesive.
4. Top Layer: Polyisocyanurate foam board, non-composite.
 - a. Attachment: Polyurethane adhesive.
5. Provide tapered saddles at roof drains as required.
 - a. Attachment: Polyurethane adhesive.

D. Cover Board: High Density Polyisocyanurate Cover Board:

1. Thickness: 0.5 inch (12.7mm).
2. R-Value: 2.5 based on ASTM tests C158 and C177.
 - a. Attachment: Low-rise polyurethane adhesive.

2.3 EPDM MEMBRANE MATERIALS

- A. Roofing and Flashing Membrane: Black cured synthetic single-ply membrane composed of ethylene propylene diene terpolymer (EPDM) with the following properties:
 - 1. Thickness: 0.060 inch (1.5 mm).
 - 2. Reinforcement: Polyester weft inserted scrim; membrane complying with ASTM D 4637 Type II.
 - 3. Nominal Thickness Tolerance: Plus/minus 10 percent.
 - 4. Sheet Width: Provide the widest available sheets to minimize field seaming.
 - 5. Acceptable Product: RubberGard Non-Reinforced EPDM Membrane by Firestone.
- B. Flashing Membrane: Self-curing, non-reinforced membrane composed of nonvulcanized EPDM rubber, complying with ASTM D 4811 Type II, and with the following properties:
 - 1. Thickness: 0.055 inch (1.4 mm).
 - 2. Color: Same as field membrane
 - 3. Acceptable Product: RubberGard EPDM FormFlash by Firestone.
- C. Self-Adhesive Flashing Membrane: Semi-cured 45 mil EPDM membrane laminated to 35 mil (0.9 mm) EPDM tape adhesive; QuickSeam Flashing by Firestone.
- D. Pre-Molded Pipe Flashings: EPDM, molded for quick adaptation to different sized pipes; Firestone EPDM Pipe Flashing.
- E. Self-Adhesive Lap Splice Tape: 35 mil (0.9 mm) EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer; QuickSeam Splice Tape by Firestone.
- F. Splice Adhesive: Synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces; SA-1065 Splice Adhesive by Firestone.
- G. Bonding Adhesive: Neoprene-based, formulated for compatibility with EPDM membrane and wide variety of substrate materials, including masonry, wood, and insulation facings; Bonding Adhesive BA-2004 by Firestone.
- H. Adhesive Primer: Synthetic rubber based primer formulated for compatibility with EPDM membrane and tape adhesive, with VOC content less than 2.1 lb/gal (250 g/L); QuickPrime Plus LVOC by Firestone.
- I. Low Rise Foam Adhesive: Two-component, low-rise polyurethane adhesive designed to attach polyisocyanurate insulation to a variety of acceptable substrates; ISO Stick by Firestone.
- J. Seam Edge Treatment: EPDM rubber-based sealant, formulated for sealing exposed edges of membrane at seams; Lap Sealant HS by Firestone.
- K. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.
- L. Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed; Water Block Seal by Firestone.

- M. Metal Fasteners: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria.
 - 1. Counter Flashing:

2.4 ROOF INSULATION AND COVER BOARDS

- A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, with the following additional characteristics:
 - 1. Thickness: As indicated elsewhere.
 - 2. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
 - 3. R-Value (LTTR): 1.0 inch (25 mm) Thickness: 5.25", minimum.
 - 4. Compressive Strength: 20 psi (138 kPa) when tested in accordance with ASTM C 1289.
 - 5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
 - 6. Recycled Content: 19 percent post-consumer and 15 percent post-industrial, average.
 - 7. Acceptable Product: ISO 95+ polyiso board insulation by Firestone
- B. High Density Polyisocyanurate Cover Board: Non-combustible, water resistant high density, closed cell polyisocyanurate core with coated glass mat facers, complying with ASTM D 1623, and with the following additional characteristics:
 - 1. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
 - a. Exception: Board to be attached using adhesive or asphalt may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
 - 2. Thickness: 0.5 inch (12.7mm).
 - 3. R-Value: 2.5 based on ASTM tests C158 and C177.
 - 4. Surface Water Absorption: <3%, maximum, when tested in accordance with ASTM C 209.
 - 5. Compressive Strength: 120psi, when tested in accordance with ASTM 1621.
 - 6. Density: 5pcf, when tested in accordance with ASTM 1622.
 - 7. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
 - 8. Mold Growth Resistance: Passed, when tested in accordance with ASTM D 3273.
 - 9. Acceptable Product: ISOGARD HD Cover Board by Firestone.
- C. Adhesive for Insulation Attachment: Type as required by roof membrane manufacturer for roofing system and warranty to be provided; use only adhesives furnished by roof membrane manufacturer.

2.5 METAL RELIEF SCUPPER AND CONDUCTOR HEAD

- A. Provide metal relief scupper (4" x 16"), 24 gage, galvanized. (See Drawings for additional information.)

2.6 ROOF DRAIN WITH INTERIOR DRAIN PIPE AND OUTFALL NOZZLE

- A. Outfall Nozzle: Wade 3940 cast bronze with birdscreen or approved equal.

2.7 METAL ACCESSORIES

- A. Parapet Copings: Formed metal coping with galvanized steel anchor/support cleats for capping any parapet wall; watertight, maintenance free, without exposed fasteners; butt type joints with concealed splice plates; mechanically fastened as required.

1. Wind Performance:
 - a. At least the minimum required when tested in accordance with ANSI/SPRI ES-1 Test Method RE-3, current edition.
 - b. Provide product listed in current Factory Mutual Research Corporation Approval Guide with at least FM 1-90 rating.
2. Description: Coping sections allowed to expand and contract freely while locked in place on anchor cleats by mechanical pressure from hardened stainless steel springs factory attached to anchor cleats; 8 inch (200 mm) wide splice plates with factory applied dual non-curing sealant strips capable of providing watertight seal.
3. Material and Finish: Petersen Aluminum "Pac-Clad" – Pac-Tite Coping (or approved equal), 24 gage, 0.024 inch (0.06 mm) thick galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
4. Dimensions:
 - a. Wall Width: Requires field measurements.
 - b. Piece Length: Minimum 144 inches (3650 mm).
5. Anchor/Support Cleats: 20 gage, 0.036 inch (0.9 mm) thick prepunched galvanized cleat with 12 inch (305 mm) wide stainless steel spring mechanically locked to cleat at 72 inches (1820 mm) on center.
6. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, corners, intersections, curves, pier caps, and end caps; minimum 14 inch (355 mm) long legs on corner, intersection, and end pieces.
7. Fasteners: Factory-furnished; electrolytically compatible; minimum pull out resistance of 240 pounds (109 kg) for actual substrate used; no exposed fasteners.

2.8 ACCESSORY MATERIALS

- A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
 1. Width: 3-1/2 inches (90 mm), nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it.
 2. Thickness: Same as thickness of roof insulation.

PART 3 EXECUTION

3.1 GENERAL

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
- B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.
- C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.

- D. Perform work using competent and properly equipped personnel.
- E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
- F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F (15 to 25 degrees C).
- G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
 - 1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
 - 2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
 - 3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
- H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.
- I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.2 EXAMINATION

- A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
- B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work. All repairs to substrate shall be approved by Engineer.
- C. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptance of project conditions and requirements.

3.3 PREPARATION

- A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.
- B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

- C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with fill material acceptable insulation to membrane manufacturer.
- D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.4 INSULATION AND COVER BOARD INSTALLATION

- A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.
- B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.
- C. Lay roof insulation in courses parallel to roof edges.
- D. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch (6 mm). Fill gaps greater than 1/4 inch (6 mm) with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch (6 mm).
- E. Adhesive Attachment: Apply in accordance with membrane manufacturer's instructions and recommendations; "walk-in" individual roof insulation boards to obtain maximum adhesive contact.

3.5 SINGLE-PLY MEMBRANE INSTALLATION

- A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
- B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.
- C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- D. Install membrane adhered to the substrate, with edge securement as specified.
- E. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.
- F. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches (1:6) using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
 - 1. Exceptions: Round pipe penetrations less than 18 inches (460 mm) in diameter and square penetrations less than 4 inches (200 mm) square.
 - 2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.6 FLASHING AND ACCESSORIES INSTALLATION

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Metal Accessories: Install metal edgings and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
 - 1. Follow roofing manufacturer's instructions.
 - 2. Remove protective plastic surface film immediately before installation.
 - 3. Install water block sealant under the membrane anchorage leg.
 - 4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
 - 5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
- C. Scuppers: Provide new conductor heads and downspouts as shown in Drawings. Set in sealant and secure to structure; flash as recommended by manufacturer.
- D. Roofing Expansion Joints: Install as shown on drawings and as recommended by roofing manufacturer.
- E. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing at least 8 inches (200 mm) high above membrane surface.
 - 1. Use the longest practical flashing pieces.
 - 2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
 - 3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
 - 4. Provide termination directly to the vertical substrate as shown on roof drawings.
- F. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.
 - 1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
 - 2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches (50 mm) deep, with at least 1 inch (25 mm) clearance from penetration, sloped to shed water.
 - 3. Structural Steel Tubing: If corner radii are greater than 1/4 inch (6 mm) and longest side of tube does not exceed 12 inches (305 mm), flash as for pipes; otherwise, provide a standard curb with flashing.
 - 4. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by manufacturer.

3.7 FIELD QUALITY CONTROL

- A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a salesperson).
- B. Perform all corrections necessary for issuance of warranty.

3.8 CLEANING

- A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.
- B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.
- C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.9 PROTECTION

- A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

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SECTION 07 9000 – JOINT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes sealants and joint backing, precompressed foam sealers, hollow gaskets, and accessories.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Samples: Submit one sample board illustrating sealant colors for selection. Provide a minimum of eight (8) colors.
- D. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.
- E. Warranty: Include coverage for installed sealants and accessories failing to achieve airtight seal, watertight seal, exhibit loss of adhesion or cohesion, and sealants which do not cure.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' experience, and approved by manufacturer.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 6000 – Product Requirements.
 - 1. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.5 WARRANTY

- A. Provide manufacturer's five year standard material warranty.
- B. Include coverage for replacement of sealant materials which fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure, provided sealant has been installed per manufacturer's recommendations.

PART 2 PRODUCTS

2.1 JOINT SEALERS

- A. Manufacturers:
 - 1. Sonneborn
 - 2. Tremco
 - 3. Dow Corning Corp.
 - 4. Sika Corp.
 - 5. Substitutions: Section 01 6000 – Product Requirements.
- B. Products Description:
 - 1. Sealant – Non-sag Polyurethane Sealant: ASTM C920, Grade NS, Class 35, Uses NT, M; single component, chemical curing, non-staining, non-bleeding.
 - a. Size: Width and depth as recommended by manufacturer to achieve specified warranty.
 - b. Color: Colors as selected by Owner.
 - c. Movement Capability: Plus and minus 25 percent.
 - d. Service Temperature Range: -40 to 180 degrees F.
 - e. Shore A Hardness Range: 20 to 35.

2.2 EXPANSION JOINT FILLER

- A. Performance Based Specifications: Expansion joint filler shall be flexible, lightweight, non-staining, polyethylene, and closed cell. It shall be a chemical-resistant, ultraviolet stable, non-absorbent, low density, compressible foam and have the following requirements:
 - 1. Density, ASTM D1751: 2.0 lbs/cu. ft.
 - 2. Compression, ASTM D3575
 - a. 10% Deflection: 10 psi
 - b. 80% Deflection: 125 psi
 - 3. Tensile Strength, ASTM D3575: 55 psi
 - 4. Water Absorption, ASTM D3575: 0.5% vol. maximum
 - 5. Temperature Stability: -40 to 160 degrees F.
 - 6. Size and Shape: As indicated on Drawings.
 - 7. Applications: As indicated on Drawings.

2.3 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces and joint openings are ready to receive work.
- C. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

- A. Remove loose materials and foreign matter impairing adhesion of sealant.
- B. Clean and prime joints.
- C. Perform preparation in accordance with ASTM C1193.
- D. Protect elements surrounding Work of this Section from damage or disfiguration.

3.3 INSTALLATION

- A. Perform installation in accordance with ASTM C1193.
- B. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- C. Install bond breaker where joint backing is not used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Tool joints concave.
- G. Precompressed Joint Filler: Do not stretch; avoid joints except at corners, ends, and intersections; install with face flush adjoining surface.

3.4 CLEANING

- A. Section 01 7000 – Execution and Closeout Requirements.
- B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Protect sealants until cured.

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SECTION 08 1342 – METAL AND FRP DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel doors and frames.
 - 2. Fiberglass (FRP) doors.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: requirements for submittals.
- B. For each type of door and frame indicated, include door designation, type, level and model, material descriptions, core description, construction details, label compliance, sound and fire resistance rating (if applicable) and finishes.
- C. Shop Drawings – Within 30 calendar days after the Contractor has received the Owner’s “Notice to Proceed” submit:
 - 1. Elevations of each door design.
 - 2. Details of door including vertical and horizontal edge details.
 - 3. Frame details for each frame type including dimensioned profiles.
 - 4. Details and locations of reinforcement and preparation for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, accessories, joints and connections.
 - 7. Coordination of glazing, frames and stops with glass and glazing requirements.
 - 8. Manufacturer’s specifications and other data needed to prove compliance with specified requirements.
 - 9. Manufacturer’s recommended installation procedure which, when approved, shall be the actual installation procedures used on this work.
- D. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.3 QUALITY ASSURANCE

- A. Steel Door and Frame Standard: Comply with ANSI A250.8, unless more stringent requirements are indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver Doors and Frames: Properly wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired, provided refinished items match new work and are acceptable to Engineer. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site protected and under cover.

1.5 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Requirements for coordination.
- B. Coordinate Work with door opening construction, door frame, and door hardware installation.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

- A. Manufacturers:
 - 1. Ceco Door; ASSA ABLOY.
 - 2. Curries Company; ASSA ABLOY.
 - 3. Mesker Door, Inc.
 - 4. Pioneer Industries, Inc.
 - 5. Republic Doors and Frames.
 - 6. Steelcraft; an Ingersoll-Rand brand.
 - 7. Substitutions: Section 01 6000 – Product Requirements.
 - 8. Special-Lite, Inc.
- B. Product Description:
 - 1. Interior Doors (Non-Rated and SDI 108 1-3/4" thick rated)
 - a. Extra heavy duty, 16 gage/0.053 inch thick face sheet, full flush design.
- C. COMPONENTS
 - 1. Face: Steel sheet in accordance with SDI 108, galvanized.
 - 2. End Closure: Channel, 0.04 inches thick, inverted.
 - 3. Core: Polyurethane.
 - 4. Thermal Insulated Door: Total insulation R-Value of 7, measured in accordance with ASTM C1363.
 - 5. Frames: 16 gage nominal thickness metal.
 - 6. Silencers: Resilient rubber fitted on drilled holes.
 - 7. Astragals: Aluminum "T" shaped specifically for double doors.
 - 8. Primer: ANSI A250.10 rust inhibitive type.
 - 9. Weatherstripping: Resilient vinyl set in aluminum retainer.
- D. GLAZING
 - 1. Glazing: As specified in Section 08 8000 and as indicated on the Door Schedule on the Drawings.
- E. HARDWARE
 - 1. Hardware shall be as indicated on the Door Hardware Schedule on the Drawings.

F. FABRICATION

1. Fabricate doors and frames with hardware reinforcement welded in place.
2. Attach astragal to inactive leaf pairs of doors.
3. Fabricate frames.
4. Fabricate frames to suite masonry wall coursing with 4 inches head member.
5. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
6. Prepare frames for silencers and install.

G. FINISHES, GENERAL

1. Steel Sheet: Galvanized to ASTM A653/A653M G90.
2. Primer: Baked.

2.2 FIBERGLASS (FRP) DOORS

A. Manufacturers:

1. Subject to compliance requirements. Provide products by one of the following:
 - a. Kawneer Company, Inc.
 - b. Tiger Door.
 - c. Special Lite: SL-17 Hybrid.
 - d. Substitutions: Section 01 6000 – Product Requirements.
2. Door Style: Flushline; Vertical Stile 5" Top Rail 5"; and Bottom Rail 5".
3. The door face sheet shall be pebble textured fiberglass reinforced polyester (FRP) 0.090" thick.
4. Vision lites shall be aluminum framed vision lites.
5. Glass for vision lites to be 1/4" thick tempered safety glass.
6. Major portions of the door members to be 0.125" nominal in thickness and glazing molding to be 0.05" thick.
7. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
8. Core insulation to be a full thickness high density expanded polystyrene (ASTM D1621-25PSI)

B. MATERIALS

1. Aluminum Extrusions: Alloy and temper recommended by aluminum-framed flush entrance doors manufacturer for strength, corrosion, resistance, and application of required finish and not less than 0.090" wall thickness at any location for the main frame and sash members.
2. Aluminum-Framed Flush Entrance Door Core: Shall be froth-in-place foam at 5.0 lb/cu. ft. density, R-value: minimum 9; U-value = 0.11, and shall have "0" O.D.P. = "Zero" Ozone Depletion Potential and contains no CFC's or HCFC's.
3. Fasteners: Aluminum, non-magnetic stainless steel or other materials to be non-corrosive and compatible with aluminum-framed flush entrance door members, trim hardware, anchors, and other components.
4. Anchors, Clips, and Accessories: Aluminum, non-magnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
5. Reinforcing Members: Aluminum, non-magnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

C. FRAMING SYSTEM

1. Storefront Entrance Framing Non-Thermal: Trifab 450, 4-1/2" deep with 1-3/4" sightline.
2. Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, non-ferrous shims for aligning system components.
3. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials. Where exposed, shall be stainless steel.
4. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action. Anchors for masonry walls to be of the wire type. Floor anchors to be provided at each jamb. Except on weather-stripped frames, punch the stop for three (3) silencers on a single door and two (2) on double door frames.

D. GLAZING

1. Glazing: As specified in Section 08 8000 and as indicated on the Door Schedule on the Drawings.

E. HARDWARE

1. Hardware shall be as indicated on the Door Hardware Schedule on the Drawings.

F. FABRICATION

1. Fabricate aluminum-framed flush entrance doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
2. Fabricate aluminum-framed flush entrance doors that are reglazable, when vision lites are used, without dismantling perimeter framing.
 - a. Door corner construction shall consist of mitered corners with angle alignment blocks secured with 3/8" full-width galvanized steel tie rods.
 - b. Accurately fit and secure joints and corner. Make joints hairline in appearance.
 - c. Face sheets shall lap and interlock with stile and rails to create a hollow cavity for the froth-in-place urethane core.
 - d. Prepare components with internal reinforcement for door hardware.
 - e. Arrange fasteners and attachments to conceal from view.
3. Weather Stripping: Provide weather stripping locked into extruded grooves in door panels or frames as indicated on manufacturer's drawings and details.

G. FINISHES, GENERAL

1. Comply with AAMA-AFPA "Anodic Finishes/Painted Aluminum" for recommendations for applying and designating finishes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes and tolerance are acceptable.

3.2 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's requirements.

B. Frames:

1. Prior to installation, all frames must be checked for rack, twist, and out of square conditions.
2. Place frames prior to enclosing walls and ceilings. Set frames accurately in position, plumbed and braced securely until permanent anchors are set. Remove shipping bar spreader and insert a wood spreader cut to the opening width, notched to clear the stops. SDI-105, "Recommended Erection Instructions for Steel Frames" and SDI-110 "Standard Steel Doors and Frames for Modular Masonry Construction" shall indicate the proper installation procedures.
3. Verify that all metal frame surfaces are coated with the factory-applied primer. Re-paint all bare metal surfaces prior to installation (where applicable).
4. Comply with Drawings, shop drawings, and manufacturer's written instructions for installing frames.
5. Set sill threshold in bed of approved sealant for weather tight construction.
6. Separate aluminum and other corrosive surfaces from sources of corrosion or electrolytical action at points of contact with other materials.

C. Doors:

1. Install doors plumb and in true alignment in a prepared opening and fasten them to achieve the maximum operational effectiveness and appearance.
2. Proper door clearance must be maintained in accordance with SDI-110.
3. Where necessary, only metal hinge shims are accessible to maintain clearances.
4. "Installation Guide for Doors and Hardware" published by DHI is recommended for further details.

D. Hardware must be applied in accordance with hardware manufacturer's templates and instructions.

3.3 ADJUST AND CLEAN

- A. Check and re-adjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper condition.

3.4 SCHEDULES

- A. After installation, copies of the door schedules are to be given to the Owner when the building is accepted.

END OF SECTION

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SECTION 08 3323 – OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes overhead coiling door, operating hardware, electric operation.
 - 1. Provide wiring from electric circuit disconnect to door operator to control station.

1.2 SYSTEM DESCRIPTION

- A. Electric motor operated unit with manual override in case of power failure.

1.3 DESIGN REQUIREMENTS

- A. Wind Loads: Design door assembly to withstand wind/suction load of 20 psf, with maximum deflection of L/120, and without damage to door or assembly components.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified.

1.4 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- C. Product Data: Submit general construction, component connections and details, wiring diagram and electrical equipment.
- D. Samples: Submit two door slats, 12 x 12 inch in size illustrating operation, shape, color and finish texture.
- E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, and adjustment and alignment procedures.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Execution and Closeout Requirements.
- B. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

- B. Installer: Company specializing in performing work of this Section with minimum three years' experience.

PART 2 PRODUCTS

2.1 OVERHEAD COILING DOORS

- A. Manufacturers:
1. Overhead Door Co., Inc.
 2. Raynor – Duracoil Door
 3. Substitutions: Section 01 6000 – Product Requirements.

2.2 COMPONENTS

- A. Curtain: Conform to following:
1. Steel Slats: Interlocking, flat, minimum 20 gage of ASTM A653/A653M steel, minimum galvanized coating designation G90 coating class.
 - a. Type: Sandwich slat construction with manufacturer's standard insulated core with minimum 3/4" thickness and minimum R-value of 6.
 - b. Nominal Slat Size: as required by required length.
 - c. Slat Ends: Each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
 - d. Curtain Bottom: Fitted with angles, channels, or tubes to provide reinforcement and positive contact with floor in closed position.
- B. Guides: Minimum 3/16 inch; galvanized steel conforming to ASTM A653/A653M, minimum galvanized coating designation G90 coating class.
1. Furnish continuous angles of profile to retain door in place with snap-on trim; mounting brackets of same material.
- C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension.
- D. Hood Enclosure: Square shape, minimum 24 gage galvanized steel; internally reinforced to maintain rigidity and shape.
- E. Hardware:
1. Handle: Inside side mounted, adjustable keeper, spring activated latch bar with feature to keep in locked or retracted position; interior handle.
 2. Weatherstripping (Exterior Assemblies): Moisture and rot proof, resilient type for complete weathertight installation.
- F. Electric Motor Operator:
1. Description: UL 325, side mounted, totally enclosed, non-ventilated or fan-cooled motor.
 2. Motor Rating: Continuous duty, as recommended by manufacturer.
 3. Motor Voltage: 115/230 single phase, 60 Hz.
 4. Brake: 24VDC disc brake.

- G. Interior Control Station: Standard three button (Open-Stop-Close) momentary control; 24 volt circuit; surface mounted, coordinate location with Owner.
- H. Safety Edge: Manufacturer's standard safety edge and weatherseal located at door bottom, full width, sensitized type, wired to reverse upon striking object.

2.3 SHOP FINISHING

- A. Curtain Slats: Precoated paint finish, manufacturer's standard type; color as selected.
- B. Steel Guides and Hood Enclosure: Precoated paint finish, manufacturer's standard type; color as selected.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.

3.2 INSTALLATION

- A. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- B. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- C. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- D. Coordinate installation of electrical service. Complete wiring from disconnect to unit components and from fire alarm system to door operator.
- E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 9000 – Joint Protection.
- F. Install perimeter trim and closures.

3.3 ERECTION TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variance from Plumb: 1/16 inch.
- C. Maximum Variation from Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge

3.4 ADJUSTING

- A. Section 01 7000 – Execution and Closeout Requirements.
- B. Adjust door, hardware and operating assemblies for smooth and noiseless operation.
- C. Test smoke-activated assemblies for proper activation.

3.5 CLEANING

- A. Section 01 7000 – Execution and Closeout Requirements.
- B. Clean door and components.
- C. Remove labels and visible markings.

END OF SECTION

SECTION 08 5113 – ALUMINUM WINDOWS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes: Extruded aluminum window system and accessories.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit component dimensions, anchorage and fasteners, glass, internal drainage, and typical details.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related Work; and installation requirements.
- D. Manufacturer's Certificates: Certify Product performance rating by independent third party such as AAMA, CAWM, or NFRC as meeting or exceed specified requirements.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. Aluminum Windows: Fabricate window assemblies in accordance with AAMA 101 for types of windows required.
 - 2. Insulated Glass: Fabricate insulated glass units in accordance with GANA Glazing Manual.
 - 3. Safety Glass: Conform to CPSC 16 CFR 1201 and applicable codes.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing commercial aluminum windows with minimum three years' experience.
- B. Installer: Company specializing in installation of commercial aluminum windows with minimum three years' experience.

1.5 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01 6000 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Handle Work of this Section in accordance with AAMA MCWM-1 – Curtain Wall Manual #10.
- C. Protect factory-finished aluminum surfaces with wrapping or strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.6 AMBIENT CONDITIONS

- A. Do not install glazing materials when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and after installation of glazing materials.

1.7 WARRANTY

- A. Furnish five year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.
- B. Warranty: Include coverage for degradation of color finish.

PART 2 PRODUCTS

2.1 ALUMINUM WINDOWS

- A. Manufacturers:
 - 1. Kawneer Series 451T framing system with 8225TL System Isolock (thermally broken) 2-1/4 inch frame depth, project-out windows.
 - 2. EFCO Corporation Series S403 framing system with Type 2700 (thermally broken) 2 inch frame depth, project-out windows.
 - 3. Substitutions: Section 01 6000 – Product Requirements.
- B. Product Description: Aluminum windows thermally broken; sill flashings. Including perimeter trims, stools, accessories, shims, anchors and perimeter sealing.
 - 1. Glazing: Type 2; see Section 08 8000 – Glazing.
- C. Window Configuration: F-fixed/operable (See Drawings).
- D. Performance / Design Criteria:
 - 1. Primary Performance Requirements: Aluminum windows to meet the minimum.
 - 2. Wind-Borne Debris Loads: Design and size glass to withstand the following loads:
 - a. ASTM E1886 and ASTM E1996; large missile impact test.
 - b. Small missile impact test.
 - 3. Wind Load Deflection: In accordance with AAMA 101 with full recovery of glazing materials.
 - 4. Assembly: To accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing, deflection of lintel.
 - 5. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, and migrating moisture occurring within system, to exterior by weep drainage network.
 - 6. Air Infiltration: Limit air infiltration through assembly to 0.3 cfm/sf of wall area, measured at reference differential pressure across assembly of 1.57 psf when tested in accordance with ASTM E283.
 - 7. Thermal Performance:
 - a. Comply with ICC International Energy Conservation Code for climate zone in which the project is located.

2.2 COMPONENTS

- A. Extruded Aluminum: ASTM B221
- B. Insulating Glass: see Section 08 8000 – Glazing.

2.3 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to ensure concealment from view.

2.4 FINISHES

- A. Finish Coatings: Conform to AAMA 611.
- B. Exterior Surfaces: To be determined from standard finishes.
- C. Interior Surfaces: To be determined from standard finishes.
- D. Anodized Aluminum Surfaces: AA-M12C2A41 non-specular as fabricated mechanical finish, medium matte chemical finish, and Architectural Class I 0.7 mils clear anodized coating.
- E. Apply coat of bituminous paint on concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.5 ACCESSORIES

- A. Fasteners and Anchors: Stainless steel.
- B. Bituminous Paint: Fibered asphaltic type.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 7000 – Execution and Closeout Requirements.
- B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

- A. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- B. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- C. Install sill and sill end angles.
- D. Install thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- E. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.

3.3 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inch every 3 ft non-cumulative or 1/8 inch per 10 ft. whichever is less.

3.4 FIELD QUALITY CONTROL

- A. Section 01 7000 – Execution and Closeout Requirements.
- B. Inspection to monitor quality of installation and glazing.

3.5 CLEANING

- A. Section 01 7000 – Execution and Closeout Requirements.
- B. Remove protective material from factory-finished aluminum surfaces.
- C. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.
- D. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08 7100 – DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes door hardware for steel doors and related accessories.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts.
 - 2. Submit manufacturer's parts lists.
- C. Samples:
 - 1. Submit one sample illustrating style, color, and finish, as indicated on the Drawings.
- D. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Execution and Closeout Requirements.
- B. Project Record Documents: Record actual locations of installed cylinders and their master key code.
- C. Operation and Maintenance Data: Submit data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- D. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following requirements:
 - 1. ANSI A156 series.
 - 2. UL 305.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' experience.
- B. Hardware Supplier: Company specializing in supply commercial door hardware with minimum three years' experience.

- C. Hardware Supplier Personnel: Employ qualified person to assist in Work of this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 – Product Requirements: Product storage and handling requirements.
- B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

1.7 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Coordinate work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
 - 1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.
- C. Sequence installation to accommodate required utility connections.
- D. Coordinate Owner's keying requirements during course of Work.

1.8 WARRANTY

- A. Furnish five year manufacturer warranty for locksets and door closers.

1.9 MAINTENANCE MATERIALS

- A. Furnish special wrenches and tools applicable for each different and for each special hardware component.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. General Hardware Requirements: When not specifically indicated, comply with applicable ANSI A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
 - 1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in Work.
 - 2. Reinforcing Units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
 - 3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
 - a. Finish: Match hardware item being fastened.
- B. Substitutions permitted per Section 01 6000 – Product Requirements.

- C. Hinges: ANSI A156.1, full mortise type.
1. Number: Furnish minimum three hinges for each door leaf.
 2. Size and Weight: 4-1/2 inch x 4-1/2 inch, heavy weight ball bearing.
 3. Pins: Furnish non-ferrous hinges with non-removable pins (NRP) at exterior and locked outswinging doors, non-rising pins at interior doors.
 4. Finish: As selected by Owner.
 5. Acceptable Manufacturers:
 - a. Bommer Industries, Inc. BB5006
 - b. Hager Companies BB1199
 - c. McKinney Products Company T4A3386
 - d. Stanley Hardware FBB199
- D. Mortise Locksets: Typical 2-3/4 inch backset. Furnish standard strikes with extended lips.
1. Locksets: Grade 1
 2. Finish: As selected by Owner.
 3. Acceptable Manufacturers:
 - a. DORMA Architectural Hardware ML Series
 - b. Schlage Locks L9000 Series
 - c. Sargent Lock Co. 8200 Series
- E. Exit Devices: ANSI A156.3, Grade 1 rim type. Standard strikes with extended lips.
1. Types: Suitable for doors requiring exit devices.
 2. Finish: As selected by Owner.
 3. Acceptable Manufacturers:
 - a. DORMA Architectural Hardware 9000 Series
 - b. Precision Hardware 2000 Series
 - c. Sargent Lock Co. 9900 Series
 - d. Von Duprin, Inc. 98 Series
- F. Key Cylinders: ANSI A156.5, Grade 1, interchangeable core type cylinders.
1. Keying: Key to Owner's existing keying system.
- G. Closers: ANSI A156.4 modern type with cover, surface-mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid.
1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
 2. Arms: Type to suit individual condition.
 3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
 4. Operating Pressure: Maximum operating pressure as follows:
 - a. Interior Doors: Maximum 5 pounds.
 - b. Exterior Doors: Maximum 8.5 pounds.
 5. Acceptable Manufacturers:
 - a. DORMA Architectural Hardware 8600 Series
 - b. LCN Closers 1460 Series
 - c. Sargent Manufacturing 1400 Series
- H. Weatherstripping:
1. Acceptable Manufacturers:
 - a. Hager Company 878

- b. K. N. Crowder W-18
- c. National Guard Products 134N
- d. Pemko Manufacturing 319_R

I. Door Bottom:

- 1. Acceptable Manufacturers:
 - a. Hager Company 778
 - b. K. N. Crowder CT-745
 - c. National Guard Products 19V
 - d. Pemko Manufacturing 216_

J. Threshold: ADA compliant

- 1. Acceptable Manufacturers:
 - a. Hager Company 513
 - b. K. N. Crowder CT-65
 - c. Pemko Manufacturing 1665_
 - d. Reese S803

K. Locking Bolt: Concealed, provide one at top and bottom of inactive leaf of double door with dustproof strike.

- 1. Acceptable Manufacturers:
 - a. Hager Company 282, 280
 - b. Hiawatha, Inc. 3780F, 382
 - c. Ives FB457, DP2
 - d. Rockwood Manufacturing 550, 570

L. Wall Stop: Wall mounted, concave rubber.

- 1. Acceptable Manufacturers:
 - a. Hager Company
 - b. Hiawatha, Inc.
 - c. Ives WS407CCV
 - d. Rockwood Manufacturing 403

M. Astragal: T-shaped, with weather seal

- 1. Acceptable Manufacturers:
 - a. National Guard Products
 - b. Pemko Manufacturing 355_S
 - c. Reese

2.2 ACCESSORIES

A. Lock Trim: Furnish levers with escutcheon plate as selected from manufacturer's full range of levers.

- 1. Finish as selected by Owner.

B. Through Bolts: Do not permit through bolts and grommet nuts on door faces in occupied areas unless no alternative is possible.

2.3 FINISHING

- A. Finishes: As selected from manufacturer's standard finish chart.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.

3.2 INSTALLATION

- A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.

3.3 ADJUSTING

- A. Adjust hardware for smooth operation.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Do not permit adjacent work to damage hardware or hardware finish.

END OF SECTION

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SECTION 08 8000 – GLAZING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Glass glazing for doors and windows.
 - 2. Glass glazing materials and installation requirements are included in this Section for other sections referring this Section.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate sizes, layout, thicknesses, and loading conditions for glass.
- C. Product Data:
 - 1. Glass: Provide structural, physical, and thermal and solar optical performance characteristics, size limitations, and special handling or installation requirements.
 - 2. Glazing Sealants, Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors where exposed.
- D. Samples:
 - 1. Glass: Submit one sample, illustrating each glass unit and coloration.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual, GANA Sealant Manual for glazing installation methods.

1.4 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this Section with minimum four years' experience approved by manufacturer.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 6000 – Product Requirements.
- B. Do not install glazing when ambient temperature is less than 50 degrees F.
- C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.6 WARRANTY

- A. Furnish five year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS

2.1 INSULATING GLASS PRODUCTS

- A. Insulating Glass Manufacturers:
 - 1. Arch Aluminum & Glass Co., Inc.
 - 2. Guardian Industries Corp; SunGuard
 - 3. Oldcastle Building Envelope
 - 4. Pilkington North America
 - 5. PPG Industries, Inc.
 - 6. Substitutions: Section 01 6000 – Product Requirements.
- B. Insulating Glass: ASTM E2190 certified by Insulating Glass Manufacturers Alliance; with glass elastomer edge seal; place reflective film within unit: purge interpane space with dry air.
 - 1. Total Unit Thickness: 1 inch.
 - 2. Insulating Glass Unit Edge Seal Construction: Aluminum, bend and soldered corners.
- C. Type 1, Double Pane Insulating Glass:
 - 1. Total Unit Thickness: 1 inch.
 - a. Each Light: ¼” glass, tempered/annealed as required
 - 2. U-Factor Winter: 0.28
 - 3. Solar Heat Gain Coefficient: 0.35
 - 4. UV Transmittance: 9%
 - 5. Visible Light Transmittance: 34%
 - 6. Solar Transmittance: 26%
 - 7. Reflectance Inside: 30%
 - 8. Reflectance Outside: 13%

2.2 GLAZING ACCESSORIES

- A. Setting Blocks: Elastomeric material recommended by glass manufacturer.
- B. Spacer Shims: Elastomeric material recommended by glass manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Verify openings for glazing are correctly sized and within acceptable tolerance.

- C. Verify surfaces of glazing channels or recesses are clean, free of obstructions impeding moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

- A. Perform installation in accordance with GANA Glazing Manual.
 - 1. Glazing Sealants: Comply with ASTM C1193.
- B. Exterior Dry Method (Gasket Glazing):
 - 1. Cut glazing gasket to length; install on glazing pane. Seal corners by butting tape and sealing junctions with compatible butyl sealant.
 - 2. Place setting blocks at $\frac{1}{4}$ points with edge block no more than 6 inches from corners.
 - 3. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
 - 4. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Glas and glazing product manufacturers to provide field surveillance of installation.
- B. Monitor and report installation procedures, and unacceptable conditions.

3.5 CLEANING

- A. Section 01 7000 – Execution and Closeout Requirements.

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SPECIFICATION SECTION 09 2900 GYPSUM BOARD SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

- A. Provide labor, materials, equipment and incidentals required for the completion of work shown on the Drawings and/or specified under this Section.

1.2 SUBMITTALS

- A. Product Data.

1.3 QUALITY ASSURANCE

- A. Gypsum Association standards and recommendations.

PART 2 PRODUCTS

2.1 MATERIALS: Provide materials as detailed below by manufacturer listed or equal.

		U.S. Gypsum	National Gypsum Co.
A.	Studs	158,212,358" CWS, 30mil @ 16" o.c.	1½", 3½", 2½ Screw Stud, 30 mil @ 16" o.c.
B.	Track	30 mil galv. Steel	30 mil galv. Steel
C.	Screws	Type "S", 1", 1½, 3"	Type "S", 1", 1½, 3"
D.	Furring	7/8", 1½", Hat Channel 1½" Z-Furring, 30 mil	7/8", 1½", Hat Channel 1½" Z-Furring, 30 mil
E.	Gyp. Board ASTM D3273 Type X Mold Resistant (** See Note 5)	¾" Sheetrock Firecode Core	¾" MR Fire Shield
F.	Gyp. Board ASTM D3273 Type X Abuse & Mold Resistant	¾" Sheetrock Firecode Core Mold Tough AR Board	¾" MR Fire Shield Mold Resistant Board Type Hi-Abuse XP
G.	Exterior Gyp. Board ASTM C931	¾" Sheetrock Ext. Ceiling Bd.	¾" Ext. Soffit Bd.
H.	Metal Trim	#200B	#200
I.	Control Joint to be #093-V expansion joint by Trim Tex, or comparable by Plastic Components, Inc., conforming to ASTM C1047 and ASTM D3678 for interior exposure. Provide control joints where necessary.		
J.	Joint Tape (* See notes)	*Perf-a-Tape	*Q-W Tape
K.	Joint Compound (* see notes)	*Perf-a-Tape	*Sta-Smooth Joint Compound
L.	Corner Bead	Dur-A-Bead #103	Standard Corner Bead
M.	Channels (framing)	3/4" x 1½" cold rolled Channels, 30 mil	3/4" x 1½" cold rolled Channels, 30 mil
N.	Suspension Wire	8 ga. wire	8 ga. wire
O.	Wire Ties	18 gal. wire	18 ga. wire

NOTES:

1. Metal trim and framing to be zinc galvanized.
2. Metal studs by ClarkDietrich, United States Steel, and Marinoware conforming to specification requirements or equal.
3. Joint tape, joint compound, miscellaneous items, etc. to be as required by gypsum board manufacturer to provide and maintain the fire rating, mold resistance, and abuse resistance of their system.
4. Provide necessary components and accessories for the complete and proper installation of the drywall.
5. Provide moisture/mold resistant drywall at all wet wall locations in restrooms, employee lounge and all mechanical room walls.

2.2 METAL SUSPENSION SYSTEM

- A. Manufacturers:
 - 1. Chicago Metallic Corp., Fire Front 650 System
 - 2. USG Interiors, Ceiling Suspension Division, Rigid X
 - 3. Armstrong, Drywall Furring System 8900 Series
- B. Provide proper system and components to support additional loading of double gypsum board, light fixtures, etc.
- C. Provide necessary components and accessories for the complete and proper installation.

PART 3 EXECUTION

3.1 METAL STUD FRAMING INSTALLATION

- A. Stud System Erection. Attach metal runners at floor with suitable fasteners located 2" from each end and spaced 16" o.c. Position studs vertically, engaging floor and ceiling runners and spaced 16" o.c. Metal studs shall run full height from floor to height as indicated. When necessary, splice studs with 8" nested lap and one positive attachment per stud flange. Place studs in direct contact with door frame jambs, abutting partitions and partition corners.
- B. Anchor studs for shelf-walls, counter, vanity, and those adjacent to door frames, partition intersections, and corners to ceiling and floor runner flanges with USG Metal Lock Fastener tool. Securely anchor studs to jamb and head anchor clips of door frames by bolt or screw attachment. Over metal door frames, place horizontally a cut-to-length section of runner with a web flange bend at each end, and secure with one positive attachment per flange.
- C. Framing components shall be cut squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Members shall be held positively in place until properly fastened.
- D. Construct corners using minimum 3 studs, double stud at wall opening, door and window jambs.
- E. Erect studs 1 piece full length; splicing of studs not permitted.
- F. Attachment of similar materials shall be done by mechanical fasteners. Dissimilar materials may be attached with screws, bolts, or properly designed clips. Wire tying of framing components in structural applications shall not be permitted.
- G. Provide necessary stud bracing, etc. as detailed and/or required to support design and anticipated loads.
- H. Install intermediate studs above and below openings to match wall stud spacing.

- I. Provide deflection allowance in stud track, directly below horizontal building framing for non-load bearing framing. Deflection Track and Firestop System to be installed per manufacturer's requirements.
- J. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- K. Provide substantial intermediate wood blocking properly anchored to metal studs for secure attachment of wall mounted items, toilet accessories, etc.

3.2 GYPSUM BOARD INSTALLATION

- A. The suspension system for the suspended gypsum board panels, ceilings and soffits shall consist of necessary components as required and shall be installed as per manufacturer's requirements and/or as detailed to support loads at 1/360 max. deflection. Provide control joints as indicated and required, installed per manufacturer's requirements. Properly glue and screw gypsum board panels to ceiling suspension system.
 - 1. Suspension system and components to be supported from steel bar joists, including but not necessarily limited to, framing and hanging wire shall be supported from the top chord of the steel joists unless otherwise specifically indicated.
- B. Gypsum board erection (on studs). Apply gypsum panels vertically. Position edges over studs for vertical application; ends over studs for horizontal application.
- C. Use maximum practical lengths to minimize end joints. Fit ends and edges closely, but not forced together.
- D. Stagger joints on opposite sides of partition and on laminated sections. Space screws 12" o.c. in field of panels and 8" o.c. staggered along vertical abutting edges.
- E. Gypsum board shall be applied to surfaces where called for in the Drawings. Joints shall be taped, spackled and neatly sanded to form a smooth, even sound surface so as to show no evidence of joints after surfaces have been painted. Provide metal corner beads at exterior corners and metal trim at exposed edges of gypsum board surfaces and where gypsum board abuts dissimilar materials, taped flush. Provide level of finish meeting Gypsum Association standards.
- F. Trim, beads, control joints, reveals, etc. to be taped in flush to provide a uniform monolithic appearance.
- G. Work and materials to be per gypsum board manufacturer's requirements to provide and maintain the fire rating, mold resistance, and abuse resistance of their system.

3.3 PATCHING

- A. After other trades and contractors have finished their work, damaged areas shall be patched. The Contractor shall accomplish patching and repainting without cost to the Owner.

3.4 PROTECTION

- A. Protect adjacent finish surfaces from damage due to operations.

END OF SECTION

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SECTION 09 5123 – ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordinate Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
 - 1. Ceiling suspension members.
 - 2. Ceiling-mounted items including lighting fixtures, diffusers and grilles.
- C. Maintenance Data: For finishes to include in maintenance manuals.

1.3 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated, as documented according to ASTM E548. NVLAP-accredited laboratories must document accreditation, based on a “Certificate of Accreditation” and a “Scope of Accreditation” listing the test method specified.
- B. Source limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components and accessories to Project site in original unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above is complete, and ambient

temperature and humidity conditions are maintained at the levels for Project when occupied for its intended use.

1.6 COORDINATION

- A. Coordinate layout and installation of acoustical panel and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, and partition assemblies.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 80 S.F.
 - 2. Suspension System Components: Left-over material.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Products
 - 2. Manufacturers: Subject to compliance with requirements, provide ceiling panel products by one of the following manufacturers:
 - a. Armstrong
 - b. Celotex Corp.
 - c. USG Corp.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E795.

2.3 MINERAL-BASE ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

- A. Products:
 - 1. Armstrong: "Tundra" or approved equal.
- B. Color: White.
- C. LR: Not less than 0.87.
- D. NRC: Not less than 0.50.

- E. CAC: Not less than 33.
- F. AC: Not less than 170.
- G. Edge Detail: Tegular.
- H. Thickness: 5/8 inch.
- I. Size: 24 by 24 inches.
- J. Special Features: Humiguard and BioBlock to inhibit or retard mold/mildew.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
 - 1. High-Humidity Finish: Comply with ASTM C635 requirements for "Closing Classification for Severe Environment Performance."
- C. Attachment Device: Size for five times the design load indicated in ASTM C635, Table 1, "Direct Hung," unless otherwise indicated.
- D. Wire Hangers, Braces and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM C641/A641M, Class I zinc coating, soft temper.
 - 2. Nickel-Copper-Alloy Wire: ASTM B164, nickel-copper-alloy UNS No. N04400.
 - 3. Size: Select wire diameter so its stress at three times hanger design load (ASTM C635, Table I, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106 inch diameter wire.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, GENERAL

- A. General: Install acoustical panel ceilings to comply with ASTM C636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstruction; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where widths of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapeze or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 6. Do not attach hangers to steel deck tabs.
 - 7. Do not attach hangers to wood fiber roof deck. Attach hangers to structural members.
 - 8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 7001 – QUARTZ EPOXY FLOORING SYSTEM

PART 1 GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Painting: Section 09 9000.

1.2 QUALITY ASSURANCE

- A. Acceptance Sample:
1. A minimum of four (4) one foot square mock up samples of the specified flooring system shall be prepared showing a representative sample of colors and slip resistance. Color and amount of skid resistant additive shall be approved by the Owner.
 2. The installed flooring system shall duplicate the acceptance sample in thicknesses of each respective film layer, color, texture and degree of overall appearance and finish.
- B. The finished floor coating shall be uniform in color, texture and appearance. All edges that terminate at walls, floor discontinuities and other embedded items shall be sharp, uniform and cosmetically acceptable with no thick or ragged edge. The Contractor shall work out an acceptable masking technique to ensure the acceptable finish of all edges.
- C. Reference Standards:
1. ACI 308 - Standard Practice for Curing Concrete.
 2. ACI 302.R1-80 - Guide for Concrete Floor and Slab Construction.
 3. United States Department of Agriculture Acceptance.
- D. Contractor Prequalification Requirements:
1. Each bidder for this project shall be a rep-qualified and “Approved Applicator” at the time of bid submittal with 5 years minimum experience.
 2. Each approved applicator shall have been pre-qualified in all phases of surface preparation and application of the specified floor coating system.

1.3 SUBMITTALS

- A. Acceptance Sample: the acceptance sample shall be a one foot square sample of Tnemec flooring system applied to hardboard or similar backing for rigidity and handling.
- B. Manufacturer’s Literature: Descriptive data and specific recommendations for initiating, mixing, application and curing.
- C. Manufacturer’s Material Safety Data Sheets (MSDS) for each respective product being used.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All material shall be delivered in original manufacturer’s sealed containers with all pertinent labels intact and legible.

- B. Store materials in protected areas at a temperature between 70° F and 90° F.
- C. Follow all manufacturer's specific instructions and prudent safety practices for storage and handling.

1.5 JOB CONDITIONS

- A. The material, air and surface temperatures shall be in the range of 70° F to 85° F during application and cure.
- B. The relative humidity in the specific location of the application shall be less than 85% and the surface temperature shall be at least 5° F above the dew point.
- C. The surfaces to be coated shall have been prepared as specified in Section 3.2 – Surface Preparation.
- D. Protect all adjacent surfaces not to be coated with masking and covers.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Tnemec Company Inc., 6800 Corporate Drive, Kansas City, MO 64120-1372; (800) 863-6221. Distributed by Righter Group, Inc., 187 Ballardvale St., Suite A190, Wilmington, MA 01887; (800) 533-3003.
- B. Approved equal.

2.2 APPROVED MATERIALS

- A. Tnemec Series 222 Deco-Tread Epoxy Flooring System with 4" rolled radius integral cove base.
 - 1. Saturating Prime Coat: Tnemec Series 201 Epoxoprime 100% Solids Epoxy Primer/Sealer.
 - 2. Intermediate Coat: Tnemec Series 222 Deco-Tread 100% Solids Epoxy with colored quartz broadcast, x 2 to achieve 1/8" thickness.
 - 3. Grout Coat: Tnemec Series 222 Deco-Tread or Series 284 Deco-Clear 100% Solids Clear Epoxy.
 - 4. Topcoat: Tnemec Series 284 or 285 Deco-Clear 100% Solids Clear Epoxy.
 - 5. Skid Resistant Additive: Tnemec Series 211 Glass Bead.

2.3 MATERIAL PREPARATION

- A. Mix all material in strict accordance with the manufacturer's specific instructions and procedures for the respective material being used.
- B. Pot life and cure times are very short; mix only enough product to satisfy immediate application requirements.

PART 3 EXECUTION

3.1 PRE-WORK INSPECTION

- A. Examine all surfaces to be coated with these materials and report any conditions that adversely affect the appearance or performance of the coating systems and which cannot be put into acceptable condition by the preparatory work specified in Paragraph 3.2.
- B. Do not proceed with surface preparation and application until the surface is acceptable or authorization to proceed is given by the Engineer.
- C. Ensure that floor drains, proximate equipment and any other items sensitive to dust and contamination are properly and adequately masked and protected.

3.2 SURFACE PREPARATION

- A. General:
 - 1. Initially, dislodge dirt, mortar, spatter and other dry surface accumulations and contamination by scraping, brushing, sweeping, vacuuming or compressed air blow-down.
 - 2. Surfaces that are heavily contaminated with petroleum or other process products shall be cleaned with the appropriate degreaser, detergent or other effective cleaner/surfactant followed by thoroughly rinsing with fresh water to remove the accumulation prior to mechanical cleaning efforts. Mechanical cleaning will not remove such deposits, but will only drive them deeper.
 - 3. All concrete floor surfaces shall be visibly dry, especially in cracks and other deep surface discontinuities, prior to commencing mechanical cleaning and preparation.
- B. Mechanical Surface Preparation and Cleaning:
 - 1. All accessible concrete floor surfaces shall be mechanically cleaned using a "BlastTrac" method or approved equivalent. All surface and embedded accumulations of paint, toppings, hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be removed leaving a bare concrete surface having a minimum profile of 30 mils and exposing the upper facades on concrete aggregate. (Reference SSPC-SP13/NACE 6, ICRI CSP 3-5)
 - 2. Floor areas that are inaccessible to the cleaning machine shall be mechanically abraded to the specified degree of cleanliness, soundness and profile using vertical disc scarifiers, starwheel scarifiers, grinders, needle guns or other suitable effective equipment.
 - 3. Cracks in the floor 3/16" and wider, shall be routed out to a minimum 1/2" deep v-groove of sound concrete and filled with materials recommended by the manufacturer. Other significant surface discontinuities such as holes, pits, depressions and exposed aggregate area shall be filled with similar materials.
 - 4. Allow the surface to dry or force dry with heat and circulating air to ensure that all surface, especially discontinuities, are visibly dry.
 - 5. All concrete floor terminations and leading edges shall be saw-cut and chiseled down to 1/4" to 1/2" as to avoid feathered edge terminations. This includes drains, construction and expansion joints and all leading edges of concrete floor where they meet dissimilar materials.

3.3 APPLICATION

A. Floor

1. This application shall consist of applying the Primer/Intermediate/Sealer, allowing time for cure, and then applying the topcoats in the sequence and film thicknesses as specified herein below and in Paragraph 3.6.
2. Open only the containers of components to be used in each specific application. Refer to manufacturer's data sheets for pot life/temperature relationship to determine size of batches to mix.
3. Pour the mix onto the floor surface, flat squeegee and backroll to form a uniform, continuous film, ensuring that all crevices, cracks and other surface discontinuities have been saturated and coated.
4. Allow for the Primer/Sealer to cure.
5. Pour intermediate resin onto floor, spread with 40 mil notched squeegee and backroll. Broadcast color quartz to rejection. Allow to cure, sweep and repeat process to achieve approximately 1/8" thick intermediate coat.
6. After full cure, sweep, vacuum and apply grout coat. When fully cured, apply top coat.

3.4 INSPECTION

- A. Request acceptance of the Primer/Intermediate coats before application of the Topcoat commences.
- B. All work that is not acceptable to the Engineer or Owner must be corrected before consideration of final acceptance.

3.5 CLEAN-UP

1. Remove any material spatters and other material that is not where it should be. Remove masking and covers, taking care not to contaminate surrounding areas.
2. Repair any damage that should arise from either the application effort or from the clean-up effort.

3.6 COATING SCHEDULE

A. Primer/Sealer Coat:

1. Tnemec Series 201 Epoxoprime or Series 222 Deco-Tread Resin 100% Solids Epoxy primer/sealer saturation at 150-200 sq. ft. per gallon. DFT of 8 mils.

B. Intermediate Coats:

1. Tnemec Series 222 Deco-Tread 100% Solids Epoxy at 1/8" with color quartz covering 100% of surface.

C. Grout/Topcoat:

1. Grout Coat: Tnemec Series 222 Deco-Tread or Series 284 Deco-Clear 100% Solids Epoxy at 80 sq. ft. per gallon.
2. Top Coat: Tnemec Series 284 or 285 Enviro Glaze Clear, 100% Solids Epoxy at 300-350 sq. ft. per gallon.

D. Glass Bead Additive

1. Tnemec Series 211 Glass Bead at 2-4 ounces per mixed gallon.

END OF SECTION

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SECTION 09 9000 - PAINTING AND COATING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Surface preparation.
 - 2. Field application of paints and other coatings.

1.2 DEFINITIONS

- A. Conform to ASTM D16 for interpretation of terms used in this Section.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Submittals for Review:
 - 1. Product Data: Provide product data on all finishing products.
 - 2. Samples:
 - a. Submit one paper chip sample in size sufficient to accurately illustrate range of available colors for each surface finishing product scheduled.
- C. Submittals for Information:
 - 1. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
- D. Submittals at Project Closeout:
 - 1. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five years' experience.
- B. Applicator Qualifications: Company specializing in performing the work of this Section with minimum five years' experience.

1.5 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior.

1.7 EXTRA MATERIALS

- A. Supply one gallon of each color and type; store where directed.
- B. Label each container with color, type, texture, and room locations, in addition to the manufacturer's label.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Tnemec, Inc.
- B. Substitutions: 01 2500 – Substitution Procedures and 01 6000 – Product Requirements.

2.2 MATERIALS

- A. Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
 - 1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
 - 2. For good flow and brushing properties.
 - 3. Capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.
- C. Patching Materials: Latex filler.
- D. Fastener Head Cover Materials: Latex filler.

2.3 FINISHES

- A. Refer to schedule at end of section for surface finish.

PART 3 EXECUTION

3.1 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. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- B. Surfaces: Correct defects and clean surfaces, which affect Work of this Section. Remove or repair existing coatings that exhibit surface defects.
- C. Marks: Seal with shellac those that may bleed through surface finishes.
- D. Impervious Surfaces: Follow manufacturer's instructions. Remove mildew by scrubbing with solution of tetra-sodium or tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Follow manufacturer's instructions. Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a 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.
- F. Shop Primed Steel Surfaces: Follow manufacturer's instructions. 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.
- G. Interior Wood Items Scheduled to Receive Transparent Finish: Follow manufacturer's instructions. Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.

3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Paint equipment and piping accessories, supports, brackets, specialties, valves and similar items not specifically mentioned in the schedule the same color as the principal assembly with which each is associated.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

- D. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Protect adjacent surfaces with protective coverings; mask name plates, hardware, valve stems and similar items; keep valve stems free from paint at all times; clean up spilled or spattered paint immediately.
- F. Lay drop cloths to protect floors and other surfaces from spatter and droppings. Protect all fixed equipment and remove the canopies of light fixtures and cover and protect from injury.
- G. Sand wood and metal surfaces lightly between coats as required to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. The use of any temporary heating or housing to obtain suitable temperatures for painting must be approved by the Engineer. Systems which result in excessive filmy deposits on metal surfaces will not be approved.
- J. Contractor shall advise paint company prior to the first field application of epoxy type paints, so that paint company representatives can meet with the painters on the site and instruct them in the proper procedures and practices for apply epoxy paints.

3.4 CLEANING

- A. Collect waste material, which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.5 GENERAL FINISHES

Note: The following schedule lists the paints and paint products of the Tnemec Company of North Kansas City, Missouri unless specifically noted otherwise. Manufacturer and products listed are for reference and establishment of quality. Equal products by other listed acceptable manufacturers may be used.

Note: All film surfaces may be measured at the option of the Engineer by use on an Elcometer. Any deficiencies found in the mil thickness shall be corrected by additional coating at the cost of the applicator.

- A. Interior Concrete Block
 - 1. First Coat: 1 coat Series N69 Hi-Build Epoxoline II at spreading rate of 75 to 100 square feet per gallon.
 - 2. Finish Coats: 2 coats Series N69 Hi-Build Epoxoline II at 5.0-6.0 dry mils per coat. Total thickness to be 10-12 mils.
- B. Interior Concrete Walls and Ceiling
 - 1. Prime Coat: Series N69 Hi-Build Epoxoline II applied at 4 mils DFT.
 - 2. Finish Coat: Series N69 Hi-Build Epoxoline II applied at 4 mils DFT.

C. Concrete Floors

1. Tnemec Series 222 Deco-Tread Epoxy Flooring System with 4" rolled radius integral cove base.
 - a. Saturating Prime Coat: Tnemec Series 201 Epoxoprime 100% Solids Epoxy Primer/Sealer.
 - b. Intermediate Coat: Tnemec Series 222 Deco-Tread 100% Solids Epoxy with colored quartz broadcast, x 2 to achieve 1/8" thickness.
 - c. Grout Coat: Tnemec Series 222 Deco-Tread or Series 284 Deco-Clear 100% Solids Epoxy.
 - d. Top Coat: Tnemec Series 284 or 285 Deco-Clear 100% Solids Clear Epoxy.
 - e. Skid Resistant Additive: Tnemec Series 211 Glass Bead.
 - f. This system shall be applied in the Softener Room, Pump Room and Chemical Feed Rooms.
2. "Everthane System" with Prime Coat – Series 201, Intermediate Coat – Series 284, Top Coat - Series 247 with Series 44-600 UV blocker additive.
 - a. This system shall be applied to the Electric Room, Office, Lab, Bathroom, Breakroom, Janitor's Closet, and Hallway.
3. Fiber reinforced flooring shall be prepared with grinding in accordance with the coating manufacturer's recommended procedures.
4. All floor joints are to be filled.

D. Piping, Valves, and Equipment (Non-Immersion, with or without existing primer).

1. Prime Coat: Tnemec Series 1 Omnithane applied at 3 mils DFT.
2. Finish Coat: Tnemec Series 1074U Endura-Shield II applied at 4 mils DFT.

E. PVC – (Non-Immersion)

1. Prime Coat: Tnemec Series N69 Hi-Build Epoxoline II applied at 3 mils.
2. Finish Coat: Tnemec Series 1074U Endura-Shield II applied at 3 mils DFT.

F. Steel – (Non-Immersion, excluding piping and valves)

1. Prime Coat: Tnemec Series 1 Omnithane applied at 3 mils DFT.
2. Finish Coat: Tnemec Series 1074U Endura-Shield II applied at 4 mils DFT.

G. Steel – (Immersion, including piping and valves)

1. Prime Coat: Tnemec Series 446-1222 Perma-Shield MCU applied at 7-9 mils DFT.
2. Finish Coat: Tnemec Series 446-1221 Perma-Shield MCU applied at 7-9 mils DFT.

H. Field touch-up of hot dipped galvanized steel

1. Series 90G-1K97 Tneme-Zinc.

I. Interior Ductwork

1. Prime Coat: Tnemec Series 115-color Uni-Bond DF applied at 3 dry mils.
2. Finish Coat: Tnemec Series 1029-color Enduratone applied at 2.5 dry mils.

3.6 PIPING COLOR IDENTIFICATION SYSTEM (TNEMEC EQUIVALENT)

Note: All piping shall be labeled with contents every 10 feet. Labels shall be stenciled on the piping with contrasting color.

A. Recommended Water Treatment Plant Pipe Identification Color Coding:

1. Raw Water – 110 GN Clover
2. Softened Water – 10 GN Aqua Sky
3. Blended Water – 11SF True Blue/Safety Blue
4. Final Effluent– 11SF True Blue/Safety Blue
5. Chlorine – 02SF Lemon Yellow/Safety
6. Brine – 32 GR Light Gray
7. Backwash – 68BR Twine
8. Natural Gas – 05SF International Orange & 35GR Black Banding
9. Potable Water – 11SF True Blue/Safety Blue

3.7 SCHEDULE – ITEMS TO BE FINISHED

- A. Exposed structural steel framing except stainless.
- B. Hollow metal Doors and Frames.
- C. Non-galvanized pipe and valves.
- D. Process plant equipment as directed by Engineer.
- E. Miscellaneous ferrous metals (unless specified otherwise).
 1. Valve actuator stand.
 2. Duct work.
- F. Concrete masonry units.
- G. Steel pipe bollards.
- H. Concrete slabs and walls.
- I. Equipment and Valve Number/Labeling:
 1. Paint black numbers as directed by Engineer on mechanical equipment and valves. Stencils shall be a maximum size of 2 inches.
 2. All valve handles and operators shall be painted black regardless of pipe color and designation.
- J. Exposed precast concrete roof plank ceiling.
- K. Steel water softener vessels.

END OF SECTION

SECTION 10 4010–BRONZE PLAQUE AND BUILDING LETTERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Furnishing and installing a new bronze plaque and exterior letters as specified.

1.2 QUALITY ASSURANCE

- A. Use skilled workmen who are thoroughly trained in the necessary crafts, and are completely familiar with the specified requirements and methods needed for proper performance of the Work.

PART 2 PRODUCTS

2.1 PLAQUE

- A. Plaque shall be approximately 18” wide x 24” high bronze with beveled edge and block letters as manufactured by “Gemini, Inc.” or approved equal. The plaque shall include City officials’ names, Contractor, Engineer, name of project and date. The exact layout and names will be provided by the Engineer. Plaque shall be blind mounted using stud fasteners which are to be furnished by the plaque manufacturer. Adhesive shall be applied to complete installation.

2.2 BUILDING LETTERS

- A. Letters shall be anodized aluminum as manufactured by “Gemini, Inc.” or approved equal. Size of letter shall be 8” high (uppercase and lowercase) with type style selected by Engineer from standard cast types. Color and finish shall be anodized or painted baked enamel selected from standard available colors provided by Contractor.
- B. Lettering shall read as shown on each building in the pertinent elevations and shall be located on the buildings in the locations indicated on the Drawings or as directed by the Engineer.

PART 3 EXECUTION

3.1 MOUNTING PLAQUES

- A. Plaque shall be installed with the fasteners provided in accordance with the manufacturer’s recommendations. Location of plaque shall be as indicated on the Drawings in a location approved by the Engineer.
- B. Letters shall be installed with mounting studs set in approved adhesive cement at spacing and location(s) as indicated on the Drawings. A stainless steel jam nut shall be inserted between the letter and building surface.

END OF SECTION

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SECTION 10 7500 - FLAGPOLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Flagpoles and accessories.

1.2 PERFORMANCE REQUIREMENTS

- A. Flagpole with Flag Flying: Resistant without permanent deformation to 90 miles/hr wind velocity; non-resonant, safety design factor of 2.5.
- B. Flagpole without Flag: Resistant without permanent deformation to 100 miles/hr wind velocity; non-resonant, safety design factor of 2.5.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate detailed dimensions, base attachment details, anchor requirements, and imposed loads.
- C. Product Data: Submit data on pole, accessories, and configurations.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Closeout Requirements.
- B. Operation and Maintenance Data: Submit Operation and Maintenance Data.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 – Product Requirements: Product storage and handling requirements.
- B. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- C. Protect flagpole and accessories from damage or moisture.

PART 2 PRODUCTS

2.1 FLAGPOLES

- A. Manufacturers:
 - 1. American Flagpole
 - 2. Concord Industries, Inc.
 - 3. Pole-Tech Company, Inc.
 - 4. Substitutions: Section 01 6000 – Product Requirements

2.2 COMPONENTS

- A. Aluminum: ASTM B241/B241M, 6063 alloy, T6 temper.
- B. Outside Butt Diameter: 5 inches.
- C. Outside Tip Diameter: 3 inches.
- D. Nominal Wall Thickness: 0.188 inch.
- E. Nominal Height: 20 ft; measured from ground elevation.
- F. Flagpole: Ground mounted type.
- G. Flagpole Design: Cone tapered.
- H. Halyard: Interior.

2.3 ACCESSORIES

- A. Finial Bell: Aluminum 5 inch diameter.
- B. Truck Assembly: Cast aluminum, stationary, non-fouling.
- C. Flags: Supply three (3) American Flag design, 48x72 inch size, brass grommets, hemmed edges.
- D. Halyard: 5/16 inch diameter polypropylene, braided, white.
- E. Foundation: as required by pole manufacturer.
- F. Pole Base Attachment: Tube with base shoe.
- G. Lighting Ground Rod: 24 inch long copper rod, 3/4 inch diameter.

2.4 FACTORY REFINISHING

- A. Metal Surfaces in Contact with Concrete: Asphaltic paint.
- B. Aluminum: Mill finish.
- C. Finial: Spun finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Verify dimensions are as indicated on shop drawings and as instructed by manufacturer.

3.2 PREPARATION

- A. Coat metal sleeve surfaces below grade, in contact with cementitious surfaces, and in contact with dissimilar metals with asphaltic paint.

3.3 INSTALLATION

- A. Electrically ground flagpole installation.
- B. Install foundation plate, centering wedges, base assembly, and fittings in accordance with manufacturer's recommendations.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/2 inch.

3.5 ADJUSTING

- A. Section 01 7000 – Closeout Requirements.
- B. Adjust operating devices so halyard and flag function smoothly.

END OF SECTION

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SECTION 11 5310 – LABORATORY CABINETRY

PART 1 GENERAL

1.1 SUMMARY

- A. Provide all labor, materials and equipment necessary to construct, deliver and install laboratory cabinetry, custom cabinetry, casework and countertops, as shown on the Drawings, as specified herein, including all water, drains, electrical, gas and ventilation services, and as needed for a complete and proper installation.
- B. Work included:
 - 1. Furnish all items as specified, delivered and unloaded at the project site.
 - 2. The Contractor shall be responsible for verifying all existing conditions and taking all necessary measurements to assure proper fit of the proposed cabinetry.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Deliver equipment to the site according to manufacturer's instructions.
- B. Store and protect equipment according to manufacturer's instructions.
- C. Store all equipment off the ground in enclosed shelter.

1.3 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on shop drawings.

1.4 MANUFACTURERS

- A. All laboratory casework covered by this Specification shall be the product of one manufacturer. Manufacturers furnishing equipment made only in the USA.
- B. Approved laboratory casework manufacturers are: BMC/Metal-Arc/LDS 800 metal, or approved equal.

PART 2 PRODUCTS

2.1 MATERIALS – METAL CASEWORK CONSTRUCTION

- A. All materials shall be of the highest quality, whether they be finished parts used in assembly, raw material, or materials and workmanship furnished by others, as part of the completed product.
- B. All steel used in the manufacture of metal casework shall be cold rolled, prime grade, or better. Steel shall be inspected prior to fabrication and certified to be free of rust, pits, or scratches, or any other defect(s) which prevent parts from being made to blueprint specifications.

2.2 GAUGES

A. Gauge specifications for individual steel parts shall be as follows:

1. Aprons	18 Ga.
2. Back Panels	20 Ga.
3. Bottom Panels	18 Ga.
4. Door & Drawer Outer Pan	20 Ga.
5. Door & Drawer Inner Pan	20 Ga.
6. Drawer Bodies	20 Ga.
7. Legs, 2" Square Tube	18 Ga.
8. Shelves	18 Ga.
9. Side Panels	18 Ga.
10. Table Frames	18 Ga.
11. Shelf Support Brackets	14 Ga.

2.3 CONSTRUCTION

- A. Cabinets: Cabinets shall be constructed of prime 18 gauge steel for the sides, backs, and toe space. 1" x 18 gauge steel tubing shall be used for the top front and back rails. Each front joint is to be welded and ground flush to provide a smooth surface. A 4' high x 3' deep toe space shall be standard. Four corners are to be fitted with a stamped and welded 14 gauge leveling gusset plate, and a plated leveling screw. Leveling screws are provided with a slot for easy adjustment, and non-marking nylon glides. Removable back panels shall be furnished on all cabinets. Cabinet bottom will be panned up to contain spills and removable for easy cleaning and maintenance.
- B. Doors – Base Cabinet Doors: Doors shall be double pan construction, with insulating material fastened to the inside for sound deadening, and strength, to prevent panning and bending. Hinges are five knuckle gauge stainless steel, fasted to both the door and cabinet frame with zinc plated steel screws. Door catches plated, friction roller type. Door closes onto nylon bumpers for noise dampening, and over nylon spaces for alignment.
- C. Drawers: Drawer bodies shall be one-piece 20 gauge construction, full coved on all four sides horizontally and formed out of one sheet of steel.
- D. Drawer Suspension: Drawers shall operate on full extension, ball bearing, zinc plated, drawer suspension rated to withstand 1,000 cycles at 100 lbs.
- E. Shelves: Shelves shall be constructed of 18 gauge steel, with channels formed on both the front and back edges. K & V shelf clips are made from 14 gauge steel, and are to be adjustable vertically in 1" increments. Sliding shelves shall use the same ball bearing slides as drawer units.
- F. Fabricated Accessories: All accessories required for specific installations shall be fabricated and finished to the same material and quality standards as the base units they will be made to complement.
- G. Wall Cabinets:

1. Wall cabinets shall be made to the same quality standards as base units. Material used, as noted above. Shelf hangers are to be constructed of 14 gauge steel, and to easily adjust vertically in one inch increments.
2. Shelves are to be constructed with channel-type fronts and backs, as well as flanged ends with nylon button guides. Wall units to have open fronts, sliding glass, framed glass sliding and swinging, or sliding and swinging steel doors as specified. Glass is plate, ground on all exposed edges.
3. Sliding door units to be furnished with extruded top and bottom channels as well as ball bearing rollers. All wall units are to be furnished with hanger brackets for ease of installation.

H. Floor Units:

1. Floor units shall be made to the same quality standards as base units. Material used, as noted above.
2. Shelves and shelf hanger construction, same as wall units.
3. Floor units to be furnished with the same front and door configurations as the above-described wall units.

I. Sinks:

1. Sink- "American Epoxy Scientific" or approved equal epoxy under mount sink #AESU-30, 18"x 15" deep with corner drain.

2.4 FINISH

- A. All surfaces shall be painted or plated, whether they are exposed or not. Paint is to be a chemically resistant baked-on epoxy powder coat enamel, conforming to BMC Metal-Arc standards. Color shall be black.
- B. General: This Specification establishes the performance and appearance requirements for the interior decorative coatings and used on laboratory products. The material used for the coating will be applied dry over metallic substrates. The material must be available in a number of colors matched to BMC/Metal-Arc standards.
- C. Manufacturability: The material shall be such that it can be applied in multiple coatings where needed, without intercoat sanding. The shelf life of the material shall be six months at not more than 77° F without deterioration of properties.

D. Appearance:

<u>Description</u>	<u>Test Procedure</u>	<u>Requirement</u>
1. Color	AES-C-0100	Pass
2. Light Resistant	QUV A Apparatus	48 hours w/o change in color or gloss
3. Thickness	Mill Gauge	See Table 2.
4. Glass	ASTM D523-80 60 Degrees Glossmeter	30 Degree + 5 Matte 20 Degree + Black

E. Performance:

<u>Description</u>	<u>Test Procedure</u>	<u>Requirement</u>
1. Hardness	ASTM D3363-74 (No indentation)	3-H Min.
2. Impact Resistance	ASTM D2794-69	120 in-lbs w/o cracking
3. Flexibility	ASTM D522-60	No cracking or loss of adhesion at bend
4. Abrasion	Tabor abrasor CS 10 Wheel	14 mg. max. weight loss per 100 cycle
5. Humidity	ASTM D2247	288 hours exposure with no loss of adhesion or blistering
6. Salt Spray	ASTM B117-64 ASTM B1654-79	144 hours exposure with no rust Max 1/8" rust creep from scribe line
7. Adhesion		90 of the squares show finish

<u>Description</u>	<u>Test Procedure</u>	<u>Requirement</u>
8. Chemical Resistance	A door shall be removed from the cabinets and laid flat and level on a horizontal surface. Chemical spot tests shall be made by applying 10 drops (approx. 0.5 cm ³) of each reagent listed in Table 1 to the surface to be tested. Each reagent spot shall be open to the atmosphere. Ambient temperature shall be 68-72° F. After one hour, chemical shall be flushed away with cold water and the surface washed with detergent and warm water at 150° F. Surface shall then be examined under 100° foot candles of illumination.	

TABLE 1

<u>Reagent</u>	<u>Concentrations by Weight</u>	<u>Reagents</u>	<u>Concentrations by Weight</u>
Acetic Acid	98%	Acetone	
Formic Acid	88%		
Hydrochloric Acid	37%	Ethyl Acetate	
Nitric Acid	25%	Ethyl Alcohol	
Nitric Acid	60%	Ethyl Ether	
Phosphoric Acid	75%	Formaldehyde	37%
Sulfuric Acid	25%	Hydrogen Peroxide	5%
Sulfuric Acid	85%	Methyl Ethyl Ketone	
Ammonium Hydroxide	28%	Phenol	85%
Sodium Hydroxide	10%	Xylene	
Sodium Hydroxide	25%		

9. Scratch Resistance	Hoffman Scratch Hardness Tester	No Substrate Appearance with 1000 gram load

F. Application:

1. Surface "A" – Most critical of all areas. Completely exposed surface. No defects listed in Table 2 allowed.
2. Surface "B" – Not as critical as surface "A." Sometimes exposed interior and exterior surfaces.
3. Surface "C" – Hidden surfaces; areas that will not be seen in normal use.

TABLE 2

<u>Appearance Surface</u>	<u>Min. Millage</u>	<u>Surface Class</u>	
Fillers	1.2	A	
Front of Cabinet or Case Including Drawer and Door Fronts			
Shelf Tops	1.2	B	
Top of Wall and Floor Cases	1.2	B	
Cabinet and Case Floors	1.2	B	
All other than above interior and exterior vertical surfaces	1.0	B	
<u>Non-Working Surfaces</u>			
All other than above unexposed surfaces	0.75	C	
<u>Condition</u>	<u>Surface “A”</u>	<u>Surface “B”</u>	<u>Surface “C”</u>
Blemish	No	Not permitted on surfaces easily detected from an arm’s length.	Yes
Water Spot	No	Not permitted on surfaces easily detected from an arm’s length.	
Sag	No	Slight	Yes
Over Cure	No	No	Yes
Under Cure	No	No	Yes

2.5 EPOXY COUNTERTOP (PHYSICAL PROPERTIES)

The following values represent typical average test results as determined by outside testing companies.

A.

<u>Test</u>	<u>Test Method</u>	<u>Results</u>
Compressive Strength	ASTM D695	30,600 psi
Tensile Strength	ASTM D651	10,700 psi
Flexural Strength	ASTM D790	12,800 psi
Flexural Modules	ASTM D790	2 x 10 ⁶ psi
Density	ASTM D792	2.03 g/cc
Water Absorption	ASTM D570	0.018%
Rockwell Hardness	ASTM D785	105
Heat Distortion Temp.	ASTM D648	331° F

- B. Heat Resistance: The top surface show no blistering or cracking when an overturned 3/8” Bunsen burner, adjusted to quiet flame with a 1-1/2” inner core, was allowed to remain on the surface for a period of two minutes.
- C. Char Resistance: A high form of porcelain crucible, size 15 ml. capacity, was heated over a Bunsen burner until the crucible bottom attained a dull, red heat. Immediately the hot crucible was transferred to the top surface and allowed to cool to room temperature. Upon removal of the cooled crucible, there were no blisters, cracks or any breakdown of the top surface whatsoever.
- D. Fire Resistance: Using the ASTM D635 test procedure for determining burning characteristics, Epoxyn shows no burn rates and is considered self-extinguishing.
- E. Flatness Tolerance: 1/64” per foot of length.
- F. Color: Black

2.6 EQUIPMENT LIST

- A. A laboratory furnishings list is attached to these Specifications.
- B. The Contractor shall provide the specified laboratory and equipment as a complete and operational facility.

PART 3 EXECUTION

3.1 FABRICATION

- A. All cabinetry shall be constructed as shown and as required to produce a complete finished product.
- B. Manufacturer shall field verify all cabinetry and casework dimensions prior to fabrication of casework.

3.2 INSTALLATION

- A. All cabinetry and casework shall be delivered and set up in all areas indicated on the Drawings. All cabinetry shall be securely fastened to walls and countertop.
- B. All doors, hardware and shelves shall be fit and adjusted as required for proper alignment. Upon completion of installation, all cabinetry and casework shall be inspected and touched up as required to provide an unmarred finished product. All shelves, casework and cabinetry shall be cleaned and dusted and left in a clean, presentable condition for use by the Owner.

3.3 WARRANTY

- A. All cabinetry shall be guaranteed against defective materials and/or workmanship for a period of one year from the date of final acceptance.

END OF SECTION

SECTION 23 1000 – HEATING, VENTILATION AND AIR CONDITIONING

PART 1 GENERAL

1.1 SUMMARY

A. Work Includes: Provide heating, ventilation, and air conditioning system where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:

1. Dehumidifiers with remote condensers and controls.
2. Ductwork, grilles, registers.
3. Wall grilles, louvers, etc.

1.2 COORDINATION

A. Wiring by other contractors:

1. Electrical contractor to provide power to disconnect switch at all HVAC equipment.
2. Electrical contractor to provide conduit and box for thermostat and control wiring, thermostat and control wiring by HVAC contractor.

B. Wiring by HVAC contractor:

1. All wiring from disconnect switch to HVAC equipment.
2. All controls and wiring to HVAC equipment.

C. Work by plumbing contractor:

1. Provide all natural gas piping, and valves to point of connection at all HVAC equipment.

D. Plumbing work by HVAC contractor:

1. Final connection of gas piping and any required gas regulators to all HVAC equipment.
2. Condensate drain line.

1.3 QUALITY ASSURANCE

A. Perform Work according to manufacturers' recommended standards.

B. Without additional cost to Owner, provide such other labor and materials as are required to complete the Work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

1.4 SUBMITTALS

A. Section 01 3300 – Submittal Procedures: Requirements for submittals.

B. Product Data: Within 30 calendar days after the Contractor has received the Owner's "Notice to Proceed," submit:

1. Manufacturers' catalogs, samples, and other items needed to fully demonstrate the quality of the proposed materials and equipment.
2. Shop drawings for ductwork, including supports and hangers.

C. Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Engineer two copies of an Operation and Maintenance Manual.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Section 01 6000 – Product Requirements: Requirements for transporting, handling, storing and protecting products.

PART 2 PRODUCTS

2.1 DUCT WORK

- A. For exhaust systems and for the heating, ventilating, and air conditioning systems, provide stainless steel sheet metal ducts fabricated and installed to pertinent ASHRAE and SMACNA standards, or to the requirements of governmental agencies having jurisdiction, whichever requirements is more stringent.
- B. All duct work shall be of size indicated on the Drawings or as required for proper equipment operation. In no case shall the Contractor change size without written consent of the Engineer.
- C. Low pressure ductwork (positive or negative) shall be designed for static pressure rating up to 2" wg, with nominal duct air velocities of 2,000 fpm or less. Class B seals shall be used in the construction of the ductwork to make all duct joints and connections airtight (SMACNA, current edition).
- D. Concealed round ducts and fittings may be fabricated with longitudinal seams. Elbows to be segmented adjustable seam type.
- E. All round stainless steel air ducts shall be constructed of the following gauges except where specifically noted otherwise on the Drawings:

<u>Duct Diameter</u>	<u>Gauge Spiral Seam</u>	<u>Gauge Longitudinal Seam</u>
Low Pressure:		
3" to 8"	28	28
9" to 14"	28	26
15" to 26"	26	24

2.2 DUCTWORK JOINTS AND SEAMS

- A. Transverse Joints:
1. Rectangular Ducts:

- a. For ducts with longest side 12" wide and over, construct ductwork using the Ductmate 35/25 slide on systems, or approved equal.
 - 1) The SMACNA T-22 flanged connection may be used.
 - 2) The non-proprietary T-24 flange and proprietary T.D.C./T.D.F. flanges, are acceptable.
 - b. For transverse joint construction, 11" wide and smaller, the above-mentioned may be used, or refer to SMACNA's current edition, for proper duct construction procedures.
 - c. Ductmate 440 butyl gasket, or an approved equal, shall be used between all rectangular transverse flanged duct connections. Ductmate's 440 butyl gasket will be used exclusively with the Ductmate systems.
 - d. For rectangular ductwork located outside, exposed to weather, construct ductwork per "Transverse Joints, Rectangular" with one (1) exception. Use continuous metal cleat on top joints of ducts, for added weather protection, or other approved methods of sealing.
2. Round Ducts:
 - a. For round ducts of 10" diameter and larger, construct ductwork using the Ductmate "Spiralmate" system or approved equal. Round ducts less than 10" in diameter shall be constructed per SMACNA manual standards.

B. Longitudinal Seam:

1. The Pittsburgh Lock seam shall be used; no exception.

2.3 BALANCING DAMPERS

- A. Volume dampers to be opposed blade, or single blade type (splitter type dampers are not acceptable) designed for reduced volume control. Damper hardware must be durable and installed properly. Damper blades should be stiffened by forming or other method, as required for the duty. Damper to have locking device to hold damper in a fixed position without vibration. Dampers shall be equal to American Warming Model VC-8 (rectangular) and VC-9 (round) for installation in low pressure systems.
1. Balancing Dampers to have lock type damper operator and linkage as best suits construction and access conditions.
 2. Dampers with accessible operators to be provided with locking damper quadrants complete with locking nuts and graduate scale.
 3. Dampers with non-accessible operators provided with Young Series 300 concealed regulator and coverplate complete with worm gear or linkage as required for smooth damper operation.

2.4 TURNING VANES

- A. Turning vanes shall be furnished and installed where denoted on Drawings and in all square elbows, designed to carry the air around the 90° bend without eddying or pressure fluctuation in the turn. Vanes shall be formed blade type and of standard catalog product of reputable manufacturer. Manufacturer of the air turns shall recommend the number and size of blades. Air turns shall be the complete unit type installed along the diagonals of each square elbow.

- B. Vanes shall be constructed and installed to limit pressure loss to not more than 20% of the velocity pressure.

2.5 DUCTWORK AND EQUIPMENT INSULATION

- A. The following ductwork shall be externally insulated as described below:

- 1. Supply Air Ductwork.

- B. All external outdoor exposed ductwork insulation shall be 2" thick, minimum 6 pounds per cubic foot density Johns Manville 800 Series, or approved equal, spun glass rigid fiberglass board with an average thermal conductivity not to exceed 0.22 btu-in. per square foot per degree F. per hour at a mean temperature of 75° F. Insulation shall be provided with reinforced aluminum foil vapor seal jacket. Provide insulation with Johns Manville Insulkote-ET weather protective coating over reinforcing mesh and Insulkote primer. Install per manufacturer's installation instructions.

2.6 HVAC EQUIPMENT

- A. All HVAC equipment shall be of size, arrangement, and function shown on the Drawings as manufactured by an approved source.

- B. Chlorine Room

- 1. Separate switches for the chlorine room wall exhaust fan and for the lights shall be provided outside the chlorine room and at the inspection window.

2.7 REGISTERS AND GRILLES

- A. Gravity relief dampers and louvers shall be as indicated on Drawings.

2.8 GAS-FIRED UNIT HEATERS

- A. Unit heaters shall be as described on plan sheets.

2.9 DEHUMIDIFIERS AND CONDENSERS

- A. Dehumidifiers and condensers shall be as described on plan sheets.

2.10 MINI-SPLIT

- A. Manufacturers:

- 1. Gree Model 3VIR09HP115V1AH wall-mounted heat pump system.
- 2. Substitutions: As approved by the Engineer.

- B. Installation

- 1. Installed according to the manufacturer's specifications and instructions
- 2. (1) unit to be installed to service the chemical feed room
- 3. (1) unit to be installed to service the chlorine room

- C. Installed per manufacturer's specifications and instructions

PART 3 EXECUTION

3.1 INSTALLATION OF DUCTWORK

- A. This Contractor shall carefully check the arrangement of ducts and dimensions for all working spaces at the building so that there will not be interferences with the running of ducts. This Contractor shall carefully lay out all openings for this Work.

3.2 DUCTWORK INSULATION

- A. On cold surfaces where a vapor barrier must be maintained, insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation.
- B. All surface finishes shall be extended in such a manner as to protect all raw edges, ends, and surfaces of insulation.
- C. All duct insulation shall be continuous through walls, ceiling openings, or sleeves, except where firestop or firesafing materials are required.
- D. No insulation materials shall be applied to any ductwork, or item of equipment until after all tests have been complete and the work is proven sound and free from defects.
- E. All fittings, equipment, ductwork, etc. which are to be insulated shall be thoroughly dry and free from oil or other foreign matter before any insulation is applied.
- F. Contractor shall note that all adhesives shall be applied as specified in continuous bands for complete coverage. The application of adhesives in daubs is not permitted.
- G. All equipment and work by other trades shall be protected during insulation installation.
- H. Entire insulation installation shall comply with manufacturer's recommendations. If there is a conflict between these specifications and the manufacturer's recommendations, follow the more stringent procedure.
- I. Exposed Exterior Insulation:
 - 1. Coat entire duct insulation system with Insulkote Primer – E.
 - 2. Completely wrap duct insulation with reinforcing mesh. Stretch mesh tightly and secure edges together tightly. Entire installation to comply with manufacturer's recommendations.
 - 3. Apply two (2) 1/8" thick coats of Insulkote weather protective coating over entire surface area of exterior ductwork. The first coat should completely cover the reinforcing mesh and be applied while the primer is still tacky. The final coat must be applied while the first coat is still tacky and slightly wet to the touch. The completed job must show no exposed reinforcing mesh.
 - 4. Entire weather protective coating installation shall comply with manufacturer's recommendations and requirements and shall provide a complete weatherproof enclosure.

3.3 DUCTWORK SUPPORT

A. All galvanized ductwork 60" or smaller in maximum dimension shall be supported by 1" x 16 GA. galvanized band iron hangers secured to building structure. Ducts larger than 60" in maximum dimension shall be supported by 1-1/2" x 16 GA. galvanized band iron hangers. No hangers shall be secured to the underside of lightweight roof decking or lightweight floor slabs. Where required, trapeze hangers using adequate strength steel angles shall be used and rods shall be secured to the building structure. Maximum spacing for all duct supports and hangers shall be 8'-0" on center. All duct hangers and supports shall be in accordance with SMACNA standards.

B. Perforated strap iron hangers will not be permitted.

3.4 DUCT SEALING AND LEAK TESTING

A. All joints and seams including longitudinal seams on plenums and ducts shall be airtight or sealed as required. Poorly made joints, splits, visible holes at corners, etc., shall be reworked or new pieces of ductwork installed as directed by the Engineer. Where excessive pulsating of ductwork or plenum housing is found, additional stiffeners shall be added as directed.

B. The corners of all joints, openings, etc., shall be as sealed as hereinbefore specified. Particular care shall be taken on all ductwork on the suction side of all fans. There shall be no audible leaks.

3.5 CONTROLS

A. Automatic controls suitable for specified equipment shall be furnished and installed by this Contractor.

3.6 BALANCING THE SYSTEM

A. After installation of the system, this Contractor shall balance the output of each register to the volumes shown on the plans.

3.7 GUARANTEE

A. This Contractor shall furnish an unconditional, written guarantee regarding all material, equipment, and workmanship for a period of one year after final acceptance.

END OF SECTION

SECTION 26 1000 - ELECTRICAL

PART 1 GENERAL

1.1 SUMMARY

A. Work Included:

1. These Electrical Specifications cover the providing of a complete electrical system of proper voltage, capacity, and location, from the point of electric service to the various loads as shown herein on the accompanying Drawings. The labor, materials, equipment, appliances, and services necessary to accomplish in compliance with the Contract Documents all electrical work required by this project shall be provided by the Contractor.
2. Accomplishing of the electrical work shall include furnishing and installing of all necessary wiring to provide lighting, heating, cooling, and ventilating as required; all necessary power wiring and outlets as required; all power wiring of mechanical equipment requiring an electrical connection; all necessary communications and control wiring for electrical and mechanical equipment as required, or as shown on the Drawings or enumerated in these specifications.
3. The Contractor shall familiarize himself with existing conditions via an on-site inspection of the site and building(s), which familiarization is to be accomplished prior to bidding.

B. Scope:

1. It is the intention of the specifications and the related portions of the accompanying Drawings to cause all systems indicated to be furnished complete, in every respect, to include furnishing and installing all equipment needed and usually furnished in connection with such a system, whether specifically mentioned or not, except such parts as are specifically excluded.
2. The Drawings showing the arrangement of the buildings and electrical equipment with wiring interlineation, figures, and details shall be considered as part of and illustrating these specifications.
3. The Drawings are not intended to show all details or any special construction which may be found necessary as work progresses. Any work necessary, due to such lack of such detail, shall be done by the Contractor at no extra cost to the Owner.

1.2 QUALITY ASSURANCE

- A. Codes – Materials and Equipment: All materials and equipment shall conform with the most current NEMA, UL, NEC, Local Utility, and Local Electrical Code standards or higher, including subsequent revisions. The reference of articles and clauses of the NEC is for convenience and does not imply that other articles and clauses do not also apply.
- B. Codes – Work: All work shall be in accordance with the current edition and subsequent revisions of the National Electrical Code (NEC) and any other applicable building codes.
- C. Conflicts: In the case of conflict between or among pertinent codes, standards, and regulations, the most stringent requirement shall take precedence and govern over the remaining requirements.

- D. Warranty: Unless otherwise noted, the Contractor's warranty shall be in accordance with the General Conditions for a time period of one year from the date of final acceptance.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Within 35 calendar days after the Contractor has received Owner's "Notice to Proceed," the Contractor shall either submit six sets of shop drawings (paper copies) or PDF files for each item for approval by the Engineer for all apparatus and accessories, and cuts for specialties, proposed to be furnished and installed under the Contract. This submittal shall include, but not be limited to:
1. Materials list of items proposed to be provided under this Section.
 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 3. Shop drawings showing general layout, installation, materials, finishes, construction and assembly, and wiring and clearances between equipment proposed to be furnished and a building structure.
 4. Manufacturer's recommended installation procedures which, when approved by the Engineer will become the basis for accepting or rejecting actual installation procedures used on the work.
- C. Manuals:
1. Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Engineer three copies of operation and maintenance manuals compiled in accordance with the provisions of Section 01 7000 , and containing, in addition to other prescribed data:
 - a. The single-line electrical wiring diagram for each piece of electrical equipment.
 - b. Sequence of operation of the controls.
 - c. Operating instructions including complete details, adjustments, and instructions relating to the controls of the equipment.
 - d. Parts lists.
 - e. Lubrication requirements.
 - f. Maintenance requirements of all equipment furnished under this Section.
 2. The enumerated operating and maintenance instructions for the electrical equipment furnished under this Section shall be grouped by major item and bound together in one folder before submitting to the Engineer.

1.4 PRODUCT HANDLING

- A. Delivery and Storage: Materials delivered to the job site shall be properly marked, with markings corresponding to those shown on the approved shop drawings, to identify the location for which they are intended. Materials shall be stored in a manner to maintain identification and prevent damage, off the ground, using pallets or other supports, in a dry location, off walkways and other locations where damage may occur, and to prevent easy access for inspection.
- B. Protection: The Contractor shall protect all electrical materials scheduled to remain and shall replace items which are damaged during construction.

PART 2 PRODUCTS

2.1 ASSOCIATED ELECTRICAL EQUIPMENT TO BE FURNISHED WITH MECHANICAL

- A. Mechanical equipment such as electric valves, pumps, and other similar equipment that is being supplied by a manufacturer as a “package” item, shall comply with these Electrical Specifications.
- B. All items furnished as “package” items shall also include all associated electrical motors and/or loads, electrical controls, panels, limit switches, alarms and other miscellaneous electrical equipment unless otherwise indicated in these specifications or on the related portion of the accompanying Drawings. The only items that would not normally be supplied as a part of the “package” would be the electrical service to the equipment and all necessary conduit, wiring and installation which would be provided by the Contractor.
- C. It shall be the Contractor’s responsibility to furnish all equipment, material and labor that is not furnished as a part of said “package” and is required to provide a complete and operable installation. No additional expense shall be incurred by the Owner due to any misunderstandings between the Contractor and supplier.

2.2 GROUNDING MATERIALS

- A. Ground rods shall be 3/4” diameter by 10 foot minimum length, copper clad steel.
- B. Electrode clamps shall be suitable for connecting up to 1/0 AWG copper stranded conductor.
- C. All grounding materials shall be UL-approved.

2.3 DISTRIBUTION EQUIPMENT

- A. All distribution equipment including disconnects, switchboards, and/or distribution panels will be complete with wired protective devices, accessories, and enclosed in cabinets as indicated.
- B. Distribution equipment shall be of the dead-front type and provide protection for individual circuits as specified or according to NEC Article 240.

2.4 WIRE, CONDUIT, AND WIRING DEVICES

- A. All conductors, insulation qualities, size, and current capacities shall, as a minimum, conform to NEC Article 310 and Chapter 9.
- B. Unless otherwise shown on the related portions of the accompanying Drawings, all power and control wires shall be new code wires type “THWN” or “THHN”.
- C. No wire smaller than #12 B and S gauge shall be used for power wiring. Control wiring may be #14 or #16.
- D. All wires shall be 98% conductivity, copper wire. All devices receiving stranded wire shall be designed for stranded wire terminations.

- E. Communications wire shall be 4 to 20 ma, shielded, twisted pair, #9463 as manufactured by Belden Wire and Cable of Richmond, IN or equal or as detailed on the Drawings.
- F. Control cable for cable trays shall be Houston Wire & Cable Series HW150, 600 volt UL Type TC-ER, TFN insulation, PVC jacket or Engineer-approved equal.
- G. Cable tray shall be "Eaton" B-Line Series 34, aluminum, 9" rung spacing, 12" wide, 12' lengths or Engineer-approved equal. Any change of direction shall be made with manufactured bends or intersections as well as any vertical installations.
- ~~H.~~ Heavy wall RGS shall be used for all exposed conduit, interior and exterior. Underground conduit shall be RNC. Conduit for primary service entrance is called out on Drawings.
- I. Conduit shall be NEC approved, have a minimum size as determined by the code, be no smaller than 3/4" in diameter and conform to NEC Article 300.
- J. All conduit on masonry walls or for major plant equipment may be installed exposed, unless noted otherwise. All other conduit must be installed concealed for general lighting, receptacles, and basic equipment installation.
- K. Conduit fittings shall be oblong forms. Pull or junction boxes shall be provided where necessary to facilitate installation of conductors and to support vertical runs of conductors, which support shall be in accordance with the NEC.
- L. All wiring devices consisting of junction boxes, pull boxes, outlet boxes, wire-ways duct, plug-in buss duct, receptacles and switches shall conform to the NEC Articles 370 and 380 as applicable, unless specified higher in the Contract Documents.
- M. Switches for the control of the lighting fixtures shall be P & S, Hubbell, General Electric, or equal 20A spec grade. Switches shall have ivory handles.
- N. Plugs and receptacles shall be P & S, Hubbell, General Electric, or equal 20A spec grade with an ivory color.
- O. Outlet boxes used with RGS conduit shall be FS type for switches and plug receptacles and 4" round cast type for lighting outlets, all with blank or special cast corners and gaskets as required.
- P. Plates for switches, receptacles, and other outlets shall be ivory.
- Q. Interior devices shall be installed in an enclosure rated NEMA 1 as a minimum, unless specified higher on the Contract Documents.
- R. Exterior devices shall be completely weatherproofed, encased in an enclosure rated NEMA 3R or 4, an enclosure providing a greater degree of protection or an enclosure as specified. Switches and receptacles shall be of the weatherproof type, with cap provided and installed. In use covers for receptacles.

- S. In designated spaces conduit, fixtures, switches, and all other items, not mentioned but required for complete installation of electrical system, shall be as required for a Class I, Division I location in accordance with NEC Article 500. All other areas shall be non-classified.
- T. Where forward and reverse contactors are required, they shall be both mechanically and electrically interlocked to prevent simultaneous operation. The electrical interlock shall be permissive.

2.5 LIGHTS

- A. Light fixtures shall, as a minimum, be listed by Underwriter's Laboratories, Inc.
- B. Interior: Interior lights shall be LED. Fixtures shall meet the requirements of damp locations. All fixtures shall be UL-approved.
- C. Exterior: Exterior lights shall be LED. Fixtures, hardware, and controls shall be as shown in the Lighting Fixtures, shall be UL-approved for operating outside.
- D. Light fixtures in hazardous areas shall be rated for use in those areas.

2.6 NAMEPLATES

- A. Nameplates are required on all major pieces of equipment, including but not limited to: generators, automatic transfer switches, motor starters, control panels, transformers, variable frequency drives, distribution panel boards, power and lighting panels, disconnect switches, and motor control centers including all unit compartments with their miscellaneous controls therein. Nameplates shall be phenolic with white letters on a black background.

PART 3 EXECUTION

3.1 INTRODUCTION

- A. To the extent indicated, the wire and conduit size, the type and capacity of control equipment, special appurtenances, lights and fixtures, and any special installation requirements shall be as defined, scheduled, or shown. Locations shown on panel boards, motors, outlets, fixtures, transformers and other equipment are approximate. The single-line wiring diagram, if included, indicates motor sizes and types of controls.
- B. It should be noted that on all small motors, the sizes indicated are approximate only. Final sizes must be determined from the actual equipment purchased, and breakers or fused disconnects, starters, conduit, and wire must be supplied at no extra compensation for the motor sizes actually installed.

3.2 EXISTING UTILITIES

- A. The Contractor shall be responsible for verifying the location of existing utilities indicated on the related portions of the accompanying Drawings and for determining the location of existing utilities not shown. Where unmarked utility lines, underground obstructions or piping may be

uncovered on the premises, the Contractor shall notify the utility company having jurisdiction thereof, take all necessary measures to prevent interruption of services that may be damaged or interrupted through the Contractor's own negligence, and be responsible for immediate repair and/or restoration at his expense. Buried utilities shown on the Drawings are for information only, and not guaranteed to be accurate.

3.3 PROJECT CONDITIONS

- A. If existing conditions prohibit installation or installation as shown on the related portions of the accompanying Drawings, the Contractor shall contact the Engineer for a solution.

3.4 COOPERATION

- A. During construction, the Contractor shall confer with other contractors whose work may affect the work under this Section, and make arrangements or changes to avoid interference or improper operation of the system.
- B. All electrical equipment furnished by other trades shall have manufacturer's instructions provided and shall be checked by the Contractor performing the electrical work as to their suitability for the particular installation before proceeding with installation or wiring of them.

The Contractor shall consult the Contract Documents and specifications of trades providing the equipment and controls for control wiring diagrams and shall refer to their shop drawings, in order to become familiar with equipment, type and operation, their location, and extent of work required for installing, wiring, and connecting them.

3.5 PROTECTION OF COMPLETED WORK

- A. The Contractor shall protect the work completed, and repair it or replace it if damage should occur. Equipment and materials installed prior to the painting of a room shall be protected against paint damage. Equipment and materials installed shall be clean, inside and out, prior to acceptance of work by the Engineer.

3.6 STARTUP OF SYSTEMS

- A. Equipment manufacturers shall supply the services of qualified technical personnel during startup or for preliminary adjustments of equipment. There shall be no limit with regard to amount of time required by the startup technician to complete startup procedures. Startup shall be considered as being complete only when all equipment is operating to the satisfaction of the Engineer and the Owner. Services of said technicians shall also be supplied as needed after startup in the event of equipment failure or malfunction during the warranty period and also for instruction of operating personnel in the use of equipment. Startup must be completed before the expiration of working days specified in the Contract Documents.
- B. If in the opinion of the Engineer or the Owner, based on performance, a particular technician is not totally qualified in the area of work involved, the equipment manufacturer shall provide the services of a more qualified technician.

- C. It shall be the Contractor's responsibility to coordinate the efforts of all technical personnel involved in the startup of a particular system.
- D. Startups shall be scheduled at times that are convenient for the Owner and the Engineer and shall interfere with normal plant operations as little as possible.

3.7 TESTING AND INSPECTION

- A. The Contractor shall provide test equipment, temporary wiring, labor and materials required to perform necessary testing. Six copies of all test results, including a list of the persons present for the testing, shall be submitted to the Engineer.
- B. The Contractor shall provide a licensed electrician or a registered professional electrical engineer to inspect and certify in writing to the Engineer that the complete electrical system complies with the Drawings and specifications and the latest issue of the National Electric Code.
- C. Upon completion of the entire electrical system and once all wires and cables are in place and connected, the system shall be tested for the following:
 - 1. Open-phase (hot) wires, open neutral and open ground.
 - 2. Reverse polarity and reverse-phase (hot) and ground.
 - 3. Grounded or shorted phase (hot) wires.
 - 4. Grounds and crosses between control wiring conductors.
 - 5. Proper operation of all connected devices.
- D. All work shall be performed in a good workmanlike manner as judged by the Engineer.
- E. The Contractor shall correct all deficiencies or problems found prior to making application for final payment.

3.8 FINAL INSPECTION

- A. After all construction is completed and the system is ready for operation and the Engineer has been provided with a signed copy of the test data and a certification that all required tests are complete and the system is ready for use, the Contractor shall contact and notify the Engineer that the project is ready for final inspection. The Engineer will inspect the project within five working days of this notification. The job shall not be considered complete until the Engineer has approved all work as acceptable and complete.

3.9 INSTALLATION/ERECTION

- A. All electrical equipment and conduit, including accessories and appurtenances, shall be installed straight, true, level, plumb, and either parallel to or at right angles with the building, except as stated herein or as shown on the related portions of the accompanying Drawings and with verbal confirmation from the Engineer at the time of installation.
- B. Listed or labeled equipment shall be installed and in accordance with instructions included in the listing or labeling.

- C. Every precaution has been taken to ensure that the related portions of the accompanying Drawings do comply with these specifications. If the Contractor feels some item or items may not comply with these specifications, the Contractor shall notify the Engineer for a solution.

3.10 ANCHORS

- A. The electrical equipment shall be firmly attached to the structure using anchors, screws, and/or hangers, which are UL-listed for the use intended. The use of the tie wire, metal stripping and other non-UL-listed equipment for electrical use shall not be permitted.
- B. Anchors used in structural steel shall have location and type approved by the Engineer prior to installation (to prevent structural damage from occurring).

3.11 CIRCUIT LABELING

- A. The Contractor shall affix printed labels to the inside of all load centers and panels and these labels shall identify each circuit number and load description of the circuit loads.
- B. Circuits and ratings shall be identified on all protective devices or on the inside of the device cover, including fused disconnects and fuse blocks with fuse size and type included.
- C. All wire shall be tagged at all junction points.
- D. Circuit labels shall be protected by a clear plastic covering, clear varnish coating, or transparent mending tape.

3.12 ELECTRIC SERVICE

- A. Provide new meter base for service to the plant. Coordinate requirements with electrical utility.

3.13 GROUNDING

- A. Provide grounding for the entire electric installation. The following are included as requiring grounding: electric service, its equipment and enclosures, conduits and enclosures, neutral or identified conductor of any interior wiring system, main switchboards, power and lighting panel boards, control centers, and non-current carrying parts of motors, starter, controllers, instrument cases, light fixtures, outdoor light fixtures and all equipment in hazardous locations.
- B. All locations where ground rods are necessary, at least two ground rods shall be installed. They shall be spaced a minimum of eight feet apart from each other, and shall be as close to the electric entrance point of the building or site service entrance point as practical. The top of the ground rods shall be embedded to a depth of at least six inches below finished grade. One each to have ground test well.
- C. Any necessary ground rods, clamps, and ground rod electrode conductors at their connections, shall be protected by a 3/16" minimum coating of silicon sealant.

3.14 EQUIPMENT FOR DISTRIBUTION

- A. Color coded wiring shall be installed to match that provided by the various manufacturers of the distribution equipment.

3.15 CONTROL EQUIPMENT

- A. Install the control equipment, to consist of control centers or starters, contactors, fused disconnects or breakers, accessories and appurtenances, and remote control and automatic devices to provide control as indicated.
- B. In cases where starters are furnished as an integral part of motor-operated equipment, only fused disconnects or circuit breakers will constitute the control equipment. Factory and site assembled control equipment will be installed and wired to conform with NEC Article 384 to perform as designed in a convenient, orderly, and accessible location for further maintenance and testing. Provide room for future additions where space is available.

3.16 WIRING

- A. Equipment and Controls: The Contractor shall provide conduit, wiring, and connect motors and other electrically-operated equipment as specified in the Contract Documents. He shall also install and provide support for and connect and starters, other control devices, and control panels furnished for such motors and equipment, complete all circuits, tag all junction points, test operation, leave in satisfactory operating condition, and meet the other requirements of these specifications.
- B. Interior: Interior wiring shall include electrical conduits, conductors, wiring devices, supports, other materials, and the installations, required to distribute electric current from distribution centers for all purposes as indicated and specified.
- C. Exterior: Exterior wiring shall include overhead and underground electrical conductors, wiring devices, supports, other materials, and the installations required to distribute electric current between centers where apparatus will be exposed to outdoor weather conditions.
- D. The installation of all conductors shall conform, as a minimum, to NEC Article 310 and Chapter 9.
- E. Installation of underground wires shall be accomplished in accordance with the National Electric Code and requirements of the local utility company. All underground electric shall have two foot minimum cover.
- F. All conduit runs as indicated are diagrammatic and exact routing of conduit shall suit job conditions. Conduit installation shall conform to NEC Article 300.
- G. All empty conduits as specified shall be installed, tested, and proved to be clear of at least 85% of the inside diameter of the conduit size, capped, and a drawing of the route submitted to the Engineer.

- H. Exterior conduit runs shall be installed sloping away from all junction and pull boxes and free of all moisture, watertight, and protected to eliminate any possible mechanical damage.
- I. Unless otherwise shown on the related portions of the accompanying Drawings, switches shall be mounted approximately four feet above the floor.
- J. Switches shall be placed in gang boxes at locations where more than one switch is necessary.
- K. All receptacles shall be mounted at heights shown on the Drawings.
- L. Ground fault circuit interrupting "GFCI" receptacles shall be installed in accordance with NEC and shall, as a minimum, be the most upstream receptacle device installed in a circuit.

3.17 LIGHTING

- A. The Contractor shall install lighting fixtures in the sizes and types as shown in the Contract Documents. Fixtures shall be completely wired and lamped with the lamps as shown in the Lighting Schedule and details of the accompanying Drawings.
- B. Interior: Interior lighting shall be installed in a manner to meet the requirements of damp locations. In addition, the installation shall include providing surface mounting and grounding according to the manufacturer's directions, utilizing silicone sealant where necessary, allowing three days curing time of any sealant inside a fixture before closing it, properly covering all holes in fixture bases per UL and NEC, and preventing entry by mud wasps in a reasonably practical manner.
- C. Exterior: Exterior lighting shall meet the requirements as indicated for interior lighting, and additionally shall be accomplished in accordance with the details as shown on the accompanying Drawings.

3.18 SIGNAL AND ALARM SYSTEMS

- A. All signals and alarms as specified and furnished with equipment will be wired and installed as required to perform the function specified.
- B. The Contractor shall install in accordance with the manufacturer's instructions all wiring, conduit, and outlet boxes required for the completion of the signal and alarm systems.
- C. All wiring shall be in conduit and of the same approved type as used for electric light and power wiring, and shall meet the requirements of all applicable codes.
- D. As a minimum, the sizes of the different wires shall be those specified by the manufacturer. All wires shall be tagged at all junction points and shall test free from grounds or crosses between conductors.
- E. Final connections between equipment and the wiring system shall be made under direct supervision of a representative of the manufacturer.

END OF SECTION

SECTION 26 2923 – VARIABLE FREQUENCY DRIVES

PART 1 SCOPE OF WORK

1.1 GENERAL

- A. This specification defines the minimum requirements for Variable Frequency Drives (VFD) and accessories for speed control of either constant or variable torque loads.

1.2 REFER TO UFD SCHEDULE

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Danfoss VLT® AQUA Series VFD (Represented by Gasvoda and Associates – Ryan Gasvoda 708-701-1274).

2.2 GENERAL

- A. Furnish complete VFD as specified herein or in the equipment schedule for loads designated to be variable speed. VFD's shall be user-selectable for either constant or variable torque loads.
- B. The High-Service Pump VFD shall be sized for 100 horsepower (Manufacturer to verify FLA does not exceed amp rating of the VFD).
- C. VFD enclosure type: Nema 12.
- D. The VFD shall convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC induction motors. The VFD shall be a six-pulse input design, and the input voltage rectifier shall employ a full wave diode bridge; VFD's utilizing controlled SCR rectifiers shall not be acceptable. The output waveform shall closely approximate a sine wave. The VFD shall be of a PWM output design utilizing current IGBT inverter technology and voltage vector control of the output PWM waveform.
- E. The VFD shall include a full-wave diode bridge rectifier and maintain a displacement power factor of near unity regardless of speed and load.
- F. The manufacturer of the VFD shall demonstrate a continuous period of manufacturing and development of VFD's for a minimum of 30 years. VFD's that are brand-labeled are not acceptable.
- G. The VFD shall produce an output waveform capable of handling maximum motor cable distances of up to 1,000 ft. (unshielded) without tripping or derating.
- H. The VFD shall utilize VVCPLUS, an output voltage-vector switching algorithm, or equivalent, in both variable and constant torque modes. VVCPLUS provides rated RMS fundamental voltage

from the VFD. This allows the motor to operate at a lower temperature rise, extending its thermal life. VFD's that cannot produce rated RMS fundamental output voltage or require the input voltage to be increased above motor nameplate value to achieve rated RMS fundamental output voltage are not acceptable. VFD's that utilize Sine-Coded PWM or Look-up tables shall not be acceptable.

- I. The VFD selected must be able to source the motor's full load nameplate amperage (fundamental RMS) on a continuous basis, and be capable of running the motor at its nameplate RPM, voltage, current, and slip without having to utilize the service factor of the motor.
- J. The VFD shall offer a programmable motor parameter that allows the total number of poles of a motor to be programmed to optimize motor performance.
- K. VFD shall automatically boost power factor at lower speeds.
- L. The VFD will be capable of running either variable or constant torque loads. In variable torque applications, the VFD shall provide a CT-start feature and be able to provide full torque at any speed up to the base speed of the motor. In either CT or VT mode, the VFD shall be able to provide its full rated output current continuously and 110% of rated current for 60 seconds.
- M. An Automatic Energy Optimization (AEO) selection feature shall be provided in the VFD to minimize energy consumption in variable torque applications. Feature shall optimize motor magnetization voltage. This feature shall dynamically adjust output voltage in response to load, independent of speed. Output voltage adjustment based on frequency alone is not acceptable for single motor VT configurations.
- N. For multi-motor variable torque configurations, user-selectable load profile curves including VT-High, VT-Medium, and VT-Low shall be provided to ensure easy commissioning and improved energy efficiency. VFD's requiring the operator to assign load torque data-points to create a V/Hz profile, are not acceptable.
- O. An initial ramp function shall be available to provide a different beginning ramp time, up to 60 seconds, for applications requiring a faster or slower ramp than the normal ramp.
- P. VFD shall offer up to 4 separate PID controllers. One controller shall operate the drive in closed loop, while the other 3 provide control signals to other equipment. VFD's with PI controllers only are not acceptable.
- Q. An empty pipe fill mode shall be available to fill an empty pipe in a short period of time, and then revert to the PID controller for stable operation. Pipe fill mode shall have a programmable time to reduce water hammer in the system or fill the pipe at a unit per time rate.
- R. VFD shall offer a motor spinning test that will run the motor at 5 Hz until the OK button is pressed to allow the user to determine if the motor is running in the correct direction.
- S. Switching of the input power to the VFD shall be possible without interlocks or damage to the VFD at a minimum interval of 2 minutes.

- T. Switching of power on the output side between the VFD and the motor shall be possible with no limitation or damage to the VFD and shall require no additional interlocks.
- U. An Automatic Motor Adaptation (AMA) function shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to spin the motor shaft or decouple the motor from the load to accomplish this optimization. Additionally, the parameters for motor resistance and motor reactance shall be user-programmable.
- V. The VFD shall have temperature controlled cooling fans for quiet operation, minimized internal losses, and greatly increased fan life.
- W. VFD shall provide full torque to the motor given input voltage fluctuations of up to +10% to -15% of the rated input voltage.
- X. VFD shall be provided with an integral fused disconnect.

2.3 HARMONICS

- A. The VFD shall provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor. VFD's without a DC link reactor shall provide a 5% impedance line side reactor.

2.4 PROTECTIVE FEATURES

- A. VFD shall have input surge protection utilizing MOV's, spark gaps, and Zener diodes to withstand surges of 2.3 times line voltage for 1.3 msec.
- B. VFD shall include circuitry to detect phase imbalance and phase loss on the input side of the VFD.
- C. VFD shall auto-derate the output voltage and frequency to the motor if an input phase is lost. This result will maintain operation without decreasing the life expectancy of the VFD. The use of this feature shall be user selectable and export a warning during the event.
- D. Automatic "No-Flow Detection" shall be available to detect a no-flow situation in pump systems where all valves can be closed. This shall be functional in closed loop control or when controlled by an external signal.
- E. Dry-pump detection shall be available to detect if the pump has run dry and trip the drive. A timer shall be included to prevent nuisance tripping.
- F. End-of-Pump curve detection shall stop motor when the pump is operating outside of its programmed pump curve.
- G. VFD shall provide flow compensation to reduce energy by adjusting the Setpoint to match changes in flow (friction loss). Flow compensation shall also operate in Cascade control mode.
- H. VFD shall include current sensors on all three-output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.

- I. VFD shall auto-derate the output voltage and frequency to the motor in the presence of sustained ambient temperatures higher than the normal operating range, so as not to trip on an inverter temperature fault. The use of this feature shall be user-selectable and a warning will be exported during the event. Function shall reduce switching frequency before reducing motor speed.
- J. VFD shall auto-derate the output frequency by limiting the output current before allowing the VFD to trip on overload. Speed can be reduced, but not stopped.
- K. The VFD shall have the option of an integral RFI filter. VFD enclosures shall be made of metal to minimize RFI and provide immunity.

2.5 INTERFACE FEATURES

- A. VFD shall provide an alphanumeric backlit display keypad (LCP) which may be remotely mounted using standard 9-pin cable. VFD may be operated with keypad disconnected or removed entirely. Keypad may be disconnected during normal operation without the need to stop the motor or disconnect power to the VFD.
- B. VFD Keypad shall offer an INFO key that, when pressed, shall offer the contents of the programming manual for the feature that is currently in the display. The contents shall explain the feature and how the settings can be made.
- C. VFD shall display all faults in plain text; VFD's which can display only fault codes are not acceptable.
- D. The keypad shall feature a 6-line graphical display and be capable of digitally displaying up to five separate operational parameters or status values simultaneously (including process values with the appropriate engineering unit) in addition to Hand/Off/Auto, Local/Remote, and operating status.
- E. Two lines of the display shall allow "free text programming" so that a description, or the actual name, of the equipment being controlled by the VFD can be entered into the display.
- F. Keypad shall provide an integral H-O-A (Hand-Off-Auto) and Local-Remote selection capability, and manual control of speed locally without the need for adding selector switches, potentiometers, or other devices.
- G. All VFD's shall be of the same series, and shall utilize a common control card and LCP (keypad/display unit) throughout the rating range. The control cards and keypads shall be interchangeable through the entire range of drives used on the project.
- H. VFD keypad shall be capable of storing drive parameter values in non-volatile RAM uploaded to it from the VFD, and shall be capable of downloading stored values to the VFD to facilitate programming of multiple drives in similar applications, or as a means of backing up the programmed parameters.
- I. VFD Display shall have the ability to display 5 different parameters about the VFD or load including: current, speed, DC bus voltage, output voltage, input signal in mA, or other values from a list of 92 different parameters.

- J. VFD display shall indicate which digital inputs are active, and the status of each relay.
- K. It shall be possible to toggle between three status read-out screens by pressing the [Status] key. Different operating variables with different formatting can be shown in each status screen.
- L. VFD display shall indicate the value of any voltage or current signal connected to the analog input terminals.
- M. VFD display shall indicate the value of the current on the analog output terminals.
- N. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
- O. Two-level password protection shall be provided to prevent unauthorized changes to the programming of the VFD. The parameters can be locked via a digital input and/or the unit can be programmed not to allow an unauthorized user to change the parameter settings.
- P. A quick setup menu with factory preset typical parameters shall be provided on the VFD to facilitate commissioning. Use of macros shall not be required.
- Q. A digital elapsed time meter and kilowatt hour meter shall be provided in the display.
- R. VFD shall offer as standard an internal clock. The internal clock can be used for: Timed Actions, Energy Meter, Trend Analysis, date/time stamps on alarms, Logged data, Preventive maintenance, or other uses. It shall be possible to program the clock for Daylight Saving Time / summertime, weekly working days or non-working days including 20 exceptions (holidays etc.). It shall be possible to program a Warning in case clock has not been reset after a power loss.
- S. VFD shall provide full galvanic isolation with suitable potential separation from the power sources (control, signal, and power circuitry within the drive) to ensure compliance with PELV requirements and to protect PLC's and other connected equipment from power surges and spikes.
- T. All inputs and outputs shall be optically isolated. Isolation boards between the VFD and external control devices shall not be required.
- U. There shall be six fully programmable digital inputs for interfacing with the systems external control and safety interlock circuitry. Two of these inputs shall be programmable as inputs or outputs.
- V. The VFD shall have two analog signal inputs. Inputs shall be programmable for either 0 -10V or 0/4-20 mA.
- W. One programmable analog output shall be provided for indication of a drive status. This output shall be programmable for output speed, voltage, frequency, motor current and output power. The analog output signal shall be 0/4-20 mA.
- X. The VFD shall provide two user programmable relays with 75 selectable functions. Two form 'C' 230VAC/2A rated dry contact relay outputs shall be provided.

- Y. Floating point control interface shall be provided to increase/decrease frequency in response to external switch closures.
- Z. The VFD shall accept a NC motor temperature over-temperature switch input, as well as possess the capability to accept a motor thermistor input.
- AA. The VFD shall store in memory the last 10 faults with time stamp and recorded data.
- BB. Run permissive circuit shall be provided to accept a “system ready” signal to ensure that the VFD does not start until isolation valves, seal water pumps or other types of auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of sending an output signal as a start command to actuate external equipment before allowing the VFD to start.
- CC. The VFD shall be equipped with a standard RS-485 serial communications port and front-of-drive accessible USB port. Danfoss FC or ModBus RTU shall be integrally mounted.

2.6 ADJUSTMENTS

- A. The VFD shall have an adjustable output switching frequency.
- B. Four complete programming parameter setups shall be provided, which can be locally selected through the keypad or remotely selected via digital input(s), allowing the VFD to be programmed for up to four alternate control scenarios without requiring parameter changes.
- C. In each programming set up, independent acceleration and deceleration ramps shall be provided. Acceleration and deceleration time shall be adjustable over the range from 0 to 3,600 seconds to base speed.
- D. The VFD shall have four programmable “skip frequencies” with adjustable bandwidths to prevent the driven equipment from running at a mechanically resonant frequency.
- E. VFD shall include an automatic acceleration and deceleration ramp-time function to prevent nuisance tripping and simplify start-up.
- F. In each programming setup, independent current limit settings, programmable between 50% and 110% of the drives output current rating, shall be provided.
- G. PID parameter settings shall be adjustable while the VFD is operating, to aid in tuning the loop at start up. The VFD will also be capable of simultaneously displaying set-point reference and feedback values with appropriate engineering units, as well as output frequency, output current, and run status while programming the PID function.
- H. The VFD will include a “loss of follower” function to detect the loss of process feedback or reference signals with a live-zero value, with a user-selectable choice of responses (go to set speed, min speed, max speed, stop, stop and trip).
- I. A Sleep Mode function shall be provided to reduce wear and heating of the pump and other equipment in periods where system demands are minimal. This function will operate in both open and closed loop modes:

1. In closed loop process control, when the output speed drops to a user-programmed minimum value (“sleep frequency”) for a specified time (“sleep mode timer”), the drive will enter sleep mode and either go into standby, or boost mode before entering standby. The drive shall automatically restart the motor once the output of the PID processor exceeds a programmable value “wake up frequency”.
 - a. Boost mode shall prevent short-cycling of the motor by temporarily adjusting the set-point by a user programmable percentage. Upon reaching this value, the unit will go into standby.
 2. In open loop, the drive shall be capable of entering sleep mode if the input reference drops below a user programmable value. When the input reference increases above a programmable reference, the drive will automatically start.
- J. An integral motor alternation function shall be provided to enable the drives output to alternate between two motors. The alternation interval shall be programmable in hours. This function shall operate external relays as required to control the motor alternation sequence. A dwell time shall be integral to the function and can prevent damage to the motor contactors.
- K. The VFD will include a user selectable Reset function, which enables the selection of between zero and twenty restart attempts after any self-clearing fault condition (under-voltage, over-voltage, current limit, inverter overload and motor overload), or the selection of an infinite number of attempts. The time between attempts shall be adjustable from 0 through 600 seconds.
- L. An automatic “on delay” function may be selected from 0 to 120 seconds.
- M. The VFD will include a user-selectable Auto-Restart function that enables the VFD to power up in a running condition after a power loss, to prevent the need to manually reset and restart the VFD.
- N. VFD shall catch a rotating motor operating either in forward or reverse at up to full speed.
- 2.7 SERVICE CONDITIONS
- A. Ambient Temperature of the VFD, -10 to 45°C (14 to 113°F)
 - B. 0 to 95% relative humidity, non-condensing.
 - C. Elevation to 1000 meters (3,300 feet) without derating.
 - D. VFD’s shall be rated for line voltage of 525 to 690VAC, 380 to 480VAC, or 200 to 240VAC; with +10% to -15% variations. Line frequency variation of $\pm 2\%$ shall be acceptable.
 - E. No side clearance shall be required for cooling of the units.

PART 3 EXECUTION

3.1 SUBMITTALS

- A. Submit manufacturer's performance data including dimensional drawings, power circuit diagrams, installation and maintenance manuals, warranty description, VFD's FLA rating, certification agency file numbers, catalog information and catalog cut-sheets for all major components.
- B. All drawings shall be in an 8.5 X 11" reproducible format, and incorporate the manufacturer's title block on the drawing.
- C. This specification lists the minimum VFD performance requirements for this project. Each supplier shall list any exceptions to the specification. If no departures from the specification are identified, the supplier shall be bound by the specification.
- D. Three copies of all submittals shall be provided.
- E. Submit a computer generated Harmonic Distortion Analysis for the jobsite location.

3.2 QUALITY ASSURANCE

- A. The manufacturer shall be both ISO-9001 and ISO-14001 certified.
- B. All products shall be CE marked; UL labeled, and meet the requirements of UL-508C.
- C. To ensure quality and minimize infantile failures on the jobsite, all VFD's shall be completely tested by the manufacturer. The VFD shall operate a dynamometer at full load and speed under elevated temperature conditions.
- D. All optional features shall be functionally tested at the factory for proper operation.
- E. Factory test documentation shall be available upon request.

3.3 EXAMINATION

- A. Contractor to verify that job site conditions for installation meet factory recommended and code-required conditions for VFD installation prior to start-up, including clearance spacing, temperature, contamination, dust, and moisture of the environment. Separate conduit installation of the motor wiring, power wiring, and control wiring, and installation per the manufacturer's recommendations shall be verified.
- B. The VFD is to be covered and protected from installation dust and contamination until the environment is cleaned and ready for operation. The VFD shall not be operated while the unit is covered.

3.4 Start-Up and Warranty

- A. A factory-authorized service technician shall perform start-up on each drive. Start-up costs provided with the bid shall include time and travel for the estimated number of visits required, but shall not be less than at least one half-day with travel. Additional labor or return trips to the site shall be billed at Danfoss' published straight-time rates. Upon completion, a start up service report shall be provided.
- B. A 6-year on-site warranty shall be provided such that the owner is not responsible for any warranty costs including travel, labor, parts, or other costs for a full 6 years from the date of manufacture of the Drive. The cost of the warranty shall be included in the bid.

3.5 UFD SCHEDULE

<u>Drive</u>	<u>Quantity</u>	<u>Voltage</u>	<u>HP</u>	<u>Related Equipment</u>
High Service Pumps	3	480	100	Specification 43 2113

END OF SECTION

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SECTION 26 3213 – STAND-BY GENERATOR SET

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Product Section Includes:
 - 1. Description of manufacturer and/or product for basis-of-design.
 - 2. Performance, regulatory, and environmental requirements.
 - 3. Engine-generator set description.
 - 4. Engine.
 - 5. Engine fuel-oil system.
 - 6. Control and monitoring.
 - 7. Generator overcurrent and fault protection.
 - 8. Generator, exciter, and voltage regulator.
 - 9. Outdoor engine generator enclosure.
 - 10. Vibration isolation devices.
 - 11. Finishes.
 - 12. Source Quality Control.
- B. System Description:
 - 1. Provide Diesel Generators as follows:
 - a. Water Treatment Plant: 800 kw
 - b. Wells 8 and 9: 300 kw each
- C. Related Requirements:
 - 1. "Battery Chargers" for remote engine battery chargers.
 - 2. Transfer Switches" for transfer switches, including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.3 DEFINITIONS

- A. EPS: Emergency power supply. The source of electric power in an emergency power supply system (e.g. the engine-generator set).
- B. EPSS: Emergency power supply system. The complete system needed for save and reliable source of electric power. Components may include but are not limited to the EPS, overcurrent protective devices, disconnecting means, transfer switches, system level controls, etc.
- C. Shall: Indicates a mandatory requirement
- D. Should: Indicates a recommendation that is preferred, but not mandatory

- E. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of packaged engine generator indicated:
1. Include rated capacities, operating characteristics, and furnished specialties and accessories.
 2. Thermal damage curve for generator.
 3. Time-current characteristic curves for generator protective device.
 4. Include fuel consumption at 0.25, 0.5, 0.75, and 1.0 times generator rating. (in volume flow rate assuming standard conditions)
 5. Include installation airflow requirements for cooling and combustion air, as appropriate for the generator set cooling configuration as described in Section 2.4. (in volume flow rate assuming standard conditions)
 6. Sound test data, based on a free field requirement.
 7. Engine-Cooling System ambient temperature performance data if cooling system is provided by manufacturer.
 8. Generator set sizing report from the manufacturer, detailing each load, and the performance for each load step.
- B. Generator set manufacturer shall provide documentation for proper installation and powering of any necessary ancillary equipment needed for the engine generator, which may include but are not limited to coolant jacket heaters, anti-condensation heaters, and enclosure lighting.
- C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, and location and size of each field connection.
1. Building Information Modelling (BIM) files are approved means of providing this information, with drawings as supplemental information.
 2. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified. Indicate access requirements affected by height of subbase fuel tank (if applicable).
 3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
 4. Indicate appropriate locations for electrical, controls, and/or fuel line stub-up areas in alignment with the configuration of engine generator set.
 5. Identify fluid drain ports and clearance requirements for proper fluid drain.
 6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for engine generators and functional relationship between all electrical components.
- D. Certifications:
1. Submit statement of compliance which states the proposed product(s) is certified to the emissions standards required by the location of installation.
 2. Submit statement of compliance which states the proposed product(s) are seismically certified in compliance with local requirements signed and sealed by a qualified professional engineer.
 3. Product(s) shall be preapproved for California's Office of Statewide Health Planning and Development (OSHPD) seismic certification of equipment. Justification for preapproval shall be based on calculations as well as physical dynamic testing.

1.5 INFORMATION SUBMITTALS

- A. Include the following:
 - 1. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 2. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Source Quality-Control Test Reports
 - 1. Certified summary of prototype-unit test report. See requirements in Part 2 "Source Quality Control" Article Part A. Include statement indicating torsional compatibility of components.
 - 2. Certified Test Report: Provide certified test report documenting factory test per the requirements of this specification, as well as certified factory test of generator set sensors per NFPA110 level 1.
 - 3. List of factory tests to be performed on units to be shipped for this Project.
 - 4. Generator set manufacturer shall provide documentation of engine EPA certification including EPA Family name and generator set model.
- C. Generator Set Manufacturer shall provide documentation demonstrating compliance with applicable limits of U.S. EPA New Source Performance Standards for US Stationary Emergency engines.
- D. Warranty: Submit manufacturer's warranty statement for this Project.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section "Operation and Maintenance Data ," include the following:
 - a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply
 - b. Operating instructions laminated and mounted adjacent to generator location
 - c. Training plan.
- B. Factory Acceptance Testing Results

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Tester Qualifications: Manufacturer's authorized representative who is trained and approved for testing of units required for this Project
- C. Manufacturer Qualifications: A qualified manufacturer

1. Maintain, within <75> miles of Project Site, a service center capable of providing training, parts, and emergency maintenance repairs.
2. Manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.8 WARRANTY

- A. Base Warranty: Manufacturer shall provide base warranty coverage on the material and workmanship of the generator set for a minimum of twenty-four (24) months for Standby product and twelve (12) months for Prime/Continuous product from registered commissioning and start-up
- B. Extended Warranty: Manufacturer shall offer extend coverage of five years from date of registered commissioning and start-up.

PART 2 PRODUCTS

2.1 MAUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Cummins Power Generation; C800N6, DQDAX or comparable product may be considered if equipment performance is shown to meet the requirements herein by among of the following:
 1. Cummins Power Generation
 2. Caterpillar, Inc.; Electric Power Division
 3. MTU Onsite Energy Corporation
 4. Kohler Power Systems
- B. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.

2.2 PERFORMANCE, REGULATORY, ENVIRONMENTAL REQUIREMENTS

- A. Comply with NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).
- B. Comply with NFPA 70 (National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, 702, and 708).
- C. Comply with NFPA 99 (Essential Electrical Systems for Health Care Facilities).
- D. Comply with UL 2200.
- E. Engine Exhaust Emissions:
 1. Shall be certified to meet applicable limits of U.S. EPA New Source Performance Standards for US Stationary Emergency engines.

- F. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
1. Ambient (Outdoor) Temperature -20 °F to (100.00 °F)
 2. Relative Humidity: 0 to 95 percent
 3. Altitude: 1000 feet).

2.3 ENGINE- GENERATOR SET DESCRIPTION

- A. Factory-assembled and -tested, engine-generator set.
- B. Nameplate Rating: Standby
- C. Engine-Generator Set Rating: 800 kW 375 kVA and 300 KW 375 kVA
- D. Power Factor 0.8 lagging
- E. Frequency: 60 Hz
- F. Voltage: 277/480, Series Wye
- G. Phase: Three phase, 12 wire
- H. Mounting Frame:
1. Designed by manufacturer to maintain alignment and withstand torsional loading and system vibrations of mounted components.
 2. Lifting attachment provisions shall be provided and identified. Rigging information shall indicate location(s) of each lifting attachment point on label affixed to the mounting frame. Generator-set center of gravity, and total package weight shall be provided in submittal drawings.
- I. Capacities and Characteristics:
1. Power Output Ratings: Electrical output power nameplate rating for the engine-generator set shall be guaranteed for the output power as cited in this section and per the ratings definitions cited within the Definitions section. Rating shall be inclusive of electrical and mechanical parasitic losses including the cooling system and battery charging alternator of the engine.
 2. Alternator shall be capable of accepting maximum 3657 kVA for 800 kw generator and 1372 kVA for 300 kw generator in a single step and be capable of recovering to a minimum of 90% of rated no load voltage. Following the application of the specified kVA load at near zero power factor applied to the generator set.
 3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of components. The engine-generator nameplate shall include information of the power output rating of the equipment.
- J. Generator-Set Output Performance:
1. Transient performance of the engine generator set shall be within the cited limits of performance class when subjected to the load steps and testing parameters as defined in ISO 8528-5.
 2. Transient performance of the engine generator set shall be within these below cited limits

- a. Steady-State Voltage Operational Bandwidth: 0.5 percent of rated output voltage from no load to full load
 - b. Transient Voltage Performance: Not more than 25 percent variation for -load. Voltage shall recover and remain within the steady-state operating band percent within 6 seconds. On application of a 100% load step the generator set shall recover to stable voltage within 10 seconds
 - c. Steady-State Frequency Operational Bandwidth: 0.25percent of rated frequency from no load to full load
 - d. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
 - e. Transient Frequency Performance: Not more than 10 percent variation for step-load. Frequency shall recover and remain within the steady-state operating band within 5 seconds. On application of a 100% load step the generator set shall recover to stable frequency within 10 seconds.
3. Output Waveform: At full load, harmonic content measured line to line or line to neutral shall not exceed 5percent total and 3 percent for any single harmonic. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.
 4. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 8 seconds without damage to generator system components. For a 1-phase, bolted short circuit at system output terminals, system shall regulate both voltage and current to prevent over-voltage conditions on the non-faulted phases.
 5. Start Time : EPSS shall comply with NFPA 110, Type 10system requirements.
 6. Load Sharing: Engine generator shall share real and reactive load proportionally within plus or minus percent with all other engine generators in the system.

2.4 ENGINE

- A. Fuel: ASTM D975 #2 Diesel Fuel or up to 100% Paraffinic Fuel that meet specifications per EN15940
- B. Rated Engine Speed: RPM
- C. Lubrication System: The following items are mounted on engine or skid:
 1. Lube oil pump: shall be positive displacement, mechanical, full pressure pump.
 2. Filter and Strainer: Provided by the engine manufacturer of record to provide adequate filtration for the prime mover to be used.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Jacket Coolant Heater: Electric-immersion type, factory installed directly to jacket coolant system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and performance.
 1. 800 kw Generator: Designed for operation on a single 08/240 VAC, Singlephase, 6000 Watt Hz power connection. Heater voltage shall be shown on the project drawings.
 2. 300 kw Generator: Designed for operation on a single 120 VAC, Singlephase, 2500 Watt Hz power connection. Heater voltage shall be shown on the project drawings.

3. Installed with isolation valves to isolate the heater for replacement of the element without draining the engine cooling system or significant coolant loss.
 4. Provided with and controlled by dedicated thermostat, installed on engine to ensure adequate heating per manufacturer's specifications
- E. Governor: Adjustable isochronous, with speed sensing. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate as appropriate to the state of the engine generator. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous states.
- F. Set-Mounted, Integral Cooling System: liquid cooled and mounted on engine generator mounting frame and integral engine-driven coolant pump.
1. Coolant: Solution of glycol-based antifreeze and water, with anticorrosion additives as recommended by engine manufacturer
 2. Expansion Tank: Adequate to contain expansion of total system coolant from cold start to maximum rated temperature. Constructed to withstand maximum closed-loop coolant system pressure for engine used. Equip with coolant level indication (sight glass is acceptable) and petcock.
 3. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 4. Outlet Air Ducting : Generator set cooling system air-outlet shall be provided with a flange or workable surface to allow installation of flexible radiator duct adapter.
- G. Remote Cooling System : Liquid cooled and mounted separately from engine generator set. And integral engine-driven coolant pump
1. Coolant Pump Performance: Coolant flows and allowable pressure drops for the engine-mounted coolant pump shall be provided to engineer of record as part of Action Submittal for appropriate sizing and location of cooling system along with pipe arrangements
 2. Temperature Control: Self-contained, thermostatic-control valve(s) modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 3. Coolant: Solution of glycol-based antifreeze and water, with anticorrosion additives as recommended by engine manufacturer.
 4. Configuration: Horizontal air discharge with electric fans with enclosed motors and sealed bearings.
 5. Expansion Tank: Adequate to contain expansion of total system coolant from cold start to maximum rated temperature. Constructed to withstand maximum closed-loop coolant system pressure for engine used.
- H. Equip with coolant level indication (sight glass is acceptable) and petcock.
- I. Muffler/Silencer: Selected with performance as required to meet sound requirements of the application, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements. For generator sets with outdoor enclosures the silencer shall be inside the enclosure.

- J. Air-Intake Filter : Engine-mounted air cleaner with replaceable dry-filter element and “blocked filter” restriction indicator.
- K. Starting System:
1. 12 V , as recommended by the engine manufacturer; electric, with negative ground
 2. Components: All components of the starting system shall be appropriately sized to endure a full engine-cranking cycle under specified ambient temperature conditions
 3. Cranking Motor: Starter(s) shall engage and release automatically from the engine flywheel without binding.
 4. Battery: The battery utilized shall be of Lead acid type. The battery's capacity shall be sufficient to support the prescribed cranking cycle at least three times without necessitating recharging as stipulated by NFPA 110. Battery Cable: The size of battery cables shall adhere to the recommendations provided by the engine manufacturer for the indicated cable length. The battery cables shall include all necessary interconnecting conductors and connection accessories.
 5. Battery Enclosure(s): Factory-provided, constructed with material(s) as appropriate for the battery type selected. Cover shall be secure and have two slots available to accommodate battery cables.
 6. Battery Stand : Battery stand shall be factory-provided and be designed to accommodate the required size and quantity of battery cells while facilitating battery interconnections
 7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation. The battery charging alternator shall have sufficient capacity to recharge the batteries with all parasitic loads connected within 4 hours after a normal engine starting sequence.
 8. Battery Chargers:
 - a. Type: The battery charger must be a current-limiting, automatic-equalizing, and float-charging type
 - b. Compatibility: The charger should be specifically designed for the battery type selected
 - c. Compliance: The charger must meet the certification requirements of UL 1236.
 - d. Operation: The battery charger shall initiate an equalizing-charging rate of 12 Amps automatically after the battery experiences discharge. This automatic equalization process shall continue until an adjustable equalizing voltage is attained at the battery terminals. Upon completion of the equalization process, the charger shall transition seamlessly to a lower float-charging mode where it shall remain until the battery is discharged again.
 - e. Automatic Temperature Compensation : The charger must include automatic temperature compensation functionality to adjust both float and equalize voltages in response to changes in ambient temperature to prevent overcharging at elevated temperatures and undercharging at lower temperatures.
 - f. Automatic Voltage Regulation: Variations in input voltage of up to plus or minus 10 percent shall not affect the charger's ability to maintain a constant output voltage
 - g. Safety Functions: The charger shall incorporate safety mechanisms to monitor battery conditions. In the presence of any of these abnormal conditions (abnormally low or high battery voltage or loss of either AC input or DC output from the charger) the charger shall engage contacts that signal a battery-charger malfunction on the system's control and monitoring panel:
 - h. Visual Indicators: The charger shall provide indication of general charger condition, including charging, faults, and modes. Display to indicate charge rate and battery voltage. The charger shall also feature relay contacts that correspond to fault conditions, as stipulated by NFPA110

- i. Enclosure and Mounting: Battery charger must be enclosed in a NEMA 250, Type 1 IP10 wall-mounted cabinet, to ensure appropriate protection and facilitate straightforward installation.

2.5 DESIGN FUEL OIL SYSTEM

- A. On -Engine Fuel System:
 1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
 2. Fuel Filtering: Remove water and contaminants as appropriate for the engine fuel system per manufacturer' requirements.
- B. Subbase-Mounted Tank: Shall be UL 142, listed and labeled. The fuel tank shall include the following features:
 1. Construction Characteristics
 - a. Tank shall be constructed with heavy gauge steel, painted exterior with rust-inhibitor coated interior.
 - b. Tank rails and lifting eyes shall be rated for the full dry weight of the tank, genset, and enclosure, if applicable. Lifting attachment provisions shall be provided and identified.
 - c. Electrical stub up pass through areas shall be provided and indicated in submittal drawings.
 2. Capacity : Minimum of 24 hours at rated load
 3. Fuel Containment Basin: Integral rupture basin with a capacity of 110 percent of nominal capacity of tank
 - a. Shall be a double wall basin with closed-top construction.
 - b. Leak Detection: Locate in rupture basin and connect to provide audible and visual alarm in the event of day-tank leak
 4. Piping Connections: Factory-installed fuel supply and return lines from tank to engine; local fuel fill, overflow line, tank drain line, and vent lines in compliance with local code requirements.
 - a. Generator Set Engine Fuel Supply and Fuel Return shall be connected to the subbase tank with fuel lines chemically compatible with diesel fuel, routed to ensure flexibility from engine generator set vibration.
 - b. Tank Overflow shall be sized and provided to allow return to a bulk fuel tank.
 - c. Normal vent
 - d. Emergency vents
 - e. Local Fuel Fill :
 5. Control: Fuel tank shall allow for manual control with "on," "off," and "test" buttons. A readout and remote annunciation provisions shall be provided for fuel tank status, including the following:
 - a. Ready/Nominal
 - b. High Fuel
 - c. Low Fuel Warning
 - d. Critical-Low Fuel Shutdown
 - e. Overflow To Basin Alarm

2.6 CONTROL AND MONITORING

- A. Engine generator control shall be microprocessor-based and provide automatic and manual starting, monitoring, and protection for the unit.
- B. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches (or remote monitoring device) initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of the switch initiates generator-set shutdown.
- C. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.
- D. Configuration: Operating and safety indications, protective devices, system controls, engine gauges, an associated equipment shall be grouped in a common control and monitoring panel. The mounting method shall isolate the control panel from generator-set vibration. AC output power circuit breakers and other output power equipment shall not be mounted in the control enclosure.
- E. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, including the following:
 - 1. AC voltmeter (3-phase, line to line and line to neutral values).
 - 2. AC ammeter (3-phases).
 - 3. AC frequency meter.
 - 4. AC kW output (total and for each phase). Control display shall indicate power flow direction.
 - 5. AC kVA output (total and for each phase). Control display shall indicate power flow direction.
 - 6. AC Power factor (total and for each phase). Control display shall indicate leading or lagging condition
 - 7. Ammeter-voltmeter displays shall simultaneously display conditions for all three phases
 - 8. Emergency Stop Switch: Switch shall be a red pushbutton device complete with lock-out/tag-out provisions. Depressing switch shall cause the generator set to immediately stop the generator set and prevent it from operating.
 - 9. Fault Reset Switch: Supply a dedicated control switch to reset/clear fault conditions locally.
 - 10. DC voltmeter (alternator battery charging).
 - 11. Engine-coolant temperature gauge
 - 12. Engine lubricating-oil pressure gauge
 - 13. Running-time meter.
 - 14. Generator-voltage and frequency digital raise/lower switches. The control shall adjust these parameters in a range of plus or minus 5% of the voltage and frequency operating set point (not nominal voltage and frequency values.) The voltage and frequency adjustment functions shall be disabled when the paralleling breaker is closed.
 - 15. Fuel tank derangement alarm
 - 16. Fuel tank high-level shutdown of fuel supply alarm.

17. AC Protective Equipment: The control system shall include over/under voltage, reverse kVAR, reverse kW, overload (kW) short circuit, over current, loss of voltage reference, and over excitation shut down protection. There shall be a ground fault alarm for generator sets rated over 1000 amps, overload warning, and overcurrent warning alarm.
 18. Status LED indicating lamps indicate remote start signal present at the control, existing shutdown condition, existing alarm condition, not in auto, and generator set running
 19. A graphical display panel (or Human Machine Interface) with appropriate navigation devices shall be provided to view all information noted above, as well as all engine status and alarm/shutdown conditions (including those from an integrated engine emission control system or ECM). The display shall also include integrated provisions for adjustment of the gain and stability settings for the governing and voltage regulation systems.
 20. Panel lighting system to allow viewing and operation of the control when the generator room or enclosure is not lighted
 21. Data Logging: The control system shall log the latest 20 different event, alarm, shut down conditions, the total number of times each alarm or shutdown has occurred, and the date and time the latest of these shutdowns and fault conditions occurred.
 22. DC control Power Monitoring: The control system shall continuously monitor DC power supply to the control and indicate low or high voltage conditions. It shall also provide an alarm indicating imminent failure of the battery bank based on degraded voltage recover on loading (engine cranking).
 23. Paralleling Breaker control switches: The control shall include manual open and close provisions for the paralleling breaker, and LED status lamps indicating whether the breaker is open or closed.
- F. Control Heater: Generator sets that are installed in outdoor enclosures or are in tropical or coastal environments shall be provided with control heaters for anti-condensation protection.
- G. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.
1. Over-crank shutdown.
 2. Coolant low-temperature alarm.
 3. Control switch not in auto position.
 4. Battery-charger malfunction alarm.
 5. Battery low-voltage alarm.
- H. Remote Alarm Annunciator: Comply with NFPA 110. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition.
- I. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.
- J. Optional Remote Monitoring Device: A remote monitoring device shall be mounted (when required) on or near generator set to offer capability to control and monitor unit.

2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Overcurrent Protection: The generator set shall be provided with a UL Listed or CSA Certified protective device that is coordinated with the alternator provided to prevent damage to

the generator set on any overload or overcurrent condition external to the machine. The protective device shall be listed as a utility grade protective device under UL category NRGU. The control system shall be subject to UL follow-up service at the manufacturing location to verify that the protective system

1. Initiates a generator kW overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
2. Under single-phase or three phase fault conditions, or on overload conditions, indicates an alarm condition when the current flow is more than 110% of rated current for more than 10 seconds.
3. Under single phase or three phase fault conditions, operates to switch off alternator excitation at the appropriate time to prevent damage to the alternator.
4. The operator panel shall indicate the fault condition as either a short circuit or an overload.
5. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot greater than 120% of nominal voltage.
6. The protective system provided shall not include an instantaneous trip function.
7. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H
- D. Temperature Rise: 105 °C rise over 40° C ambient / Class H environment.
- E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, over speed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- F. Permanent Magnet Generator (PMG) shall provide excitation power for optimum motor starting and short circuit performance.
- G. Enclosure: Drip-proof.
- H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified. The voltage regulation system shall be microprocessor-controlled, 3-phase true RMS sensing, full wave rectified, and provide a pulse-width modulated signal to the exciter. No exceptions or deviations to these requirements will be permitted.
- I. The alternator shall be provided with anti-condensation heater(s) in all applications where the generator set is provided in an outdoor enclosure, or when the generator set is installed in a coastal or tropical environment.
- J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

2.9 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description:

1. Vandal-resistant, sound-attenuating, weatherproof Steel housing constructed with multiple lockable access panels to provide adequate access to components requiring maintenance. Instruments, control, and battery system shall be mounted within enclosure.
2. Prefabricated or pre-engineered, steel-clad, integral structural-steel-framed, skin-tight enclosure, erected on concrete foundation.
3. Prefabricated or pre-engineered, steel-clad, integral structural-steel-framed, walk-in enclosure, erected on concrete foundation.

B. Performance Characteristics

1. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 100
2. Sound Performance: Product shall allow for sound performance in accordance with requirements of the installation site as cited in Noise Emissions section of this specification. Required documentation supporting sound performance shall be stipulated in the Submittal requirements of this specification.
3. Cooling Performance: Product shall allow for cooling performance in accordance with requirements of the installation site as cited in Environmental Conditions section of this specification. Required documentation supporting cooling performance and needed airflow considerations shall be stipulated in the Submittal requirements of this specification.

C. Construction and Configuration:

1. Access and Doors: Hinged doors for service access shall provide padlocking provisions. Hardware shall allow restraint/securing door in the open position near-180 degrees during maintenance. Rain lips over all doors. Exhaust System Muffler located within enclosure.
2. Engine Cooling Airflow through Enclosure: Discharge of cooling air shall be oriented horizontally.
3. Louvers: Fixed cooling-air inlet and discharge louvers to mitigate ingress of rain or snow during generator set operation. Louvers shall have a screen to mitigate intrusion of varmints or birds.
4. Motorized Louvers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
5. Hardware: All hardware and hinges shall be corrosion-resistant, comprised of stainless steel or equivalent materials.
6. Mounting Base: Suitable for mounting on sub-base fuel tank or housekeeping pad.

D. Electrical Provisions

1. Compliance with NEC: Package shall comply with the requirements of the National Electrical Code for all wiring materials and component spacing.
2. Provide an internally mounted and wired electrical distribution panel to serve the engine generator and enclosure, including:
 - a. **100** amp distribution panelboard connected to a 120/240VAC utility service by the installer.
 - b. Two duplex GFI receptacles, one inside the enclosure, and a weatherproof receptacle on the outside of the enclosure.
 - c. Factory wired normal AC service from the panelboard to the engine coolant heater, alternator heater, and battery charger.

- d. Interior Lights with Switch: Two three-way switches controlling three AC lamps mounted in vapor tight and gasketed fixtures.
- 3. External Electrical Connections: All power and control interconnections shall be made within the perimeter of the enclosure.

2.10 VIBRATION ISOLATION DEVICES

- A. Vibration Isolation: Generators Set shall be provided as recommended by the manufacturer to mitigate vibration and noise resulting from the rotating machinery. Vibration isolation devices may be elastomeric isolator pads integral to the generator assembly or spring isolators to be mounted under the generator assembly at site of installation.
- B. IBC Compliance: Isolators complying with IBC requirements shall be specified in the equipment documentation, as well as the installation requirements for the unit.
- C. Comply with requirements in "Hydronic Piping Specialties " for vibration isolation and flexible connector materials for steel piping.
- D. Comply with requirements in "Metal Ducts " for vibration isolation and flexible connector materials for exhaust shroud and ductwork.
- E. Vibration isolation devices shall not be used to accommodate misalignments in installation.

2.11 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Powder-coated and baked over corrosion-resistant pretreatment and compatible primer. Manufacturer's standard color.
 - 1. Tests: Comply with NFPA 110, Level 1 Energy Converters. In addition, the equipment engine, skid, cooling system, and alternator shall have been subjected to actual prototype tests to validate the capability of the design under the abnormal conditions noted in NFPA110.
- B. Test engine generator set manufactured for this Project to demonstrate compatibility and functionality.
 - 1. Full load run.
 - 2. Maximum power.
 - 3. Voltage regulation.
 - 4. Steady-state governing.
 - 5. Single-step load pickup.
 - 6. Simulated safety shutdowns.
- C. Factory testing may be witnessed by the owner and consulting engineer. Costs for travel expenses will be the responsibility of the owner and consulting engineer. Supplier is responsible to provide two weeks' notice for testing.
 - 1. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative
- D. Report factory test results within 10 days of completion of test

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation, application, and alignment instructions and with NFPA 110.
- B. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.
- C. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.
- D. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site.
- E. E. Equipment shall be initially started and operated by representatives of the manufacturer. All protective settings shall be adjusted as instructed by the consulting engineer.
- F. F. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.
- G. G. On completion of the installation by the electrical contractor, the generator set supplier shall conduct a site evaluation to verify that the equipment is installed per manufacturer's recommended practice.

3.2 ON SITE ACCEPTANCE TEST

- A. The complete installation shall be tested to verify compliance with the performance requirements of this specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests. The generator set manufacturer shall provide a site test specification covering the entire system. Tests shall include:
- B. Prior to start of active testing, all field connections for wiring, power conductors, and bus bar connections shall be checked for proper tightening torque.
- C. Installation acceptance tests to be conducted on site shall include a "cold start" test, a two-hour full load (resistive) test, and a one-step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary.

- D. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.

3.3 TRAINING

- A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration and the class size shall be limited to 5 persons. Training date shall be coordinated with the facility owner.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

3.5 SERVICE AND SUPPORT

- A. The generator set supplier shall maintain service parts inventory for the entire power system at a central location which is accessible to the service location 24 hours per day, 365 days per year. The inventory shall have a commercial value of \$3 million or more. The manufacturer of the generator set shall maintain a central parts inventory to support the supplier, covering all the major components of the power system, including engines, alternators, control systems, paralleling electronics, and power transfer equipment.
- B. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical power system replacement parts in the local service location. Service vehicles shall be stocked with critical replacement parts. The service organization shall be on call 24 hours per day, 365 days per year. The service organization shall be physically located within 4 miles of the site.
- C. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.
 - 1. Generator supplier must have an in-house rental fleet with equipment sized to back up this project site.
 - 2. All engine maintenance as recommended by the service manual.
 - 3. All electrical controls maintenance and calibrations as recommended by the manufacturer.
 - 4. All auxiliary equipment as a part of the emergency systems.
 - 5. The supplier shall guarantee emergency service.
 - 6. All expendable maintenance items are to be included in this agreement.
 - 7. A copy of this agreement and a schedule shall be given to the Owner at the time of his acceptance, showing what work is to be accomplished and when.

END OF SECTION

SECTION 27 2623 – SCADA SYSTEM

PART 1 GENERAL

1.1 PROJECT DESCRIPTION

A. Description of Work:

1. The work to be accomplished under this section shall consist of furnishing the equipment necessary for a complete automatic control and monitoring system to function as specified herein and as shown on the drawings. The system integrator shall furnish a completely integrated all solid-state radio telemetry base Supervisory Control and Data Acquisition (SCADA) system. It shall be the system integrator's responsibility to supply a system that is compatible with existing Micro-Comm EWWTP, CWWTP, WTP and all of the existing distribution sites. It shall be the system integrator's responsibility to supply a system also compatible with new equipment supplied by others as part of this contract, and equipment supplied in other contracts. The complete system shall be designed, fabricated, programmed, tested, started up, and warranted by a single supplier to ensure a single source of responsibility.

B. Scope of Work:

1. This section covers a radio telemetry based SCADA and Instrumentation system to include 3 RTU units located at the New WTP and interfacing to the existing SCADA system.
 - a. (1) WTP HMI and Display Console with interface to the new WTP RTU
 - b. (1) WTP RTU panel with current distribution/Well radio communication
 - c. (1) Well 8 RTU Control Panel w/new instrumentation listed below
 - d. (1) Well 9 RTU Control Panel w/new instrumentation listed below
 - e. (1) Provisions for selected HMI software to include remote access.
 - f. (1) Provisions to interface to existing EWWTP, CWWTP and SLS RTUs
 - g. (1) Provisions to interface to existing WTP and distribution RTUs

C. General/Electrical Contractor Shall Supply

1. All equipment required in other sections of the specifications.
2. All labor for installation of the system.

D. System Integrator Shall Supply

1. Engineering submittal and shop drawings prior to installation.
2. All user licenses and fees for software supplied in this system with licenses in the name of the owner. Upgrade support fees for ALL software shall be included for duration of specified warranty.
3. Operation and maintenance manuals, as detailed in this section.
4. All start-up labor and services, as required for equipment specified in this section.
5. Operator training as detailed in this section.

E. Owner Shall

1. Access and easements as needed for all sites.
2. 120VAC power at all sites.
3. Pressure sensing taps for all sensing points in the system.
4. Meter pits for sensing tank levels or line pressures in the system.

5. Future provisions for DSL or internet for dialer support.

1.2 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. The system specified herein shall be the product of a manufacturer who can demonstrate at least ten (10) years of satisfactory experience in furnishing and installing comparable radio based telemetry/control systems for water and wastewater installations.
2. The manufacturer of this system shall maintain a 24-hour available inventory of all replaceable modules to assure the Owner of prompt maintenance service and a single source of responsibility. The manufacture shall certify this to the Engineer in writing at the time of bidder pre-qualification.

B. Pre-bid Approval: Systems integrator for this project is:

1. Micro-Comm, Inc. Olathe, Kansas
(Contact information: Jeremy Martens Phone 913-390-4500)
2. Engineer Approved Equal

C. Other integrators desiring to bid this project must seek pre-bid approval by providing a submittal (14) days prior to the bid date. Submissions that fail to include a complete submittal as detailed shall be deemed unresponsive. The Consulting Engineer and the Owner shall be the sole judge as to whether the alternate equipment is considered an approved equal. Approval of an alternate system by the Engineer will not relieve the alternate system of strict adherence to these specifications. The pre-bid submittal shall include the following:

1. An installation list with the names and phone numbers of both the Owner and Consulting Engineer for at least ten projects of similar size and complexity.
2. A "statement of compliance" detailing paragraph by paragraph the bidders compliance to these specifications.
3. Block diagrams for the various sites in the proposed system showing the selected pieces of hardware equipment to be used.
4. Sample electrical drawings for typical sites proposed in this contract.
5. A product performance data sheet shall be included for each hardware component in the system (i.e. antennas, radios, coaxial cables & arrestors, programmable controllers, power supplies, time delays and relays, and the various sensors required) and each software component (programming & configuration software and operator display console software).
6. Radio path study for each radio path in the system. Bidders shall satisfy themselves that the necessary radio frequency(s) can be obtained. The radio path study provided by each bidder shall utilize either:
 - a. Computer generated techniques utilizing a USGS 3 second terrain database to plot the path profiles for each radio path with elevation samples at not more than 200 foot increments.
 - b. Actual field measurements showing the necessary antenna heights, transmitter power, and antenna gains required to insure a 20db fade margin as detailed in Section 2.02 of these specifications. A physical path analysis shall be made using temporary equipment installations and a radio communications analyzer to measure actual path margins. The bidder shall include in his bid, all the calculations used to extrapolate the measured data. The bidder is expected to obtain the necessary temporary FCC license for the study.

7. Communication diagram for the entire system showing normal CTU-RTU communications paths and Peer-to-Peer back-up communications paths.
- D. Approval Agencies: Control system and its components shall comply with all applicable requirements of the following: System Integrators supplying panels or components that do not meet these requirements are NOT approved to bid.
1. International Society of Automation (ISA) for instrumentation
 2. National Electrical Code (NEC) Compliance for both National & Local standards
 3. Firm shall be a member of the Control System Integrators Association (CSIA) of North America, and provide a copy of their membership.
 4. Underwriters Laboratories, Inc.
 - a. UL508 for Programmable Controllers. The Programmable Logic Controllers (PLCs) and Input/Output devices shall be UL listed for use in an Industrial Control Panel per UL508 per UL Category NRAQ.
 - b. UL508A for Industrial Control Panels. The System Integrator shall be a UL508A listed manufacture for Industrial Control Panels per UL Category NITW. All control panels shall have an interior mounted label that has the name, address, phone number, and UL 508A file number of the Control Panel Manufacturer. All control panels shall have affixed to the panel a UL 508A serial numbered "UL Listed Enclosed Industrial Control Panel" label prior to shipment. Control Panel(s) without the affixed UL 508A "serial numbered" label shall be rejected and sent back to the factory.
 5. National Electrical Manufacturers Association (NEMA)
 - a. 250, Enclosures for Electrical Equipment (1000 Volts maximum)
 - b. ICS, Industrial Control & Systems
 6. Federal Communications Commission (FCC)
 7. The System Integrator must maintain insurance throughout the course of the design and construction administration meeting the following minimum levels:
 - a. Commercial General Liability Insurance, including coverage for premises and operations, products and completed operations, independent contractors, and contractual liability. Such insurance shall be no less than \$1,000,000 per occurrence and \$2,000,000 in the aggregate.
 - b. Automobile Liability Insurance for all owned, hired and on-owned automobiles in the minimum amount of \$1,000,000 per occurrence.
 - c. Professional Liability Insurance of \$1,000,000 per claim.

1.3 SUBMITTALS

- A. Complete submittal shall be provided to the engineer for approval prior to equipment fabrication. The submittal data shall include the following:
1. Product Data – Provide product data sheets for each instrument and component supplied in the system. The data sheets shall show the component name as used on reference drawings, manufacturer's model number or other product designator, input and output characteristics, scale or ranges selected, electrical or mechanical requirements, and materials compatibility.
 2. Shop Drawings – Provide drawings for each panel showing the wiring diagrams for control circuits and interconnections of all components. The drawings shall include wiring diagrams for all remote devices connected to the panel.
 3. Panel Layout Drawings – A front panel and sub-panel layout shall be included as part of each control panel drawing. Components shall be clearly labeled on the drawing.

4. Installation Drawings – Typical installation drawings applicable to each site in the system shall be included.
5. Operator Interface Software – The submittal shall include a generic but detailed technical description of the Operator's Interface Software as proposed for this system including:
 - a. Sample text screens and menus
 - b. Sample graphics screens
 - c. Sample report logs and printed graphs

1.4 MAINTENANCE INFORMATION

- A. Maintenance Data Manuals
 1. Submit maintenance manuals and "as built" drawings on all items supplied with the system. The manuals and drawings are to be bound into one or more books as needed. In addition to "as built" engineering submittal data and drawings, the manual shall include trouble shooting guides and maintenance and calibration data for all adjustable items.

1.5 JOB CONDITIONS

- A. All instruments and equipment shall be designed to operate under the environmental conditions where they are to perform their service. The equipment shall be designed to handle lightning and transient voltages as normal environmental hazards. The environmental conditions are as follows:
 1. Outdoor – The equipment will be exposed to direct sunlight, dust, rain, snow, ambient temperatures from -20 to +120 degrees F, relative humidity of 10 to 100 percent, and other natural outdoor conditions. The installations shall be hardened to withstand normal vandalism.
 2. Indoor – The equipment will be capable of operating in ambient temperatures of +32 to +130 degrees F and relative humidity of 20 to 100 percent.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. All items shall be stored in a dry sheltered place, not exposed to the outside elements, until ready for installation. All items shall be handled with appropriate care to avoid damage during transport and installation.

1.7 SEQUENCING AND SCHEDULING

- A. Coordination
 1. The Systems Integrator shall coordinate with other electrical and mechanical work including wires/cables, raceways, electrical boxes and fittings, controls supplied by others, and existing controls, to properly interface installation and commissioning of the control system.
- B. Sequence
 1. Sequence installation and start-up work with other trades to minimize downtime and to minimize the possibility of damage and soiling during the remainder of the construction period.

1.8 DISTRIBUTED CONTROL OPERATION

- A. General

1. The control system shall use "Programmable Logic Controllers" (PLCs) at all locations in the system as detailed later in these specifications. Each site in the system shall have a unique digital address. The Central Processing Units (CPUs) and Input/Output (I/O) cards used in each of the PLCs shall all be identical, fully interchangeable with out reprogramming by the operator. The PLCs shall be "self-initializing" and "self restoring" so that operator intervention is not required after power interruptions, transients from lightning storms, or component changes.
- B. Distributed Control Software Features
1. The CTU-RTU control must continue to work if the HMI turns off or fails. The control algorithms shall have the ability to integrate both hardware and software operator inputs (i.e. ODC setpoints and selector switch input) along with hardware inputs at the remote sites (i.e. remote Hand/Off/Audot selector switches, etc.) into a unified cohesive automatic control system.
 2. The control system shall provide for multiple levels of control such that a single point of failure shall not render the control system in-operative:
 - a. In the event of a ODC failure, the PLC shall continue to poll all of the RTUs to collect data and provide supervisory control.
 - b. In the event of PLC failure at the CTU, the individual RTUs shall turn off the controlling items at the well sites.
 3. The system shall automatically revert to the next higher level of control as communications or equipment failures are repaired.
- C. Standard Control Software Features
1. The supplied software shall not be a one-of-a-kind system, but rather a comprehensively designed software platform that provides a number of built in features that monitor local & remote inputs combined with standard software algorithms to provide an integrated system as follows:
 - a. Monitor local Hand/Off/Automatic (HOA) selector switch positions (ie on existing pump control panels) and integrate the switch position in to the control logic such that a HOA in HAND or OFF shall be considered by the control system as 'un-available'.
 - b. Provide for High Discharge Cut-off and Low Suction Cut-off control of pumps from locally entered set points at RTUs equipped with suction and discharge pressure transmitters and/or from existing pressure switches.
 - c. Provide automatic Pressure/Flow pump staging operation of pumps of different sizes (including variable speed pumps) from local discharge pressure and discharge flow inputs in a closed-loop system. The pumps shall be up-staged on decreasing discharge pressure and down-staged on decreasing flow rate. The control shall include PID (Proportional Integral Derivative) loop control of variable speed pumps mixed with constant speed pumps for the various stages required.
 - d. Provide "Compound Loop" PID control of final devices (i.e. chemical feeders) from multiple inputs (i.e. flow rate and a chemical process analyzer, such as chlorine residual).

1.9 RADIO CHANNEL DATA OPERATION

A. General

1. The overall system design and operation shall provide a 20db pad over the minimum required for operation on all primary data paths (primary paths may include data relays) to insure a 98% reliability of communications. Remote site communications for distributed peer-to-peer communications shall provide 30db of pad to insure operation under all weather conditions and provide a 99.9% communications reliability. The 20db and 30db pad requirements and FCC rule compliance shall be demonstrated (at no additional cost) to the Engineer at his request. The testing shall be accomplished using an IFR AM/FM 1000S communications analyzer or equal equipment.
- B. Radio Channel Operation
1. The system shall be capable of operation on the narrow band splinter frequencies of the Private Land Mobile Radio Services within the Federal Communications Commissions (FCC) rules and regulations regarding these telemetry channels. The manufacturer shall guarantee operation under co-channel conditions with other radio systems without interference to this system. FSK tones, data baud rates, transmitter output power, transmitter deviation, antenna gain, and antenna height shall be chosen to comply with the FCC requirements Part 90 - Subpart 90.35 and 90.238 for the Industrial/Business frequency pools. The radio system shall specifically meet the operating requirement that the sum of the highest FSK frequency and the amount of deviation shall not exceed 1.7 kHz for 3F2 emission (or 2.8 kHz for 6F2 emission) as detailed by the FCC for the specific frequency assigned. The system is designed using 900MHz spread spectrum radios, but it is the responsibility of the integrator to provide a reliable radio network as specified. It is the bidding integrators discretion to use licensed VHF or UHF, but all costs associated with doing so are the responsibility of the bidding integrator including FCC licensing.
- C. FCC Licensing
1. The system manufacturer/supplier shall be responsible for collecting all information, generating all paper work, and paying all fees required obtaining a license on behalf of the Owner if a VHF/UHF frequency is chosen by integrator.

PART 2 PRODUCTS

2.1 PROGRAMMABLE LOGIC CONTROLLS AND LOCAL I/O EQUIPMENT

- A. General
1. Industrial Programmable Logic Controllers (PLCs) shall be used at all locations. The PLCs shall have an operational range of 0-60degC and 5-95% relative humidity. The PLCs shall all be from the same family of controllers, scalable from very small to very large applications, and programmed from identical programming software used for all processors. The PLCs shall be readily available on and directly purchasable online from the manufacture's WEB page. The PLCs shall be Allen-Bradley Compact-Logix, Motorola Moscad, Micro-Comm M5 series smart RTU, or Micro-Comm M1600 Series controllers, no exceptions.
- B. Construction
1. The PLC shall use modular construction. The base unit shall be composed of the power supply, CPU, communications modules, and basic inputs and outputs (I/O). The unit shall have expandable inputs and outputs using a "rack-less" DIN rail mount design and capable

of supporting local I/O (via an integrated high-performance serial I/O bus) and remote I/O via an industrial serial bus. All terminations shall use removable, NEMA-style "finger-safe" terminal blocks so that individual modules may be removed without disturbing adjacent modules.

2. The PLC shall be capable of being powered from AC, DC, or solar sources. DC and solar powered PLCs shall have an integral battery charging circuit that protects the external battery from over and under voltage conditions and provides automatic charging of the battery after power failures. The back-up power supply shall be either 12VDC with 24VDC DC/DC converter or 24VDC with a 12VDC DC/DC converter to run the 12VDC radio and 24VDC to power external sensors from a single battery source. Series tapped 24VDC batteries for 12VDC will not be allowed. Back-up batteries shall be rechargeable sealed lead-acid type batteries as manufactured by PowerSonic or equal. The back-up battery shall provide for 24 hours of back-up operation at water tower remote units and 3 hours at all other sites.
3. The PLC shall have a minimum of two (2) communications ports. The first shall be used primarily for CTU-RTU and RTU-RTU communications. It shall support baud rates of 110-19,200 baud and have a plug-in standard 25pin or 9pin sub-D connector that provides a full RS232 interface and radio modem interface. The second communications port shall provide programming, operator front panel interface, multiple PLC interconnect and other local communications. It shall support baud rates of 110-19,200 baud and have a 9-pin sub-D interface. The communications ports shall include LED's to show the status of all control lines. The PLC shall also optionally support Ethernet communications as detailed in the specifications.
4. The PLC shall utilize a rack-less design and provide for sufficient installed and configured spare inputs and outputs (I/O) to meet the site requirements as detailed and provide for 25% spares of each type. The unit shall have a minimum of (4) discrete (relay) outputs, (8) discrete inputs (DI), (4) analog inputs (AI), and (2) analog outputs (AO). The analog inputs shall provide for sensor excitation with separate fuses for each input. The fuses may be the self-resetting type. All input and output connections to the PLC shall be via Nema "finger-safe" plug-in terminal blocks.
5. The PLC shall support both local and remote I/O. Input/Output cards shall be mounted on a DIN rail channel. The PLC inputs, outputs, and operator interface shall be as follows:
 - a. DISCRETE OUTPUTS – The discrete outputs shall be isolated relay outputs rated at 5.0A continuous @ 240VAC. LEDs on the front of the PLC base unit or expansion module shall indicate the status of each output point. Interposing relays shall be provided if the voltage or current of the external load on a contact exceed the 5.0A 240VAC ratings. Each output shall be provided with operator settable software ON and OFF time delays.
 - b. DISCRETE INPUTS – The discrete inputs shall be optically isolated and provide for 24VDC excitation to remote sensors and switches. Each input shall be separately fused or current limited such that accidental grounding shall not render the other inputs non-functional. LEDs on the front of the input module shall indicate the status of each input point.
 - c. ANALOG INPUTS – The analog inputs shall provide filtered and scalable analog to digital conversion of input signals. The analog inputs shall be switch selectable from 0-5VDC to 0-20mADC and provide a minimum of 0.3% resolution and 0.5% accuracy over the temperature range of 0-70degrees C. The PLC shall provide separately fused 24VDC excitations to the remote sensors.

- d. ANALOG OUTPUTS – The analog outputs shall provide a 4-20mA isolated signal to other panels and devices as specified.
- e. PULSE INPUTS – The high-speed counter/pulse inputs shall provide for pulse rates up to 1KHz direct from flow meter transmitter heads without interposing equipment. The pulse input shall include fused 12VDC excitation to the meter transmitter.
- f. POWER SUPPLY – Each PLC assembly shall include an integral power supply. Power supplies shall be designed for 12VDC or 24VDC input power and suitable for use in battery back-up operations. DC/DC converters shall be required to insure that both the 12VDC and 24VDC are regulated separately from the common source.
- g. HMI FRONT PANEL TOUCH-SCREEN DISPLAY UNIT - The HMI Front Panel Touch Screen Display Unit shall have either a 15" (1024x768 native resolution) or 17" (1280x1024 native resolution) diagonal backlit Color Active Matrix Display with Graphical Touch-Screen interface. The display shall have a resistive touch-screen with a touch accuracy of 2mm. The unit shall use the Windows 11 operating system and have the SCADA HMI software installed. The unit shall have a MINIMUM of 2GB of RAM memory, 32GB HDD, and (3) USB ports. The operator interface shall be graphical and provide for display of all data monitored and operator input of setpoints and operating commands. The Graphical Touch-screen unit shall be supplied and mounted on the front of the PLC enclosure if detailed in the specific PLC I/O requirement list. The unit shall maintain the Nema 4 rating of the PLC enclosure. Front panel display and computer should have enough processor speed and memory to allow for selected HMI software to run without errors and to handle datalogging for a period of FIVE YEARS. Display shall be Allen-Bradley Panelview series, Hope industrial system, or Advantech.

C. Enclosures

- 1. The remote unit enclosures for indoor mounting shall meet all the requirements for NEMA Type 12 enclosures. The enclosures body shall be made of a minimum 14 gauge steel with continuously welded seams and be furnished with external mounting feet. The enclosure door shall be made of a minimum 16 gauge steel with have a 14 gauge steel hinge. Enclosures larger than 16x14 shall have a rolled lip on 3 sides of the door for added strength. The door opening shall have a rolled edge on 4 sides to protect the door gasket. The door gasket shall be heavy neoprene and attached to the door with oil resistant adhesive. Sub-panels shall be 14-gauge steel for 16x14 enclosures and 12 gauge for larger enclosures. The enclosure finish shall be gray polyester powder coating inside and out over phosphatized surfaces. The subpanels shall be finished in white. Nema 12 enclosures shall be Hoffman "CH" or "CONCEPT" wall mount enclosures.
- 2. Remote site installations requiring equipment to be mounted outside shall have a lockable NEMA 3R enclosure or NEMA 4X. The NEMA 3R enclosure shall be constructed of 14 gauge galvanized steel, with a drip shield top and seems free sides front and back, and a stainless steel hinge pin. The enclosure finish shall be gray polyester powder coating inside and out over phosphatized surfaces. The NEMA 3R enclosure shall be Hoffman Bulletin A-3. The enclosures shall be made of molded fiberglass polyester or Polycarbonate and be furnished with external mounting feet. The door shall have a seamless foam-in-place gasket and corrosion-resistant hinge pin and bails. Sub-panels shall be 14-gauge steel for 16x14 enclosures and 12 gauge for larger enclosures. The enclosure finish shall be a light gray inside and out. The subpanels shall be finished in white. Nema type 4X enclosures shall be Hoffman "Fiberglass Hinged Cover" or equal.

D. Local Control Functions

1. In general, the PLC shall be programmed to provide generic control functions as detailed earlier and to work in concert with the CTU. The integrator shall be responsible to meet with the owner and the engineer to develop the automatic control strategy required for the system.

2.2 RADIO TRANSCEIVERS AND ACCESSORIES

A. General

1. The radio transceivers shall be standard "un-modified" radios that can be tuned, aligned, and repaired at any two-way radio shop. Interface to external data modems shall be through the front panel microphone jack. The radios shall be synthesized and fully field programmable and include a built-in time-out timer to disable the transmitter after 0-60seconds. The units shall be tuned to FCC specifications for the specific frequency assigned. The radio equipment shall be FCC type approved and the system capable of operation on the 3KHz or 6KHz narrow band splinter frequencies (154, 173, or 450 MHz) in the Industrial/Business radio service. The bidding integrator can decide to use VHF, UHF or unlicensed 900 MHz at their discretion to allow for a reliable radio network.

B. VHF Radio Transceiver (154Mhz or 173Mhz) – MORRIS DISTRIBUTION SYSTEM

1. The system manufacturer shall supply a 25-watt VHF radio transceiver to insure a high level of quality and reliability. The radios shall be adjustable to 4 watts output power as may be required by the FCC for ERP (Effective Radiated Power) restrictions. All connections to the radio shall be plug-in. The VHF radio transceivers shall be a Motorola Radius CM200D, Microwave Data Systems SD1/4, or a CalAmp (Data Radio) Viper, no exceptions.

C. 900 MHz Spread Spectrum unlicensed Radio Transceiver (900Mhz) – WELL 8 & 9

1. The radio transceiver shall be MicroHard P900, no exceptions.

D. Antenna and Coaxial Cable

1. The radio antennas at all locations shall be a five element Yagi, constructed with 3/8" diameter solid aluminum rod elements and 1-1/16" diameter aluminum pipe element support with a type N coaxial connector. The antenna shall have a minimum 8.0db forward gain with a 20.0db front-to-back ratio. The antenna shall be wind rated for a 100-MPH wind speed. The VHF antennas shall be MC-Yagi-154, Decibel Products DB292, or Celwave PD390S. The 900Mhz antennas shall be PCTEL BMOY8905 or equal.
2. Antennas shall be cabled to the transmitter enclosure connection by a RG/8U type low loss (less than 1.8db per 100ft @ 100MHz) coaxial cable with cellular polyethylene (foam) dielectric. The coaxial cable shall have a braided copper shield coverage of 97% and a long life weather resistant polyvinyl chloride jacket. The antenna coaxial cable connection shall be a constant impedance weatherproof Type N connector, taped with a weather resistant electrical tape to insure a lifetime watertight assembly. The coaxial cable shall be Belden 8214 or 9913 cable

E. ANTENNA LIGHTNING PROTECTION

1. Coaxial connection to remote and central unit enclosures shall be by means of a coaxial type bulkhead lightning arrestor. The units shall be rated at 1 kilowatt with a minimum 500V and maximum 2000V-breakdown voltage. Coaxial lightning arrestors shall be a PD-593 or PolyPhaser IS-B50LN-C1.

F. Antenna Mounting Systems

1. Antennas shall be mounted at a height above ground that is consistent with FCC rules and regulations and provides adequate signal fade margin as described earlier. Antennas must be a minimum of 15 feet above ground and mounted as follows:
 - a. Water Towers: The antenna shall be mounted on the ladder or the water tower catwalk railing at a height consistent with FCC requirements. The coaxial cable shall be secured to the ladder or obstruction lighting conduit. A 3/4" rigid conduit with a weather-head shall be provided from the transmitter to the ladder on the tower.
 - b. Well equipment rack structure: The antenna shall be mounted on a 20' long X 1-1/2" diameter galvanized mast with top mounted weather-head. The mast assembly shall be secured to the side of the structure with Uni-strut clamps. The coaxial cable shall feed through the mast assembly to the interior of the building.

2.3 ACCESSORIES

A. General

1. All items in the control system (electronic cards, power supplies, radios, time delays, relays, etc.) shall be of plug-in construction, make use of a plug-in wiring harness, use plug-in terminal blocks, and be interchangeable without recalibration. To insure field repair-ability by non-technical personnel, equipment that must be un-wired for replacement will not be accepted.
2. The following instrumentation devices and techniques shall be used as specifically called for in the RTU and CTU input/output sections of this specification.

B. Power Supplies:

1. The DC power supplies shall provide $\pm 0.1\%$ line and load regulation with $\pm 10\%$ input variations. They shall have a temperature coefficient of $\pm 0.02\%$ per degree C. The input/output isolation shall be 100 Mohms DC (900Volts AC) with output transient response of 50 microseconds maximum. The power supplies shall be sized to operate the remote unit equipment with or without the back-up battery in place. Power Supplies shall be a Meanwell DR Series, Sola SLS, Allen-Bradley 1606-XLE.

C. Battery Back-Up Operation

1. The remote units indicated shall be supplied with battery back-up operation. The rechargeable batteries shall be the sealed solid gelled electrolyte types, designed for float or standby service. Unless noted otherwise in the RTU descriptions, batteries shall be sized to maintain 24-hour service at water tower remotes and 3 hour service at pump stations and other remotes. The remote shall include a charging module to recharge the battery when power is resumed, maintain the charge between outages, and provide a low voltage cut-off to protect the battery from excessive discharge during prolonged outages. All discrete, analog, and pulse inputs (i.e. switch closures, pressure, level, flows, etc.) shall continue to function on battery back up. Batteries shall be Globe Gel/Cell or approved equal. Battery back-up shall be Allen-Bradley 1606-XLS, APC series, or MC-M3.

D. Entry Alarm

1. Unauthorized entry alarms at remote sites shall be accomplished through a perimeter alarm system powered from the common 12VDC-power supply. The system shall include the necessary structure entrance magnetic door switches. Should an intruder enter the structure without acknowledging his presence, an entry alarm will be sent over the phone dialer.

- E. Ethernet Unmanaged Switch
 - 1. Acceptable Ethernet switch manufacturer are T-Tron 105TX or Moxa equivalent.

2.4 OPERATOR DISPLAY CONSOLE (ODC)

- A. General
 - 1. As described previously the Central Unit shall have a secondary “Client” Operator Display Console or ODC provided and it shall handle the LCD displays, operator keyboard, alarm/log printer, and data storage duties. The system shall be capable of supporting multiple ODCs connected to a single CTU-PLC.
- B. System Unit: The Operator Display Console (ODC) computer shall be an Intel/Windows base processor with the following features:
 - 1. Intel Core i7- Processor operating at 3.6 GHz (minimum)
 - 2. Windows 11 Professional Operating System (64bit)
 - 3. 16GB RAM (minimum)
 - 4. 1 TB Hard Drive (minimum)
 - 5. USB 104-Key QWERTY Keyboard with integral numeric keypad & 6ft cable
 - 6. USB 2-button Mouse with Scroll Wheel
 - 7. Integral Gigabit wired Network Adapter
 - 8. (2) Ethernet ports
 - 9. (6) USB 2.0 ports
 - a. The system unit shall be housed in a desktop or mini-tower case as required by the owner. The CTU shall store all command inputs and set points as downloaded from the ODC. The hard drive in the ODC shall be used for program and data storage.
 - b. The separately mounted keyboard shall have a standard typewriter format with tactile feedback, twelve special function keys, and a separate numeric keypad for entering set point data and cursor control. The 256-character symbol set shall include 96 ASCII characters and the IBM (International Business Machine) graphic symbols. The system shall include a 2-button Windows compatible mouse with mouse pad. The ODC shall be a minimum Dell Optiplex Model 7050 or latest current model.
- C. LCD Video Displays
 - 1. The system unit shall be equipped with a LCD Flat Panel display. The LCD display shall be a 21.5" high-resolution (1920 x 1080) color display terminal with minimum .247mm dot pitch, 1,000:1 contrast ratio, and IBM SXGA compatibility. The LCDs shall be utilized for display of station and system graphics and real-time data display. The LCD shall provide for operator input and output data, multiple graphic overviews, report generation, and access to system utilities. The LCD display shall be a minimum Dell 21.5inch U2212HM Flat Panel Monitor or latest available model.
- D. Internal Modem
 - 1. The internal modem shall be reserved for phone-line debug & remote access.
 - a. The ODC shall include remote access software for remote access by the Owner's or Systems Integrator's remote computers. The software shall provide for remote access security and be the latest version of Symantec's PCAnywhere, TeamViewer, or approved equal.
- E. VPN Firewall Appliance

1. The system shall be equipped with a secure network protection device. It shall include comprehensive threat prevention, encrypted traffic inspection, and unified threat management that includes intrusion detection, malware defense and application control. The appliance supports secure site-to-site and remote access VPNs, ensuring protected communication between SCADA ODCs. The device shall have 750 Mbps Firewall throughput and 100 Mbps Anti-malware throughput. The Firewall appliance shall be a SonicWall TZ Series or equal.

F. Enclosures

1. The Operator Display Console unit (including CRT display, Keyboard, and System Unit) and the graphic printer shall be located on top of a desk supplied by the Owner. All interconnecting cabling shall be plug-in and supplied by the contractor.

G. Battery Back-Up Operation

1. The ODC shall include 20 minutes of back up. The ODC back-up unit shall be a Stand-by Uninterruptible Power Supply (UPS) system that provides power line filtering and transient protection. The unit shall automatically take over (within 4mS) when the power line fails without interrupting or restarting the system and automatically recharge the battery within 10 hours after the power returns to normal. The UPS shall be located at the desk location of the ODC and shall power the System Unit and display. The UPS shall be a APC Back-UPS 650, 1000, or 1400 as required.

2.5 WATER TREATMENT PLANT DISPLAY CONSOLE SOFTWARE

A. General

1. The software shall operate in the 64-bit Windows 11 Professional Business environment. The software shall be the latest "full developmental" version of SCADAview CSX. It will need to integrate with the existing SCADAview CSX HMI. The software shall be licensed to the owner. All software upgrade costs shall be included in integrators BID.

B. System Back-up & Installation

1. The contractor shall provide a back-up copy of the installed software on a USB-Thumb drive. Back-up copies of any setup or graphic files shall be on a USB-Thumb drive. In the event of a catastrophic failure, the Owner shall utilize the USB-Thumb drive for emergency reloading the software. The contractor shall provide an easy to use installation (or re-installation) program that will automatically setup the hard drive operating system and automatically load (or reload) the software.

C. System Capacity

1. At a minimum, the operating software shall be capable of accommodating 32,000 tag points as follows:
 - a. Discrete status and alarm points
 - b. Measured variables
 - c. Accumulated variables
 - d. Calculated status & alarm points
 - e. Calculated control points

D. Communications

1. The HMI shall have several methods for exchanging data from programmable controllers and other software programs.
 - a. Direct
 - b. DDE Client/Server
 - c. OPC Client
 - d. ODBC
 - e. SQL Database (MySQL, MS-SQL, PostgreSQL)

E. HMI OPERATIONAL CHARACTERISTICS:

1. In general, the HMI software shall display all received data in engineering units with appropriate generated labels, generate and print alarms, print logs, store manually entered data, update displays, and perform operator commands as required by the database. The system shall automatically generate the following system displays:
 - a. Main Menu page (with direct access to all screens and other program modules)
 - b. System Summary page listing key data points for all RTUs in the system
 - c. RTU specific display pages showing all data for each RTU in the system
2. Beyond the basic operating software required for SCADA operations, the software package shall accommodate the following:
 - a. Status Point Operations:
 - 1) Display ODC, CTU, and RTU status functions
 - 2) Input/Display control database
 - b. Analog Data:
 - 1) Display value directly in engineering units
 - 2) Accept operator High & Low alarm limits and generate alarms
 - 3) Accept operator rate of change alarm limit and generate alarm
 - 4) Store data for trending displays
 - c. Flow Rate Data:
 - 1) Display value directly in engineering units
 - 2) Accept operator High & Low rate alarm limits and generate alarms
 - 3) Totalize flow total and display in engineering units
 - 4) Accept operator High/Low 24 hour total limits and alarms
 - 5) Store data for trending displays
 - d. Pump Control Operations:
 - 1) Display ODC, CTU, and RTU HAND/OFF/AUTO functions
 - 2) Display Pump CALL/RUN/FAIL status for each pump
 - 3) Input/Display control database
 - e. Alarm Point Operations:
 - 1) Display ODC, CTU, and RTU alarm functions
 - 2) Enter new alarm in data log archive and send alarm to printer
 - 3) Sound alarm horn until alarm is acknowledge by the operator
 - 4) Log alarm acknowledgment to data log and printer
 - 5) Log alarm clearing and send alarm clear to printer
 - 6) Input/Display control database
 - f. Event Point Operations:
 - 1) Display ODC, CTU, and RTU alarm functions
 - 2) Display ODC, CTU, and RTU event functions
 - 3) Enter new event in data log archive and send alarm to printer
 - 4) Log event clearing and send alarm clear to printer
 - 5) Input/Display control database

- g. Historical Trending Operations:
 - 1) Real-time and historical trending functions
 - 2) Create a multi-pen trend.
 - 3) Ability to be shaded to compare two or more different trends
 - 4) Create a trend that is part of a graphic display
 - 5) The trends shall have a marker displaying the pen's date, time, and value
- h. Graphical Screen Display Editor
 - 1) The HMI shall provide a graphics display editor for creating displays using graphic objects. The graphics display editor shall have the ability to drag and drop objects from a pre-configured graphics library, paste objects that are copied to the clipboard from another Windows application, and insert objects created by another Windows application using OLE. True OLE support is required in that it shall be possible to call up the native application that created the object being inserted and use the naïve object editing tools from within the HMI.

2.6 WEB SERVER

A. General

- 1. The ODC shall include an integral WEB Server allowing the operator to remotely access the system using standard WEB browser software (MS Internet Explorer). The operator shall have the ability to monitor the main display screen, view current alarms, view RTU sub-screens, view trend graphs, and make changes to the HOA and operator setpoints.
- 2. The integral WEB Server will use the same ODC HMI software security to control unauthorized access.

2.7 VOICE/TEXT ALARM DAILER

A. General

- 1. The ODC shall be equipped with software based automatic alarm dialer software. The software shall be tied to the MMI software database to provide automatic dialing of operator selected alarms. The software shall be 64bit compatible and capable of operating in the ODC hardware described above. The contractor shall supply a fully functional "developmental" version of the Alarm Dialer Software (including any required software protection keys) for the first ODC as well as a separate configured "runtime" version for installation and use in a customer supplied back-up computer. The software may be modular, however the operator interface shall provide an integrated interface to all areas of the program.
- 2. The software shall dial/text a pre-programmed list of phone numbers to provide a natural voice describing the specific alarm and time of occurrence. The dialer software shall have provisions to accept an operator acknowledgement of the alarm that will cancel further calls. If a proper acknowledgement is not received, the software will continue to dial/text phone numbers from the list until an acknowledgement is received.
- 3. The alarm dialer software shall allow operators to dial into the system to retrieve current alarm status and via a voice driven menu system access current operational data for each remote station.

B. Internet Gateway

- 1. The phone dialer software shall include an internet gateway to SMS text and voice text to speech option. The internet gateway will allow the ODC computer to use an internet connection to send SMS text and voice calls from a regular phone number. The internet

gateway needs to be able to create custom ringtones. The Voice/Text alarm Software shall be SCADAial, or Win911.

PART 3 EXECUTION

3.1 EQUIPMENT EXAMINATION

- A. The control system shall be completely tested prior to shipment. The entire control system shall be "Burned In" at the factory for a period of at least 20 days. The component equipment shall be computer tested and temperature cycled at zero degrees and at fifty degrees centigrade.

3.2 SYSTEM START-UP

- A. The manufacturer shall supply "Factory" personnel for start-up service as needed to insure satisfactory operation. Subsequent trips to the job site to correct defects shall be made at no charge to the Owner during the warranty period.

3.3 TRAINING

- A. The system manufacturer shall supply "factory" personnel to conduct two separate on-site training sessions, totaling a minimum of three days of training.
- B. The initial training session shall be conducted during start-up as needed until the Owner and Engineer are satisfied that the operators are comfortable with the operation and maintenance of the system. Training shall be done on site with the owner's personnel.
- C. Three to six months after the Owner commencing system operation, the system manufacturer shall supply "factory" personnel to conduct follow-up training of the Owner's personnel. The follow-up training shall be conducted on-site and consist of reviewing the operation and maintenance of the system. The Owner shall be contacted a minimum of two weeks in advance, prior to scheduling the training session to allow proper coordination.

3.4 SUBSTANTIAL COMPLETION

- A. The Engineer will grant substantial completion only after completion of the start-up and initial training phase of the project. The Engineer shall make an inspection of the system to determine the status of completion. Substantial completion will be awarded only when the system is providing usable service to the Owner. If the system is commissioned in phases, the Contractor may request substantial completion for the completed phases.

3.5 ACCEPTANCE TEST

- A. After start-up and debugging of the entire system has been completed, the system manufacturer shall notify the Engineer that he is ready to begin the 60-day acceptance test. The system must run continuously for 60 consecutive calendar days. During this period, all system functions shall be exercised in automatic control, including all levels of back-up control. During the initial phase of the acceptance test, the multiple levels of control and radio path pad shall be demonstrated to the Owner as follows:

1. Primary level control shall be demonstrated by allowing the operators to manually initiate remote device operation and observing the automatic operation by comparing trend charts to operator entered stop/start values.
 2. Secondary level control shall be demonstrated by turning off the ODC and verifying that each automatic control loop continues to function by monitoring operation with a passive monitor.
 3. Third level control shall be demonstrated by turning off the CTU radio and verifying that the RTUs continue automatic operation and communications between RTUs by monitoring one full cycle of automatic operation using a passive monitor.
 4. The fourth level of control shall be demonstrated by placing selected RTUs in back-up pressure mode and monitoring tower levels to observe one full pumping cycle.
- B. Any level test or system interruption and accompanying component, subsystem, or program failure shall be logged for cause of failure, as well as the time of occurrence and the duration of each failure.
- C. The Owner's representative shall classify failures as either major or minor. A minor failure would be a small, non-critical component failure that is corrected by the operators. This occurrence shall be logged but shall not be grounds for non-acceptance unless the same or similar failure occurs repeatedly (more than two such failures of similar components). A major failure shall be considered to have occurred when a component, subsystem, or program fault causes a halt in the operation of the any portion of the system and/or when a "factory" technician's work is required to make a repair or to reinitiate operation of the system.
- D. A major failure shall cause termination of the 60-day acceptance test. When the causes of a major failure have been corrected, a new 60-day acceptance test shall be started. Final Acceptance of the control system shall not occur until satisfactory completion of this 60-day test.
- E. The manufacturer shall provide "factory" personnel who shall be on site and conduct the initial system exercise portion of the testing. The manufacturer shall be responsible for maintaining a checklist type test report wherein each function is checked-off and initialed by the Owner's representative as it is demonstrated. During the remainder of the 60-day acceptance test, the manufacturer shall provide 24-hour response to calls from the owner in order to correct any failure.

3.6 WARRANTY/SUPPORT PROGRAM

- A. The control system manufacturer shall supply a FIVE (5) year parts and labor warranty and comprehensive support program for all items and software supplied under this section (except as noted below). Power surges and lightning damage shall be included as part of the warranty.
- B. The warranty shall begin from the time of "substantial completion" as issued by the engineer. The manufacturer shall provide a 24-hour response to calls from the Owner. The manufacturer, at his discretion, may dispatch replacement parts to the Owner by next-day delivery service for field replacement by the Owner. Any damage to the control system caused by the actions of the Owner in attempting these field replacements shall be the sole responsibility of the manufacturer. If, during the warranty period, satisfactory field repair can not be attained by field replacement of parts by the Owner, the manufacturer shall dispatch "factory" personnel to the job site to complete repairs at no cost to the Owner. Systems integrator shall dispatch field technician in a

timely manner NOT to exceed 5 working days from time of first attempt to fix the problem by means listed above.

- C. All PLC software and HMI software development files shall be provided to End user on USB drive with AS BUILT software versions of what actually was installed in each PLC. All software shall contain commented code.
- D. The support program shall begin from the time of "substantial completion" as issued by the engineer. The support program shall include free updating of all software as needed and providing free phone support from the integrator throughout the warranty period.
- E. The ODC Computer System Unit, keyboard, LCD display, printer, and associated UPS shall be covered by a one (1) year warranty beginning with "substantial completion". Lightning damage shall be included as part of the warranty on these components.
- F. Flow meters, control valves, process analyzers (ie turbidity, chlorine, pH, etc) supplied, as part of this contract shall be covered by a one (1) year warranty beginning with "substantial completion".

PART 4 APPENDIX: DETAILED EQUIPMENT DESCRIPTION (BASE BID)

4.1 WATER TREATMENT PLANT REMOTE UNIT

- A. Installation Requirements:
 - 1. Site WTP RTU Unit and Desktop ODC.
 - 2. All of the Remote Terminal Unit (RTU) equipment (including RTU, radio, power supplies, and local inputs & outputs) at the WTP shall be housed in a single wall mount NEMA 12 enclosure. The ODC equipment will be placed on a desk provided by the owner.
 - 3. The RTU shall communicate with the new Well RTUs listed below and existing SLS RTUs via the existing licensed radio link. A radio switch and minimum of 3 radios and antennas are required.
 - 4. The RTU antenna shall be mounted on a 10' long X 1-1/2" diameter mast secured to the top of the building as specified earlier. The System Integrator is responsible for determining the required antenna height and azimuths to achieve a reliable radio based data network.
- B. Front Panel Display Requirements:
 - 1. KEYPAD & DISPLAY UNIT
- C. Operator Display Console Requirements:
 - 1. (2) LCD displays as specified earlier
- D. SCADA Web Specifications:
 - 1. The integral as WEB Server specified earlier will use the same HMI software security to control un-authorized access. High Speed internet connection will be responsibility of the owner.
- E. Alarm Dialer Specifications: as specified earlier.
- F. Discrete Outputs (Control): (Minimum of TEN)

1. High Service Pump 1 Call to Run
2. High Service Pump 2 Call to Run
3. High Service Pump 3 Call to Run
4. Aerator Call to Run
5. Sodium Hypochlorite Pump Call to Run
6. Fluorosilicic Pump Call to Run
7. Orthophosphate Pump Call to Run
8. Spare Discrete Output
9. Spare Discrete Output
10. Spare Discrete Output

G. Discrete Inputs: (Minimum of FORTY)

1. High Service Pump 1 Running
2. High Service Pump 2 Running
3. High Service Pump 3 Running
4. Aerator Running
5. Sodium Hypochlorite Pump Running (if available)
6. Fluorosilicic Pump Running (if available)
7. Orthophosphate Pump Running (if available)
8. Sodium Hypochlorite Pump Fault
9. Fluorosilicic Pump Fault
10. Orthophosphate Pump Fault
11. Aerator Fault
12. Aerator HOA in HAND
13. Aerator HOA in AUTO
14. Aerator High Float
15. Aerator Low Float
16. High Service Pump 1 VFD Fault
17. High Service Pump 1 HOA in HAND
18. High Service Pump 1 HOA in AUTO
19. High Service Pump 2 VFD Fault
20. High Service Pump 2 HOA in HAND
21. High Service Pump 2 HOA in AUTO
22. High Service Pump 3 VFD Fault
23. High Service Pump 3 HOA in HAND
24. High Service Pump 3 HOA in AUTO
25. RPZ Flood Sensor
26. Power Failure
27. ATS in Emergency power
28. ATS in Normal power
29. Generator Running
30. Generator Fail
31. Generator Fault
32. Generator Low Fuel
33. Spare Discrete Output
34. Spare Discrete Output
35. Spare Discrete Output
36. Spare Discrete Output
37. Spare Discrete Output

38. Spare Discrete Output
39. Spare Discrete Output
40. Spare Discrete Output

H. Analog Inputs: (4-20mA, Minimum of TWENTY-EIGHT)

1. High Service Pump 1 Speed Feedback
2. High Service Pump 2 Speed Feedback
3. High Service Pump 3 Speed Feedback
4. Generator Engine Temperature
5. Sodium Hypochlorite Scale
6. Fluorosilicic Acid Scale
7. Orthophosphate Scale
8. Sodium Hypochlorite Pump Speed Feedback (if available)
9. Fluorosilicic Acid Pump Speed Feedback (if available)
10. Orthophosphate Pump Speed Feedback (if available)
11. Aerator Tank Flow Rate
12. Aerator Level
13. Finished Water Flow Rate
14. High Service Pump 1 Flow Rate
15. High Service Pump 2 Flow Rate
16. High Service Pump 3 Flow Rate
17. Chlorine Analyzer
18. High Service Pump Suction Pressure
19. High Service Pump Discharge Pressure
20. Clearwell Level
21. Spare Analog Input
22. Spare Analog Input
23. Spare Analog Input
24. Spare Analog Input
25. Spare Analog Input
26. Spare Analog Input
27. Spare Analog Input
28. Spare Analog Input

I. Analog Outputs: (4-20mA, Minimum of TEN)

1. High Service Pump 1 Speed Command
2. High Service Pump 2 Speed Command
3. High Service Pump 3 Speed Command
4. Sodium Hypochlorite Pump Speed Command
5. Fluorosilicic Acid Pump Speed Command
6. Orthophosphate Pump Speed Command
7. Spare Analog Output
8. Spare Analog Output
9. Spare Analog Output
10. Spare Analog Output

4.2 WELL 8 RTU REQUIREMENTS:

A. Installation Requirements:

1. Sites: Well 8: The General/Electrical Contractor will be responsible for installation of the specified RTU and associated hardware, all conduit and wiring, and the installation of the antenna mast.
 - a. The Antenna shall be mounted on a 10' long X 1-1/2" galvanized mast secured with stand-offs to the side of the existing building as specified earlier.
 - b. RTU will be powered from a 120Vac 15 amp single pole breaker.
- B. Front Panel Display Requirements:
 1. KEYPAD & DISPLAY UNIT
- C. Discrete Outputs (Control): (Minimum of FOUR)
 1. Well 8 Call to Run
 2. Spare Discrete Output
 3. Spare Discrete Output
 4. Spare Discrete Output
- D. Discrete Inputs: (Minimum of TWENTY-FOUR)
 1. Well 8 Running (includes runtime calculation)
 2. Well 8 VFD Fault
 3. Well 8 HOA in HAND
 4. Well 8 HOA in AUTO
 5. Flood Alarm (new flood switch by system integrator)
 6. Entry Alarm (new door switch by system integrator)
 7. Power Failure
 8. ATS in Emergency Power
 9. ATS in Normal Power
 10. Generator Running
 11. Generator Fail
 12. Generator Fault
 13. Generator Low Fuel
 14. Spare Discrete Input
 15. Spare Discrete Input
 16. Spare Discrete Input
 17. Spare Discrete Input
 18. Spare Discrete Input
 19. Spare Discrete Input
 20. Spare Discrete Input
 21. Spare Discrete Input
 22. Spare Discrete Input
 23. Spare Discrete Input
 24. Spare Discrete Input
- E. Analog Inputs: (4-20mA, Minimum of FOUR)
 1. Well 8 VFD Speed Feedback
 2. Well 8 Drawdown Level (new transducer by system integrator)
 3. Well 8 Flow Rate
 4. Spare Analog Input
- F. Analog Outputs: (4-20mA, Minimum of TWO)

1. Well 8 VFD Command speed
2. Spare Analog Output

4.3 Well 9 RTU Requirements:

- A. Installation Requirements:
- B. Sites Well 9: The General/Electrical Contractor will be responsible for installation of the specified RTU and associated hardware, all conduit and wiring, and the installation of the antenna mast.
 1. The Antenna shall be mounted on a 10' long X 1-1/2" galvanized mast secured with stand-offs to the side of the existing building as specified earlier.
 2. RTU will be powered from a 120Vac 15 amp single pole breaker.
- C. Front Panel Display Requirements:
 1. KEYPAD & DISPLAY UNIT
- D. Discrete Outputs (Control): (Minimum of FOUR)
 1. Well 9 Call to Run
 2. Spare Discrete Output
 3. Spare Discrete Output
 4. Spare Discrete Output
- E. Discrete Inputs: (Minimum of TWENTY-FOUR)
 1. Well 9 Running (includes runtime calculation)
 2. Well 9 VFD Fault
 3. Well 9 HOA in HAND
 4. Well 9 HOA in AUTO
 5. Flood Alarm (new flood switch by system integrator)
 6. Entry Alarm (new door switch by system integrator)
 7. Power Failure
 8. ATS in Emergency Power
 9. ATS in Normal Power
 10. Generator Running
 11. Generator Fail
 12. Generator Fault
 13. Generator Low Fuel
 14. Spare Discrete Input
 15. Spare Discrete Input
 16. Spare Discrete Input
 17. Spare Discrete Input
 18. Spare Discrete Input
 19. Spare Discrete Input
 20. Spare Discrete Input
 21. Spare Discrete Input
 22. Spare Discrete Input
 23. Spare Discrete Input
 24. Spare Discrete Input

- F. Analog Inputs: (4-20mA, Minimum of FOUR)
 - 1. Well 9 VFD Speed Feedback
 - 2. Well 9 Drawdown Level (new transducer by system integrator)
 - 3. Well 9 Flow Rate
 - 4. Spare Analog Input
- G. Analog Outputs: (4-20mA, Minimum of TWO)
 - 1. Well 9 VFD Command speed
 - 2. Spare Analog Output

END OF SECTION

SECTION 31 0510 – SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 DESCRIPTION

- A. Subsurface soil investigations have been conducted at the site by Chamlin & Associates, Inc., hereinafter referred to as the “Soils Engineer.” See Attached.
- B. The soil investigation was obtained only for the Engineer’s use in design and is not a part of the Contract Documents. The boring logs attached are for Bidder’s information only, but are not a warranty of subsurface conditions.
- C. Bidders should visit the site and acquaint themselves with all existing conditions prior to bidding. Bidders may make their own subsurface investigations to satisfy themselves as to site subsurface conditions, but all investigations shall be performed only under the schedules and arrangements approved, in advance, by the Engineer.

PART 2 PRODUCTS – Not used.

PART 3 EXECUTION – Not used.

END OF SECTION

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GEOTECHNICAL REPORT

Morris Water Treatment Plant
E Grand Ridge Road
Morris, IL 60450
February 23, 2026



Prepared By: Troy Reddoch, P.E.
Chamlin & Associates
troyr@chamlin.com

Prepared For: City of Morris
700 N. Division St.
Morris, IL 60450

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APPENDIX

- Appendix A – Location Map
- Appendix B – Topography Map
- Appendix C – Soil Boring Layout
- Appendix D – Boring Logs
- Appendix E – NRCS Soil Map

I. GENERAL INFORMATION

Introduction

Chamlin & Associates (Chamlin) has been retained by the City of Morris to conduct a geotechnical engineering investigation for a proposed water treatment plant (WTP) located near Morris, Illinois. The purpose of the geotechnical investigation is to describe the soil conditions encountered in the soil borings and to submit recommendations for the design and construction of the foundations for various structures and tanks. The project location is shown in Figure 1.



Figure 1 – Project Location

Scope of Work

The scope of services included a subsurface investigation at the site, field and laboratory testing of the soil samples collected, and providing engineering analysis and evaluation of the data. In addition, we reviewed available published geologic maps and literature relative to the general area of the site.

Site Description

The project site is in Morris, Illinois, Section 15, Township 34N, Range 7E of the third principal meridian, Figure 1. The site is located 2 miles north of I-80 and is currently agricultural land adjacent to the Morris Municipal Airport. The site is relatively flat with a slight slope to the south with an average ground surface elevation of 565.00 feet.

Project Description

We understand the Morris WTP project will consist of the design and construction of the following improvements:

Water Treatment Plant Building – The proposed water treatment plant building is located approximately 300 feet north of the existing townhall structure. Borings B-1 to B-5 were completed within the footprint of the proposed structure. The proposed structure is a single-story masonry building with a finish floor elevation of 566.0 feet. The building has dimensions of approximately 80 feet by 106 feet.

Aeration Tank – The proposed location of the aeration tank is east of the water treatment plant building near boring B-12. The aeration tank has a footprint of approximately 34 feet by 34 feet. The tank has a proposed bottom elevation of 554 feet with a 12-inch PCC bottom, and anticipated foundation loads of up to 3000 psf at the perimeter walls.

Brine Tanks – The proposed location of brine tanks is near the northeast corner of the water treatment plant building, near boring B-13. The existing ground elevation at this location is 566.2 ft and the proposed bottom of each tank being 556.0 ft. Foundation loads are anticipated to be 1,500 psf across the base of the foundation with a concentrated 3000 psf load at the perimeter wall.

Concrete Pads – Various concrete pads will be constructed on the site for generators, transformers and prefabricated well houses. These slabs are expected to be constructed at grade.

Subsurface Investigation

The subsurface investigation for the proposed wastewater treatment plant additions was developed by Chamlin & Associates and completed by Midwest Testing Services, Inc. on January 27, 2026.

Fourteen (14) structure borings were performed, and field-testing of the sub-soils was conducted to classify and determine the strengths of the soils encountered at the site. The borings were laid out as shown in Appendix C of this report.

Boring B-1 and B-5 were completed on opposite corners of the proposed building and were both advanced 41 ft below the ground surface. Borings B-2 to B-4 were within the footprint of the proposed structure and were advanced 21 ft below the ground surface. Boring B-6 to B-9 were completed on the west side of the lot, and were all advanced 21 ft below the ground

surface. Boring B-10 to B-14 were completed on the east side of the lot and were advanced 21 - 26 ft below the ground surface.

These borings were performed using a D-50 truck mounted rig. The structure borings utilized standard penetration test methods with an automatic hammer weighing 140 pounds that is lifted and dropped repeatedly from a height of 30 inches, following the guidelines of ASTM D1586. The blow counts are recorded every 6 inches while advancing the split spoon a total of 18 inches into the soil at regular intervals. The number of blows it takes to advance the split spoon the last 12 inches is known as the N-value. Unconfined compressive strengths were tested using a Rimac machine when suitable samples were retrieved, a pocket penetrometer was used on the others.

Area Geology

The project lies on what is referred to as the Kankakee Plain and has quaternary deposits from the Mason Group in the equality formation section of the Wisconsin Episode. The bedrock in this area is from the Carbondale Formation of the Pennsylvanian Age and like the rest of the Pennsylvanian, is composed of gray shale or mudstone, siltstone, and sandstone. Rock bodies vary greatly in thickness and commonly grade laterally into one another.

Subsurface Materials

According to the Natural Resources Conservation Service, NRCS, soil maps for the project limits, the native soils of the area are Silt Loam and Silty Clay Loam. At this site, the soil that makes up the area are "Martinton Silt Loam" and "Graymont Silt Loam". Martinton Silt Loam is considered somewhat poorly drained and Graymont Silt Loam is considered moderately well drained. The investigation by Midwest Testing Services shows the soils are classified as silty clay loam over loose fine sand. Bedrock was not encountered in any of the borings, but hard till was present 26 feet below the ground surface. See Appendix F of this report for a copy of the NRCS map for the proposed and our own classification test results.

In general, the soil borings all encountered a similar soil stratigraphy. There is 10 inches of silty clay topsoil, followed by 7 – 14 feet of medium stiff to stiff silty clay loam with an average $Q_u = 1.5$ tsf. Below the stiff silty clay loam is 7 to 10.5 feet of medium dense fine sand with an average N value = 16. In most of the soil borings, beginning 19 feet below the ground surface is very stiff to hard silty clay till with an average $Q_u = 2.5$ tsf.

Boring B-2 encountered soft silty clay with a $Q_u < 1.0$ tsf 7 feet below the ground surface. Localized undercutting due to soft soils will be necessary to achieve suitable foundation bearing soils. It is recommended that the foundation bearing soils be evaluated by a geotechnical engineer during construction to determine the depth of undercut.

Ground water was present in all the soil borings, when inspected at the time of completion of each boring. The groundwater had a static water level of 557.0 feet, 10 feet below the ground surface. Plans should be made to dewater any excavation 10 feet or deeper. Depending on when construction takes place, the groundwater level could be higher or lower than encountered during our investigation. Dewatering will be required for several of the improvements, see the "Groundwater Control" section for recommendations.

Climate

The climatic conditions for the four months prior to our January 2026 borings are compared to the historical average for that month in Table 1 and Table 2. The data was evaluated to determine any effects of precipitation and temperature on the water table level and soil moisture content that was encountered during the investigations. Local data was available from the National Weather Service's website. Historical averages were available from the National Oceanic Atmospheric Administration.

Table 1 – Precipitation Data

Month	Actual, inches*	Historical Average, inches**	Gain (+) or Loss (-), inches
October 2025	1.75	3.23	- 1.48
November 2025	1.04	2.50	- 1.46
December 2025	1.18	2.02	- 0.84
January 2026	0.78	2.09	- 1.31
Total	4.75	9.84	-5.09

Table 2 - Temperature Data

Month / Year	Average Temperature, Fahrenheit	Historical Average, Fahrenheit	Gain (+) or Loss (-), Fahrenheit
October 2025	57.4	53.6	+3.8
November 2025	41.9	40.3	+1.6
December 2025	27.7	29.1	- 1.4
January 2026	22.5	23.4	- 0.9

The four months leading to the investigation have experienced less than half of the total precipitation than the historical average. The weather for the four months has been similar to the historical average. The moisture contents available on soil boring logs may differ from the actual field conditions depending on the time of year construction takes place.

II. EARTHWORK

The following sections present general recommendations for site preparation, subgrade treatment, structural fill, and excavations at the project site. The recommendations for the design and construction of earth supported foundations are contingent upon the following recommendations. It is not reasonable to rely upon the conclusions or recommendations in this report if any future earthwork activities are conducted unobserved or untested. A representative of the geotechnical engineer should be retained to perform observation and testing of structural fill, subgrade preparation, foundation bearing soils and other geotechnical conditions not evident in the subsurface investigation.

Site Preparation

It is recommended that all existing topsoil, pavement, vegetation, topsoil/root mat and any other unsatisfactory or deleterious materials be removed at least 5 feet laterally beyond the limits of new construction. Such material should be considered unsuitable for reuse as structural fill. The topsoil can be stockpiled on site to be used in landscaping areas at the end of construction. This site has 10 inches of black silty clay topsoil. This material could be stockpiled to be used as topsoil in the landscaping areas at the completion of the project.

The exposed foundation support soils should be evaluated by a representative of the Geotechnical Engineer to confirm they are suitable to support the design bearing pressure. This can be done using either static or dynamic cone penetrometer tests, depending on the soil type. Any unstable area found should be stabilized by excavating and replacing those soils with suitable soil (adequately compacted), by lowering the moisture content of the subgrade soils and compacting them, or by other methods (placing a geotextile and stone layer, etc.).

Surface areas of the site to receive fill or directly support new construction should be proof rolled with a tandem-axle dump truck weighing between 20 and 25 tons. Proof rolling should occur prior to fill placement or after reaching final grade in cut areas in the presence of a representative of the project geotechnical engineer so that recommendations can be provided for areas that rut, pump, or deflect excessively. Proof rolling should not be performed on frozen or excessively wet subgrades.

Excess moisture and construction traffic loading may cause the onsite soils to become unstable. Therefore, it is recommended that proper site drainage be maintained during earthwork operations and that construction traffic be limited during and after wet weather. If not, the accumulation of water could result in construction delays. Common approaches to reduce wet weather delays include grading the area so that surface water flows away from the excavation, sealing exposed soil surface with a smooth-drum roller prior to precipitation events, and forming temporary ditches, swales, berms or other surface water diversion features.

Structural Fill

Structural fill materials should be free of debris, organic matter, and frozen materials. Any material used as structural fill should not contain rocks or rock fragments greater than 3 inches in diameter or have greater than 30 percent retained on the $\frac{3}{4}$ -inch sieve. All fill placed within pavement areas should be placed as structural fill.

Cohesive material used in the upper 3 ft of the finished subgrade should have a Plasticity index less than 25 and a Liquid Limit less than 50, as determined by the Atterberg limit testing. It is recommended that the material have a standard proctor maximum dry density >100 pcf. If fine-grained silt or clay soil is used for structural fill, moisture control will be essential to achieve the recommended degree of compaction. We recommend the fill be tested for moisture content and compaction during placement. If the in-place density tests indicate the specified moisture content or degree of compaction have not been met, the area will need to be reworked and retested until the specified moisture and compaction requirements are met. The onsite Silty Clay Loam and Clay soils meet these criteria.

Granular structural fill should be a crushed limestone material such as that meeting IDOT's CA-06, CA-07 or CA-11 gradation. In wet excavations the clean CA-7 or CA-11 is more suitable than the CA-06. It is recommended that the foundations be placed on a base course of at least 6 inches in thickness.

The fill placed below paved area should be compacted to at least 95 percent of the material's maximum dry density per ASTM D 1557 Method C, "Standard Test Methods for Laboratory Compaction Characteristics of Soil". To obtain this degree of compaction, the lift thickness should be less than or equal to 6 inches until it is proven the compaction requirements can be met with thicker lifts. At no point should the lifts exceed 8 inches in thickness.

Backfill of Structures

We recommend providing a drainage layer behind the wall to collect and drain groundwater or surface water infiltration from behind the wall. The drainage layer should be a free draining, well graded granular material that is more readily compacted to required densities. It is recommended that backfill against underground structures extend out a minimum of 2 ft from the wall or at an angle of at least 45 degrees from vertical.

Temporary Excavation and Shoring

Excavations up to 13 feet will be required for the proposed improvements at the site. Due to site size constraints, the depth of excavation and the granular nature of the soil, it is anticipated that temporary shoring will be required to support the excavation. The contractor or the contractor's specialty subcontractor should be made responsible in the plan specifications for the design of temporary shoring in accordance with applicable regulatory requirements.

Excavations

All excavations should be performed in accordance with the requirements detailed in the OSHA Excavation Regulations and procedures, Section 1926 Subpart P. Based upon the soil boring data Type B cohesive soils and Type C granular soils are most prominent on this site. The type B soil only extends 7 to 14 feet below the ground surface, the maximum allowable slopes for Type B soil is 1:1 (H:V). Below this depth, the excavation for the tank structures will be through Type C granular Soils. The maximum allowable slope for Type C soil is 1.5:1 (H:V). All excavations should be monitored by a Competent Person, as defined by the OSHA standard, and appropriate shoring and sloping techniques should be used to prevent cave-ins.

Over-Excavation

Over-excavation should be considered for this site due to the soft silty clay layers present. When over excavating for a foundation, it is important to remember that the pit needs to be over excavated as shown in Figure 2.

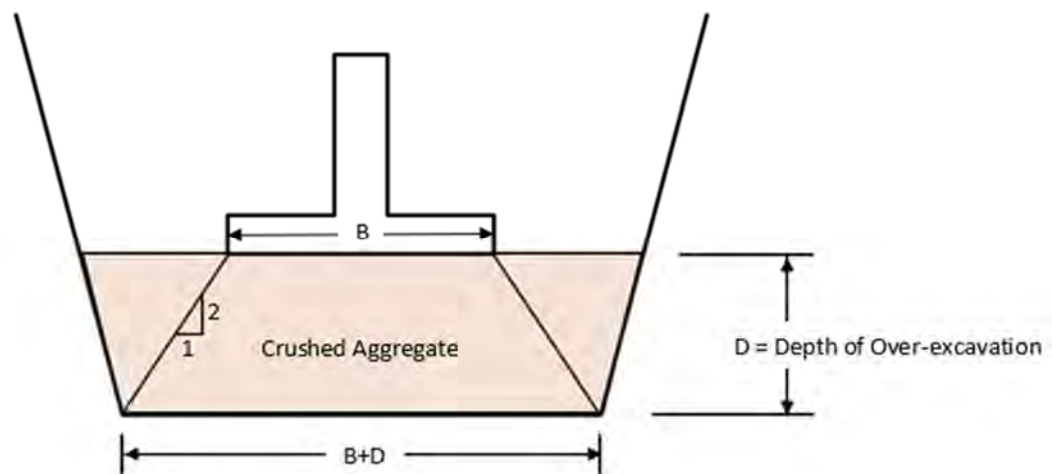


Figure 2 - Over-Excavation Detail

It is recommended that any load bearing soils with a $Q_u < 1.0$ and/or a moisture content greater than 30% should be removed. The exposed foundation subgrades should be evaluated by a representative of the Geotechnical Engineer to confirm conditions are suitable for support of the design bearing pressure after excavation to the proposed grade. The depth of over excavation will need to be determined in the field by a geotechnical engineer.

The fill material should meet the requirements of the "Structural Fill" section of this report. It is recommended that the fill is capped with 6 inches of $\frac{3}{4}$ inch rock such as CA-06 or CA-07 to allow for fine grading. The remainder of the structural fill can be additional $\frac{3}{4}$ inch rock or 1–3-inch rock such as CS01.

III. GEOTECHNICAL ANALYSIS AND RECOMMENDATIONS

General

The recommendations for design and construction presented in the following sections is based on Chamlin's understanding of the proposed construction, an engineering assessment of the anticipated subsurface conditions and Chamlin's experience with similar projects. Discussion of the foundation design parameters, as well as site preparation and construction considerations, is included in the following sections.

Water Treatment Building

The water treatment building will be located near the center of the site. The structure is a single-story masonry structure. Conventional strip footings and a reinforced concrete mat foundation are proposed.

Bearing Capacity/Settlement

With a finish floor elevation of 566.0 it is anticipated that the foundation will be established 3.5 feet below the ground surface (elev 562.5 feet) on the medium stiff to stiff silty clay. Using a factor of safety, FS=3 resulted in an allowable bearing capacity of 2500 psf. As noted in the subsurface investigation section, isolated undercutting may be required around Boring B-02 due to unsuitable bearing soil. Refer to the over excavation section of this report for further information.

It is expected that the total settlement will be under 1 inch and the differential settlement will be approximately ½ of an inch if the previous recommendations are implemented and if good construction practices are followed.

Slab-on-grade

The floor slab for the proposed structure should be designed as a slab-on-grade system, and the subgrade should be prepared in accordance with the procedures described in this report. It is our opinion that the existing native soils are generally capable of providing slab support. This recommendation assumes all slab areas are proof-rolled and evaluated prior to the placement of the sub-base stone. We recommend the placement of a minimum of 4 inches of granular subbase beneath the floor slab to provide uniform support distribution between the subgrade soils and the base of the concrete slab. If these recommendations are followed a modulus of subgrade reaction value of 125 psi/in can be used in design.

The floor slabs should be suitably reinforced to control shrinkage cracks. Proper joints should be provided at the junction of the slabs and the foundation system so that a small amount of independent movement can occur without causing damage.

Aeration Tank

The proposed location of the aeration tank is on the east side of the water treatment plant building, near boring B-12. The aeration tank has a footprint of approximately 34 feet by 34 feet. The tank has an anticipated foundation bearing elevation of 554 feet.

Bearing Capacity/Settlement

With a proposed bottom of tank elevation of 554 ft, boring B-12 indicates the foundation will bear on medium dense fine sand. Using a factor of safety, $FS=3$ resulted in an allowable bearing capacity of 3000 psf. Due to the granular nature of the soil encountered, settlement is expected to be minimal.

The bearing capacity of sand is affected by the width and depth of the footing, the materials effective unit weight, and the sand's internal angle of friction. If the ground water is to be at or above the footings an allowable bearing capacity of 1000 psf is recommended for design. The presence of groundwater reduces the unit weight of the soil, thereby reducing its bearing capacity.

Keep in mind, it will be very difficult to excavate in the sand below the water table. It will be even more difficult to compact the crushed aggregate at or below the water table. It will be necessary to lower the groundwater table a minimum of 2 feet below the bottom of the excavations (Elevation 552 feet) to protect the bottom stability of the excavations and to allow for proper compaction of the subgrade soils. Groundwater control measures by means of specialized dewatering methods such as downhole pumps in slotted casings or wellpoints, will be required. After the dewatering has been completed, an allowable bearing capacity of 3000 psf can be used for the medium dense sands.

Brine Tanks

The proposed location of the brine tanks is on the northeast side of the water treatment plant building. Soil boring B-13 was completed between the footprints of the tanks. The existing ground elevation at this location is 566.2 ft and the proposed bottom of each tank being approximately 556.0 ft. Boring B-13 indicates the foundation will bear on medium dense fine sand. Using a factor of safety, $FS=3$ resulted in an allowable bearing capacity of 3000 psf. Due to the granular nature of the soil encountered, settlement is expected to be minimal.

As with the aeration tank, this foundation will be constructed below the groundwater table. Please follow the recommendations in the aeration tank bearing capacity analysis for managing the groundwater.

Bearing Capacity/Settlement

At elevation 559 ft it is anticipated that the foundation on medium dense fine sand. Groundwater was encountered at elevation 557.5, 1.5 feet above the bottom of the tanks.

Concrete Pads

Several concrete pads will be constructed to support transformers, generators and well houses. It is our opinion that the existing native soils are generally capable of providing slab support. This recommendation assumes all slab areas are proof-rolled and evaluated prior to the placement of the sub-base stone. We recommend the placement of a minimum of 4 inches of granular subbase beneath the floor slab to provide uniform support distribution between the subgrade soils and the base of the concrete slab. If these recommendations are followed, a modulus of subgrade reaction value of 125 psi/in can be used in design.

Lateral Earth Pressures

The lateral earth pressure recommendations provided in this section are applicable to the design of rigid retaining walls fixed against rotation or subject to slight rotation, such as cantilever or gravity type concrete walls. The recommendations are not applicable to the design of geogrid-reinforced, modular block walls backfilled with select materials.

In general, tank walls should be designed to resist lateral pressures generated by soil backfill materials and any temporary or permanent surcharge loads. At-rest conditions should be used for the design of tank walls, and other walls that are not free to deflect or rotate. Walls that are free to deflect or rotate may be designed using active conditions. The walls shall be designed for earth pressures at least equal to those indicated in Table 3.

Table 3 - Earth Pressure Recommendations

Design Parameter	Recommended Design Value	
	Active	At Rest
Coefficient of Lateral Earth Pressure	0.33	0.5
Equivalent Fluid Pressure (pcf)	40	60

The parameters in Table 3 are subject to the following requirements:

- The zone of backfill behind the wall is 2 feet wide or extends upward from the back of the retaining wall foundation at a slope of 1H:1V, or flatter.
- The grade behind the top of the wall will be horizontal. Different geometry behind the wall will produce different earth pressures, and sloping backfill will generally increase the earth pressures applied to retaining walls.
- The earth pressure coefficients can also be used to estimate the increased earth pressure from uniform surcharge loads on the backfill behind the walls.
- Hydrostatic pressures are not included in the earth pressure coefficient or unit weights.
- Seismic forces are not included in the earth pressure coefficients or unit weights.

- Lateral and overturning stability of the retaining wall should include a factor of safety at least 1.5 or as required by the building code or local codes.

We recommend that an adequate drainage system be installed adjacent to below-grade structures, thus eliminating hydrostatic forces. This drainage system shall include

- A drainage layer of free draining, well graded granular material (CA07) at least 2 feet wide behind the wall or at an angle of at least 45 degrees from vertical from the base of the wall.
- A perforated PVC collector pipe (at least 4 inches diameter) should be provided at the base of the drainage zone to collect water from the zone and drain it from behind the wall via gravity to a suitable daylight outlet.

If drainage systems are not included in the design, the lateral pressures provided herein should be modified accordingly.

Seismic Parameters

Use the following seismic information for structural design. The Soil Site Class was determined using the excel spreadsheet from the Illinois Department of Transportation website. The Design Spectral accelerations were determined using the USGS Seismic Design Maps and ASCE 7-10.

Soil Site Class = C

Design Spectral Acceleration at 0.2 sec (S_{DS}) = 0.116g

Design Spectral Acceleration at 1.0 sec (S_{D1}) = 0.085g

Groundwater Control

Groundwater was present in all the soil borings, 10 feet below the ground surface. Groundwater should be expected in excavations that extend 10 feet below the existing grade and are kept open for more than a few hours. As stated in the aeration tank bearing capacity/settlement section, it will be necessary to lower the groundwater table to a minimum of 2 feet below the bottom of the excavations (Elevation 552 feet) to protect the bottom stability of the excavations and to allow for proper compaction of the subgrade soils.

This can be accomplished by surrounding the site with a pumped well dewatering system. Pumped wells that have been properly installed and developed in highly permeable sand deposits can produce high discharge rates. Pumped wells are generally the most effective dewatering method in areas where dewatering to deeper than about 15 feet below the ground surface is necessary.

We strongly recommend that dewatering, where used, be performed by a contractor or subcontractor with dewatering experience. We recommend a dewatering plan be required as a submittal from the contractor at least two weeks prior to dewatering, that fully describes the dewatering approach, including material and equipment specifications, calculations and

supporting assumptions to ensure that dewatering is achieved to not less than 2 foot below excavation subgrade.

Water should not be allowed to accumulate at the bottom of the excavations. Surface water runoff should be directed away from excavations to reduce potential dewatering efforts and protect subgrades from becoming soft and unstable. Temporary detention ponds, trenches, ditches, and other groundwater or stormwater control systems should be carefully planned and designed so as not to conflict with new areas to be excavated and/or backfilled.

Cold Weather Protection

If construction is performed during cold weather, subgrade soil needs to be adequately protected so they are not allowed to be exposed to freezing conditions. All exterior shallow foundation elements should be established 3.5 feet below the finished grade for frost protection purposes.

Summary

This geotechnical study was commissioned to investigate the engineering parameters of the subsurface materials found at the Morris Water Treatment Plant site. From the Boring logs, recommendations were provided for the design and construction of the shallow foundation.

The analysis and recommendations in this report are based upon data obtained from the borings taken January 27, 2026. This report does not reflect variations that may occur away from the boring's location or variations due to the modifying effects of construction or weather.

This report has been prepared for the specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices for this geographical area. No warranties, either expressed or implied, are offered.

Chamlin & Associates should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

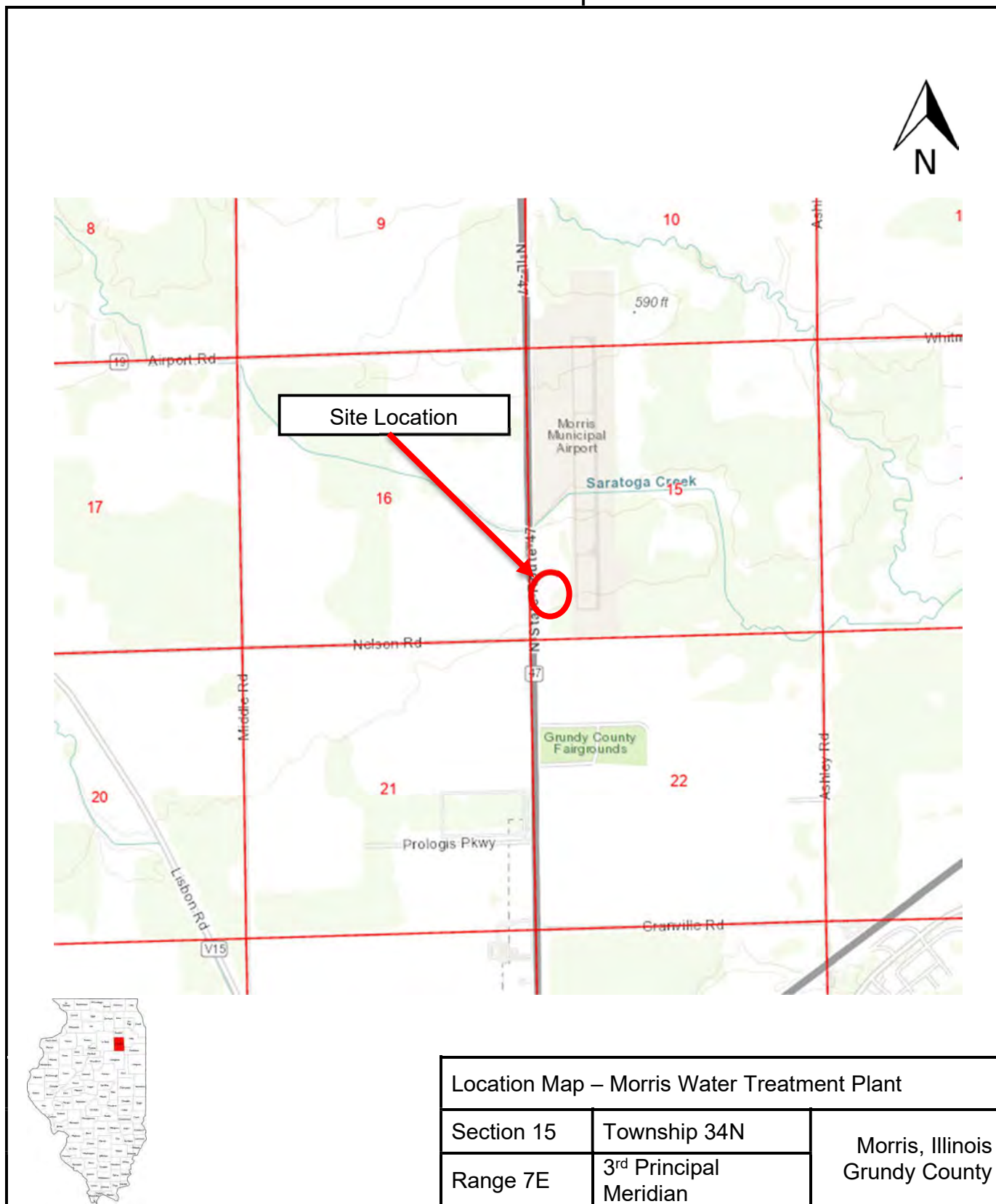
Review of the final set of plans would provide us with an opportunity to make sure the recommendations have been properly incorporated into the design documents. This document should be forwarded onto the contractor at the discretion of the engineer and is not intended to be a complete description of problems which may be encountered by the contractor.

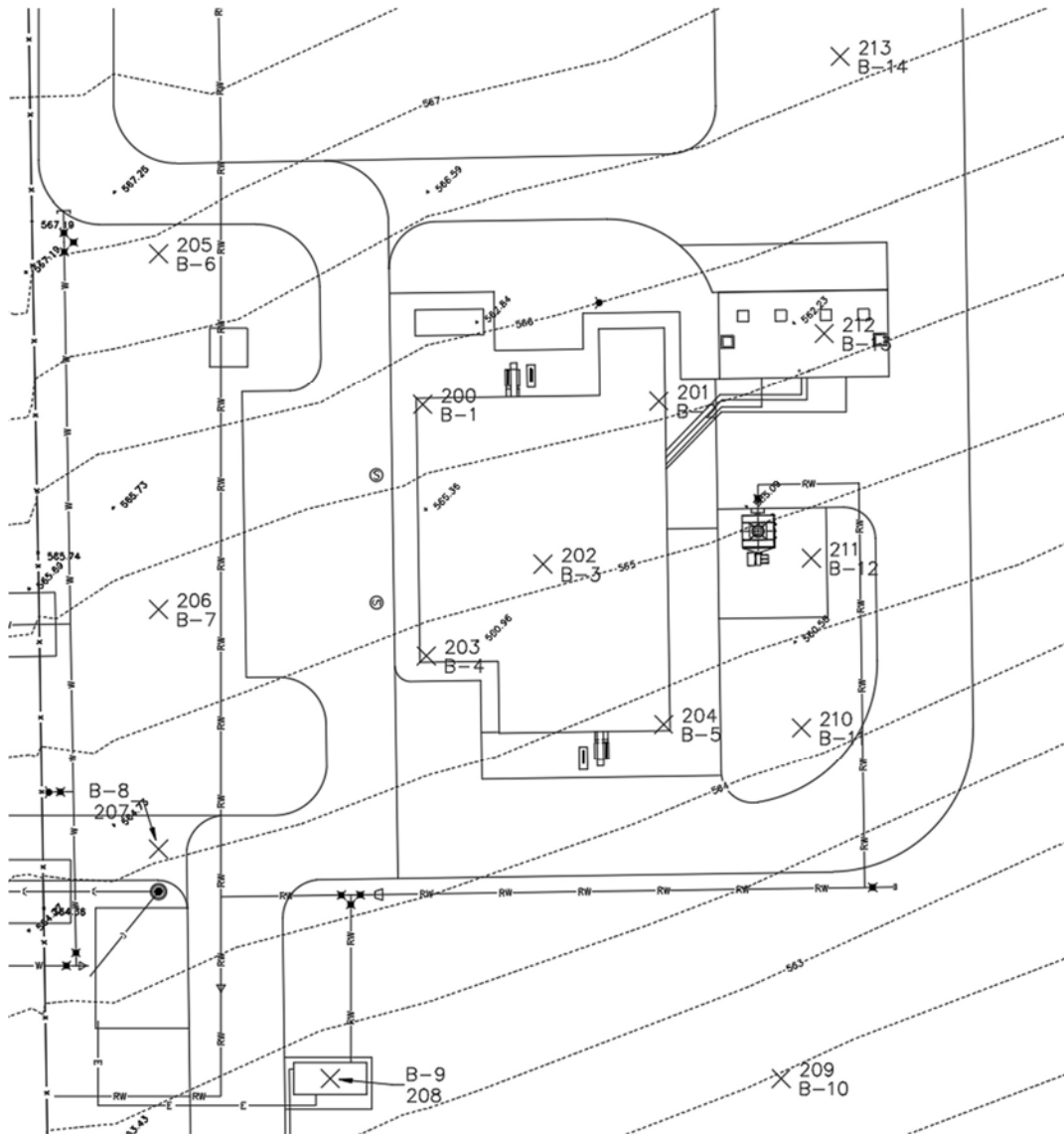
Respectfully submitted,

Troy Reddoch, P.E.

APPENDIX

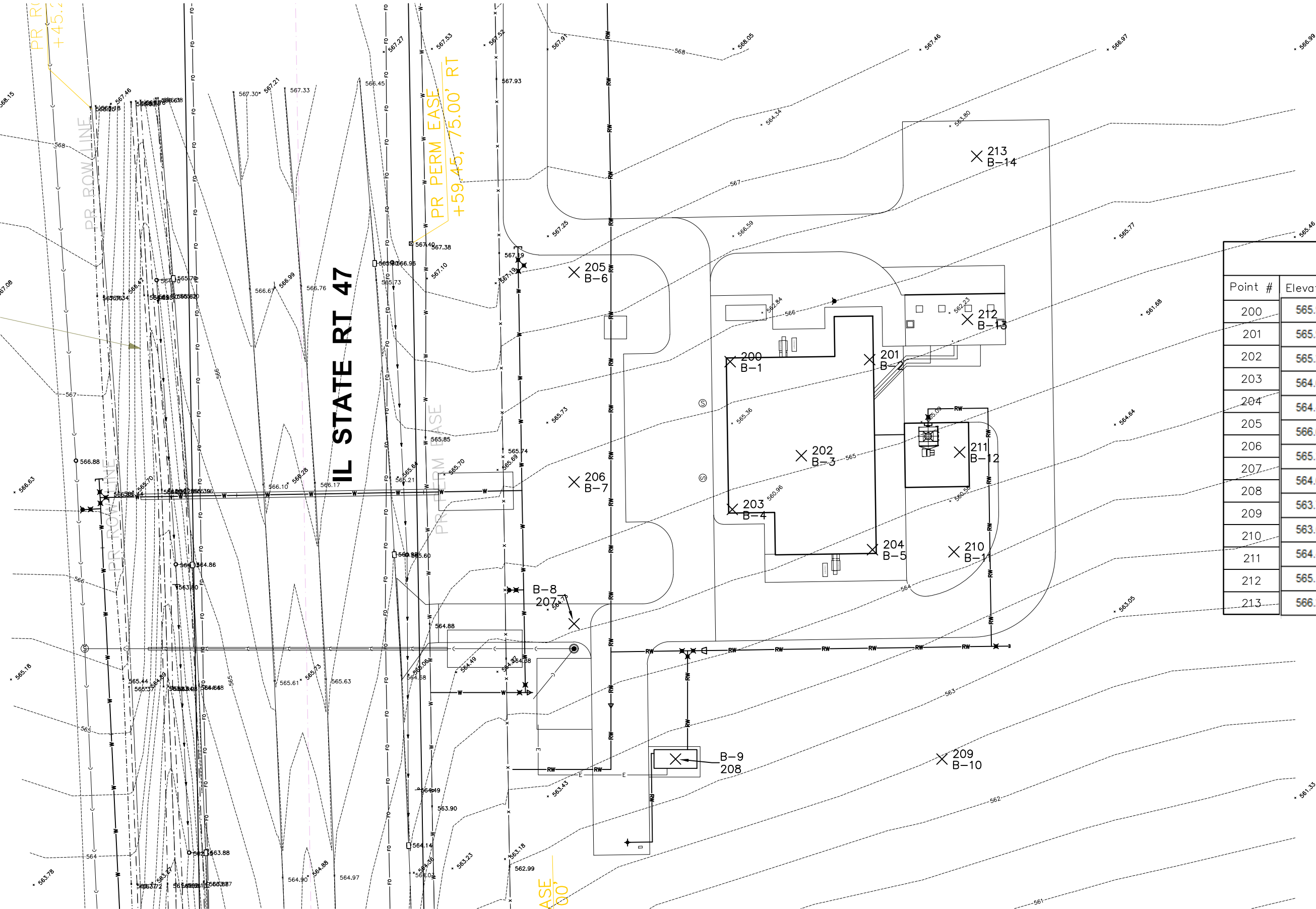
Location Map





Morris, Illinois
Grundy County

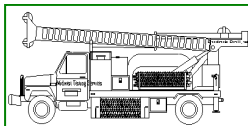
Soil Boring Layout



Point Table

Point #	Elevation	Northing	Easting	Description
200	565.90	1730651.48	959915.73	B-1
201	565.96	1730652.58	959990.39	B-2
202	565.23	1730601.20	959953.81	B-3
203	564.68	1730572.49	959916.89	B-4
204	564.40	1730550.92	959991.88	B-5
205	566.60	1730699.35	959832.23	B-6
206	565.32	1730587.12	959832.24	B-7
207	564.66	1730511.25	959832.24	B-8
208	563.72	1730438.87	959886.51	B-9
209	563.05	1730438.89	960029.05	B-10
210	563.05	1730549.79	960035.46	B-11
211	564.40	1730603.06	960038.53	B-12
212	565.15	1730674.16	960042.64	B-13
213	566.20	1730761.43	960047.68	B-14

Boring Logs

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
 Project Name: Morris New Water Treatment Plant
 Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-01
 Surface Elev. 565.90
 Auger Depth 41' Rotary Depth NA
 Start Date 01/27/26 Finish Date 01/27/26

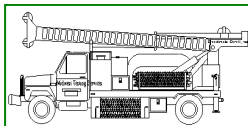
Location: See Boring Location Map
959915.7264 1730651.5138

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
							Water	

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
565.90			
564.90	± 10-inches Black Silty Clay Topsoil		1
563.90	Medium Stiff to Stiff Brown Silty Clay		2
562.90			3
561.90			4
560.90	Stiff Brown Silty Clay Till		5
559.90			6
558.90			7
557.90			8
556.90	Medium Dense Brown Fine Sand		9
555.90			10
554.90			11
553.90			12
552.90			13
551.90	Medium Dense Gray Fine Sand		14
550.90			15
549.90			16
548.90			17
547.90			18
546.90			19
545.90			20

Groundwater Data: Static water level after auger removal; Elevation 557.4

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 2 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
 Project Name: Morris New Water Treatment Plant
 Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-01
 Surface Elev. 565.90
 Auger Depth 41' Rotary Depth NA
 Start Date 01/27/26 Finish Date 01/27/26

Location: See Boring Location Map
959915.7264 1730651.5138

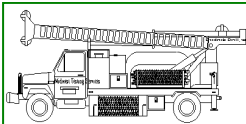
SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
9	SS	---	17	---	---			
10	SS	---	17	---	---			
11	SS	2.5	25	S	20			
12	SS	---	28	---	19			
13	SS	---	24	---	20			

(DEPTH) ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
544.90			
543.90			22
542.90	Medium Dense Gray Fine Sand		23
541.90			24
540.90			25
539.90			26
538.90			27
537.90			28
536.90			29
535.90			30
534.90			31
533.90	Very Stiff Gray Silt Loam Till with Sand & Gravel Layers		32
532.90			33
531.90			34
530.90			35
529.90			36
528.90			37
527.90			38
526.90			39
525.90			40
524.90			41

Boring Terminated

Groundwater Data: Static water level after auger removal; Elevation 557.4

Comments:

**Midwest Testing Services, Inc.**

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Peru, IL 61354

BORING LOGSheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.

Project Name: Morris New Water Treatment Plant

Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-02

Surface Elev. 565.96

Auger Depth 21' Rotary Depth NA

Start Date 01/02/26 Finish Date 01/02/26

Location: See Boring Location Map

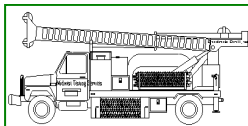
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SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski CME-55	
							REMARKS	
							← Water	
1	SS	1.2	8	B	21			
2	SS	0.8	5	S	20			
3	SS	0.6	3	---	26			
4	SS	---	11	---	---			
5	SS	---	15	---	---			
6	SS	---	17	---	---			
7	SS	---	18	---	---			
8	SS	---	17	---	---			

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
565.96			
564.96	± 10-inches Black Silty Clay Topsoil		1
563.96	Medium Stiff Brown Silty Clay		2
562.96			3
561.96			4
560.96	Stiff Brown Silty Clay Till		5
559.96			6
558.96			7
557.96	Soft to Medium Stiff Brown/Gray Silty Clay Loam Till		8
556.96			9
555.96			10
554.96			11
553.96	Medium Dense Brown Fine Sand		12
552.96			13
551.96			14
550.96			15
549.96			16
548.96			17
547.96			18
546.96	Medium Dense Gray Medium Sand		19
545.96			20

Groundwater Data: Static water level after auger removal; Elevation 556.96

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.
Peru, IL 61354

BORING LOG

Sheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
Project Name: Morris New Water Treatment Plant
Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-03
Surface Elev. 565.23
Auger Depth 21' Rotary Depth NA
Start Date 01/02/26 Finish Date 01/02/26

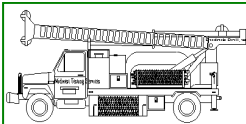
Location: See Boring Location Map
959953.8416 1730601.2247

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski CME-55	
							REMARKS	
							← Water	
1	SS	1.2	8	S	21			
2	SS	1.2	8	S	22			
3	SS	---	3	---	26			
4	SS	---	12	---	---			
5	SS	---	13	---	---			
6	SS	---	16	---	---			
7	SS	---	16	---	---			
8	SS	---	17	---	---			

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
565.23			
564.23	± 10-inches Black Silty Clay Topsoil		1
563.23			2
562.23	Stiff Brown Silty Clay Till		3
561.23			4
560.23			5
559.23			6
558.23	Soft Brown Silty Clay Loam Till		7
557.23			8
556.23			9
555.23	Medium Dense Brown Fine Sand		10
554.23			11
553.23			12
552.23			13
551.23	Medium Dense Brown/Gray Medium Sand		14
550.23			15
549.23			16
548.23			17
547.23	Medium Dense Gray Medium Sand		18
546.23			19
545.23			20

Groundwater Data: Static water level after auger removal; Elevation 558.23

Comments:

**Midwest Testing Services, Inc.**

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Peru, IL 61354

BORING LOGSheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.

Project Name: Morris New Water Treatment Plant

Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-04

Surface Elev. 564.68

Auger Depth 21' Rotary Depth NA

Start Date 01/02/26 Finish Date 01/02/26

Location: See Boring Location Map

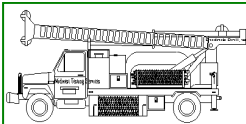
959916.9312 1730572.5226

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski CME-55	
							REMARKS	
							Water	

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
564.68			
563.68	± 8-inches Black Silty Clay Topsoil		1
562.68			2
561.68	Medium Stiff to Stiff Brown/Gray Silty Clay Till		3
560.68			4
559.68			5
558.68			6
557.68			7
556.68			8
555.68			9
554.68	Stiff to Very Stiff Gray Silty Clay Loam Till		10
553.68			11
552.68	Medium Dense Brown Fine Sand		12
551.68			13
550.68			14
549.68			15
548.68			16
547.68	Medium Dense Gray Medium Sand		17
546.68			18
545.68			19
544.68			20

Groundwater Data: Static water level after auger removal; Elevation 558.23

Comments:

**Midwest Testing Services, Inc.**

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Peru, IL 61354

BORING LOGSheet 1 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
 Project Name: Morris New Water Treatment Plant
 Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-05
 Surface Elev. 564.40
 Auger Depth 41' Rotary Depth NA
 Start Date 01/27/26 Finish Date 01/27/26

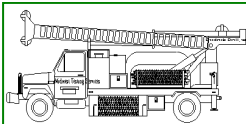
Location: See Boring Location Map
959991.8717 1730550.8807

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
							Water	

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
564.40			
563.40	± 10-inches Black Silty Clay Topsoil		1
562.40	Stiff Brown Silty Clay		2
561.40			3
560.40			4
559.40	Stiff Brown Silty Clay Till		5
558.40			6
557.40	Stiff Brown/Gray Silty Clay Till		7
556.40			8
555.40			9
554.40	Very Stiff Gray Silt Loam Till		10
553.40			11
552.40			12
551.40			13
550.40			14
549.40			15
548.40			16
547.40	Medium Dense Gray Fine Sand		17
546.40			18
545.40			19
544.40			20

Groundwater Data: Static water level after auger removal; Elevation 553.4

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.
Peru, IL 61354

BORING LOGSheet 2 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
Project Name: Morris New Water Treatment Plant
Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-05
Surface Elev. 564.40
Auger Depth 41' Rotary Depth NA
Start Date 01/27/26 Finish Date 01/27/26

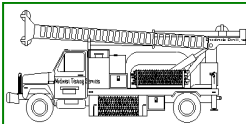
Location: See Boring Location Map
959991.8717 1730550.8807

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
9	SS	---	17	---	---			
10	SS	---	30	---	17			
11	SS	---	41	---	17			
12	SS	---	30	---	15			
13	SS	---	27	---	17			

(DEPTH) ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
543.40			
542.40	Medium Dense Gray Fine Sand		22
541.40			23
540.40			24
539.40	Very Stiff to Hard Gray Silt Loam Till with Sand & Gravel Layers		25
538.40			26
537.40			27
536.40			28
535.40			29
534.40			30
533.40			31
532.40			32
531.40			33
530.40			34
529.40			35
528.40			36
527.40			37
526.40			38
525.40			39
524.40			40
523.40			41
Boring Terminated			

Groundwater Data: Static water level after auger removal; Elevation 553.4

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
 Project Name: Morris New Water Treatment Plant
 Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-06
 Surface Elev. 566.60
 Auger Depth 21' Rotary Depth NA
 Start Date 01/02/26 Finish Date 01/02/26

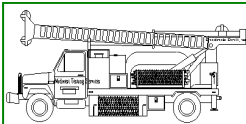
Location: See Boring Location Map
959832.2099 1730699.3698

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski CME-55	
							REMARKS	
							Water	

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
566.60			
565.60	± 12-inches Black Silty Clay Topsoil		1
564.60	Medium Stiff to Stiff Brown Silty Sandy Clay		2
563.60			3
562.60			4
561.60			5
560.60			6
559.60			7
558.60			8
557.60	Stiff Brown/Gray Silty Clay Loam Till		9
556.60			10
555.60			11
554.60			12
553.60			13
552.60			14
551.60	Medium Dense Brown/Gray Medium Sand & Gravel		15
550.60			16
549.60			17
548.60			18
547.60	Medium Dense Gray Fine to Medium Sand		19
546.60			20

Groundwater Data: Static water level after auger removal; Elevation 557.60

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
 Project Name: Morris New Water Treatment Plant
 Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-07
 Surface Elev. 565.32
 Auger Depth 21' Rotary Depth NA
 Start Date 01/02/26 Finish Date 01/02/26

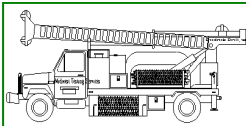
Location: See Boring Location Map
959832.2172 1730587.1529

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski CME-55	
							REMARKS	
							Water	

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
565.32			
564.32	+ 10-inches Black Silty Clay Topsoil		1
563.32	Medium Stiff to Stiff Brown Silty Sandy Clay		2
562.32			3
561.32	Stiff Brown Silty Clay Loam Till		4
560.32			5
559.32			6
558.32			7
557.32	Stiff Brown/Gray Silty Clay Loam Till		8
556.32			9
555.32			10
554.32			11
553.32	Stiff Gray Silty Clay Loam Till		12
552.32			13
551.32			14
550.32	Medium Dense Gray Fine Sand		15
549.32			16
548.32			17
547.32			18
546.32			19
545.32			20

Groundwater Data: Static water level after auger removal; Elevation 557.32

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.

Project Name: Morris New Water Treatment Plant

Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-08

Surface Elev. 564.66

Auger Depth 21' Rotary Depth NA

Start Date 01/02/26 Finish Date 01/02/26

Location: See Boring Location Map

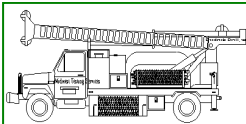
959832.2472 1730511.2193

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet	SAMPLES						Dry Density (PCF)	DRILLED BY
				Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)		REMARKS
564.66											
563.66	± 10-inches Black Silty Clay Topsoil		1								
562.66	Medium Stiff Brown Silty Sandy Clay		2								
561.66			3	1	SS	1.0	5	S	18		
560.66			4								
559.66	Medium Stiff to Stiff Brown/Gray Silty Clay Till		5								
558.66			6	2	SS	1.2	7	S	16		
557.66			7								
556.66			8	3	SS	1.4	15	S	15		
555.66			9								
554.66	Stiff to Very Stiff Gray Silty Clay Till		10								
553.66			11	4	SS	1.8	27	S	14		
552.66			12								
551.66			13	5	SS	1.8	26	S	15		
550.66			14								
549.66			15								
548.66			16	6	SS	---	30	---	---		
547.66	Medium Dense to Dense Gray Course Sand and Fine Gravel		17								
546.66			18	7	SS	---	30	---	---		
545.66			19								
544.66			20	8	SS	---	30	---	---		

Water

Groundwater Data: Static water level after auger removal; Elevation 557.66

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
Project Name: Morris New Water Treatment Plant
Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-09
Surface Elev. 563.72
Auger Depth 21' Rotary Depth NA
Start Date 01/27/26 Finish Date 01/27/26

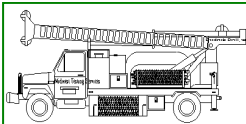
Location: See Boring Location Map
959886.5159 1730438.9083

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
							Water	

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
563.72			
562.72	± 10-inches Aggregate		1
561.72	Medium Stiff Brown Silty Clay		2
560.72			3
559.72			4
558.72	Stiff Brown Silty Clay Till with Sand Seams		5
557.72			6
556.72			7
555.72			8
554.72			9
553.72	Stiff to Very Stiff Gray Silty Clay Till		10
552.72			11
551.72			12
550.72			13
549.72			14
548.72			15
547.72			16
546.72	Medium Dense to Dense Gray Fine Sand and Silt		17
545.72			18
544.72			19
543.72			20

Groundwater Data: Static water level after auger removal; Elevation 556.72

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.

Project Name: Morris New Water Treatment Plant

Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-10

Surface Elev. 563.05

Auger Depth 26' Rotary Depth NA

Start Date 01/27/26 Finish Date 01/27/26

Location: See Boring Location Map

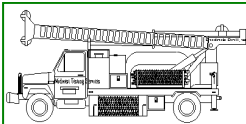
960029.0701 1730438.9610

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
							Water	

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
563.05			
562.05	+ 10-inches Black Silty Clay Topsoil		1
561.05			2
560.05	Medium Stiff Brown/Gray Silty Clay		3
559.05			4
558.05			5
557.05	Medium Stiff Brown/Gray Silty Clay Till		6
556.05			7
555.05			8
554.05			9
553.05	Stiff Brown/Gray Silty Clay Till		10
552.05			11
551.05			12
550.05			13
549.05			14
548.05	Medium Dense Gray Fine Sand		15
547.05			16
546.05			17
545.05			18
544.05			19
543.05	Very Stiff Gray Silty Clay Till		20

Groundwater Data: Static water level after auger removal; Elevation 551.05

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.
Peru, IL 61354

BORING LOGSheet 2 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
Project Name: Morris New Water Treatment Plant
Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-10
Surface Elev. 563.05
Auger Depth 26' Rotary Depth NA
Start Date 01/27/26 Finish Date 01/27/26

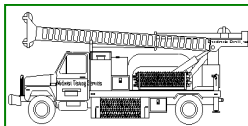
Location: See Boring Location Map
960029.0701 1730438.9610

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
9	SS	2.3	23	S	20			
10	SS	2.4	24	S	20			

(DEPTH) ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
542.05			
541.05			22
540.05	Very Stiff Gray Silty Clay Till		23
539.05			24
538.05			25
537.05			26
536.05	Boring Terminated		27
535.05			28
534.05			29
533.05			30
532.05			31
531.05			32
530.05			33
529.05			34
528.05			35
527.05			36
526.05			37
525.05			38
524.05			39
523.05			40
522.05			41

Groundwater Data: Static water level after auger removal; Elevation 551.05

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
 Project Name: Morris New Water Treatment Plant
 Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-11
 Surface Elev. 564.40
 Auger Depth 21' Rotary Depth NA
 Start Date 01/27/26 Finish Date 01/27/26

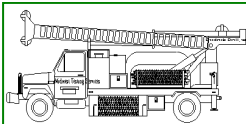
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960035.4841 1730549.7935

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
							Water	
1	SS	1.3	12	S	19			
2	SS	1.4	12	S	16			
3	SS	1.5	11	S	17			
4	SS	1.8	14	S	18			
5	SS	---	18	---	---			
6	SS	---	28	---	---			
7	SS	---	27	---	---			
8	SS	2.5	24	S	18			

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
564.40			
563.40	± 10-inches Black Silty Clay Topsoil		1
562.40	Stiff Brown Silty Clay		2
561.40			3
560.40			4
559.40			5
558.40	Stiff Brown/Gray Silty Clay Till		6
557.40			7
556.40			8
555.40			9
554.40			10
553.40			11
552.40			12
551.40			13
550.40	Medium Dense Brown/Gray Fine Sand		14
549.40			15
548.40			16
547.40			17
546.40			18
545.40			19
544.40	Very Stiff Gray Silty Clay Till		20

Groundwater Data: Static water level after auger removal; Elevation 553.90

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
 Project Name: Morris New Water Treatment Plant
 Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-12
 Surface Elev. 565.15
 Auger Depth 26' Rotary Depth NA
 Start Date 01/27/26 Finish Date 01/27/26

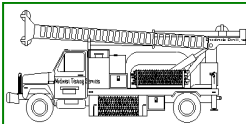
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960038.5315 1730603.1140

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
							Water	

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
565.15			
564.15	± 10-inches Black Silty Clay Topsoil		1
563.15	Stiff Brown/Gray Very Silty Clay		2
562.15			3
561.15			4
560.15	Stiff Brown/Gray Silty Clay Till		5
559.15			6
558.15			7
557.15			8
556.15			9
555.15	Medium Dense Brown Medium to Fine Sand		10
554.15			11
553.15			12
552.15			13
551.15			14
550.15			15
549.15			16
548.15			17
547.15			18
546.15			19
545.15	Very Stiff Gray Silty Clay Loam Till		20

Groundwater Data: Static water level after auger removal; Elevation 551.05

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 2 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
Project Name: Morris New Water Treatment Plant
Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

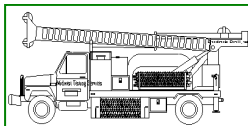
Boring No. B-12
Surface Elev. 565.15
Auger Depth 26' Rotary Depth NA
Start Date 01/27/26 Finish Date 01/27/26

Location: See Boring Location Map
960038.5315 1730603.1140

(DEPTH) ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet	SAMPLES						Dry Density (PCF)	DRILLED BY
				Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)		Randy Safranski Diedrich D-120
544.15											REMARKS
543.15			22								
542.15	Very Stiff Gray Silty Clay Loam Till		23	9	SS	2.6	23	S	20		
541.15			24								
540.15			25								
539.15			26	10	SS	2.7	24	S	20		
538.15	Boring Terminated		27								
537.15			28								
536.15			29								
535.15			30								
534.15			31								
533.15			32								
532.15			33								
531.15			34								
530.15			35								
529.15			36								
528.15			37								
527.15			38								
526.15			39								
525.15			40								
524.15			41								

Groundwater Data: Static water level after auger removal; Elevation 551.05

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 1 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
 Project Name: Morris New Water Treatment Plant
 Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-13
 Surface Elev. 566.20
 Auger Depth 26' Rotary Depth NA
 Start Date 01/27/26 Finish Date 01/27/26

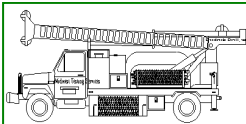
Location: See Boring Location Map
960042.6168 1730674.1494

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
							← Water	
1	SS	1.5	13	B	16			
2	SS	1.2	15	S	14			
3	SS	1.5	17	S	14			
4	SS	---	19	---	---			
5	SS	---	24	---	---			
6	SS	---	24	---	---			
7	SS	---	27	---	---			
8	SS	2.3	17	S	19			

(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
566.20			
565.20	± 10-inches Black Silty Clay Topsoil		1
564.20	Stiff Brown Silty Clay		2
563.20			3
562.20			4
561.20	Stiff Brown/Gray Very Silty Clay Till		5
560.20			6
559.20			7
558.20			8
557.20			9
556.20			10
555.20			11
554.20			12
553.20	Medium Dense Brown Medium to Fine Sand		13
552.20			14
551.20			15
550.20			16
549.20			17
548.20			18
547.20			19
546.20	Very Stiff Gray Silty Clay Loam Till		20

Groundwater Data: Static water level after auger removal; Elevation 557.20

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.

Peru, IL 61354

BORING LOGSheet 2 of 2

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
Project Name: Morris New Water Treatment Plant
Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-13
Surface Elev. 566.20
Auger Depth 26' Rotary Depth NA
Start Date 01/27/26 Finish Date 01/27/26

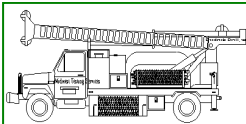
Location: See Boring Location Map
960042.6168 1730674.1494

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski Diedrich D-120	
							REMARKS	
9	SS	2.4	20	S	20			
10	SS	2.2	21	S	19			

(DEPTH) ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
545.20			
544.20			22
543.20	Very Stiff Gray Silty Clay Loam Till		23
542.20			24
541.20			25
540.20			26
539.20	Boring Terminated		27
538.20			28
537.20			29
536.20			30
535.20			31
534.20			32
533.20			33
532.20			34
531.20			35
530.20			36
529.20			37
528.20			38
527.20			39
526.20			40
525.20			41

Groundwater Data: Static water level after auger removal; Elevation 557.20

Comments:

**Midwest Testing Services, Inc.**

3705 Progress Blvd.
Peru, IL 61354

BORING LOG

Sheet 1 of 1

Phone: 815-223-6696

Fax: 815-223-6659

e-mail: mts37@comcast.net

Client: Chamlin & Associates, Inc.
Project Name: Morris New Water Treatment Plant
Project Site: North Route 47 @ SW Corner of Morris Airport
Morris, IL

Boring No. B-14
Surface Elev. 567.23
Auger Depth 21' Rotary Depth NA
Start Date 01/02/26 Finish Date 01/02/26

Location: See Boring Location Map
960047.6129 1730761.3888

SAMPLES							DRILLED BY	
Sample No.	Sample Type	Qu (TSF)*	N Value (Blows)	Bulge / Shear	Moisture (%)	Dry Density (PCF)	Randy Safranski CME-55	
							REMARKS	
							← Water	

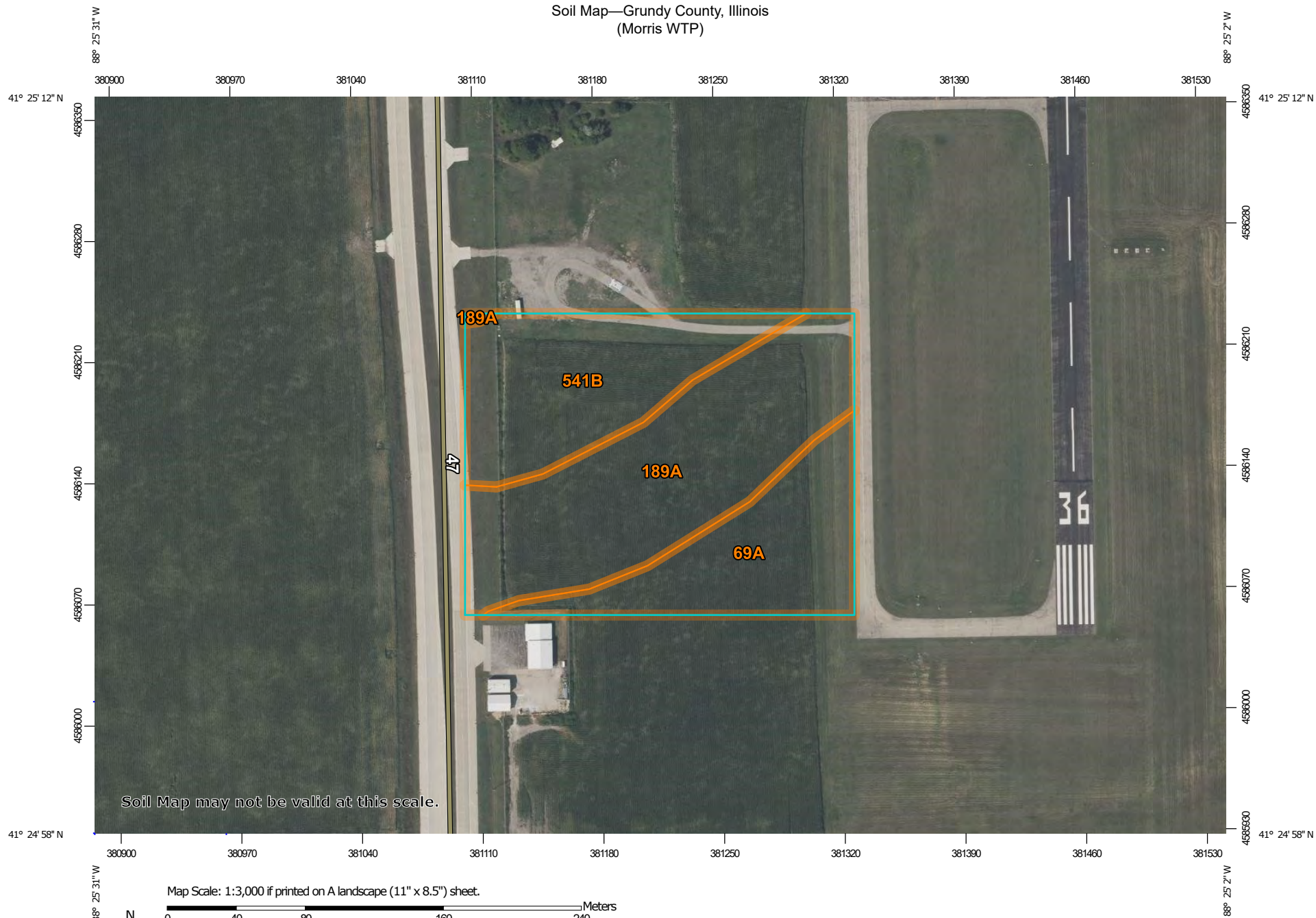
(DEPTH) *ELEV.	DESCRIPTION OF MATERIALS	Graphic Log	Depth in feet
567.23			
566.23	± 12-inches Black Silty Clay Topsoil		1
565.23	Stiff Brown Silty Clay		2
564.23			3
563.23			4
562.23	Stiff Brown Silty Clay Till		5
561.23			6
560.23	Medium Dense Brown Silt & Fine Sand		7
559.23			8
558.23			9
557.23	Stiff Brown Silty Clay Loam Till		10
556.23			11
555.23			12
554.23	Medium Dense Brown Fine Sand		13
553.23			14
552.23	Dense Gray Silt		15
551.23			16
550.23	Medium Dense Gray Silt		17
549.23			18
548.23			19
547.23	Medium Dense Gray Medium Sand		20

Groundwater Data: Static water level after auger removal; Elevation 555.23

Comments:

NRCS Soil Map

Soil Map—Grundy County, Illinois (Morris WTP)



Map Scale: 1:3,000 if printed on A landscape (11" x 8.5") sheet.

0 40 80 160 240 Meters

0 100 200 400 600 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

1/21/2026
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Grundy County, Illinois

Survey Area Data: Version 20, Aug 31, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 30, 2023—Sep 2, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
69A	Milford silty clay loam, 0 to 2 percent slopes	2.4	24.8%
189A	Martinton silt loam, 0 to 2 percent slopes	4.5	45.7%
541B	Graymont silt loam, 2 to 5 percent slopes	2.9	29.5%
Totals for Area of Interest		9.8	100.0%

SECTION 31 0513 - SOILS FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Subsoil materials.
 - 2. Topsoil materials.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Materials Source: Submit name of imported materials source.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements and Report of Soils Exploration.

PART 2 PRODUCTS

2.1 SUBSOIL MATERIALS

- A. Subsoil Type:
 - 1. Select or local borrow.
 - 2. Graded.
 - 3. Free of lumps larger than 2 inches, rocks larger than 2 inches, and debris.
 - 4. Inorganic silty clays conforming to ASTM D2487 Group Symbol CL.
 - 5. Granular soils conforming to ASTM D2487 Group Symbol SM.

2.2 TOPSOIL MATERIALS

- A. Topsoil Type: Conforming to Section 1081.06 of the Roadway Specifications.
 - 1. Select.
 - 2. Graded.
 - 3. Free of roots, rocks larger than ¼ inch, subsoil, debris, large weeds and foreign matter

2.3 SOURCE QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements: Testing and analysis of soil material.
- B. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698 and ASTM D1557.
- C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698 and ASTM D1557.
- D. When tests indicate materials do not meet specified requirements, change material and retest.
- E. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION

- A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.
- B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.
- C. Remove excess excavated materials, subsoil, and topsoil not intended for reuse, from site. Coordinate location with Owner.
- D. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from site.

3.2 STOCKPILING

- A. Stockpile materials on site at locations designated by Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Stockpile topsoil 8 feet high, maximum, and protect from erosion.
- E. Prevent intermixing of soil types or contamination.
- F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- G. Stockpile unsuitable or hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.3 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade Site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 0516 - AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Coarse aggregate materials.
 - 2. Fine aggregate materials.

PART 2 PRODUCTS

2.1 COARSE AGGREGATE MATERIALS

- A. Coarse Aggregate Type CA-6 or CA-7: Crushed stone conforming to Section 1004 of the Roadway Specifications.

2.2 FINE AGGREGATE MATERIALS

- A. Fine Aggregate Type FA-6: Sand conforming to Section 1003 of the Roadway Specifications.

2.3 SOURCE QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements: Testing and inspection services.
- B. Testing and analysis shall be performed in accordance with ASTM D1557, ASTM D4318, and ASTM C136.
- C. When tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.
- E. Aggregate material must be from an IDOT-approved source.

PART 3 EXECUTION

3.1 EXCAVATION

- A. Stockpile excavated material meeting requirements for coarse aggregate materials and fine aggregate materials.
- B. Remove excess excavated materials, coarse aggregate materials and fine aggregate materials not intended for reuse, from site.
- C. Remove excavated materials not meeting requirements for coarse aggregate materials and fine aggregate materials from site.

3.2 STOCKPILING

- A. Stockpile materials on site at locations designated by Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- E. Stockpile unsuitable materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.3 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 1000 - SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removing surface debris.

1.2 QUALITY ASSURANCE

- A. Conform to applicable code for environmental requirements, disposal of debris, and burning debris on site.
- B. Perform Work in accordance with municipal and State of Illinois standard.

PART 2 PRODUCTS

2.1 MATERIALS

- A. None in this Section.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Verification of existing conditions before starting work.

3.2 PREPARATION

- A. Call JULIE not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designed to remain, as final landscaping as specified in Section 01 5000 – Temporary Facilities and Controls.
- C. Protect bench marks, and survey control points, from damage or displacement.

3.4 CLEARING

- A. Clear areas required for access to site and execution of Work.

- B. Clear undergrowth and deadwood, without disturbing subsoil.

3.5 REMOVAL

- A. Continuously clean up and remove waste materials from site. Do not allow materials to accumulate on site.
- B. Do not burn or bury materials on site. Leave site in clean condition.

END OF SECTION

SECTION 31 2213 - ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating topsoil.
 - 2. Excavating subsoil.
 - 3. Cutting, grading, filling, rough contouring, compacting, site for Site structures, building pads, pavement and sidewalks.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in air-tight containers, an adequate quantity of the fill material to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- E. Source for the cohesive structural fill along with material sample.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C136, ASTM D2419, and ASTM D2434.
- B. Perform Work in accordance with the Roadway Specifications.

PART 2 PRODUCTS – N/A

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

- A. Call JULIE not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.

- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded marked areas.
- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Remove excess subsoil not intended for reuse, from site.
- E. Stockpile subsoil in area designated on site and protect from erosion.
- F. Stockpile excavated material in area designed on site in accordance with Section 31 0513 – Soils for Earthwork.
- G. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key placed fill material to slope to provide firm bearing.
- H. Stability: Replace damaged or displaced subsoil as specified for fill.

3.4 TOPSOIL

- A. Excavate and stockpile topsoil for re-use on site.

3.5 FILLING

- A. Prior to any filling activity, the existing ground shall be scarified.
- B. Fill areas to contours and elevations with unfrozen materials.
- C. Place fill material in continuous layers and compact in accordance with schedule at end of this section. Fill layers not to exceed 12 inches in thickness.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.

- F. Make grade changes gradual. Blend slope into level areas.
- G. Install Work in accordance with the Roadway Specifications.

3.6 TOLERANCES

- A. Section 01 4000 – Quality Requirements: Tolerances
- B. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

3.7 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D698.
- C. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. One compaction test shall be performed for every two feet of fill with a minimum of one test if the fill is less than 2 feet.

3.8 SCHEDULES

- A. Cohesive Structural Fill:
 - 1. Fill Location: To be used beneath all building foundations and building slabs from existing ground level to bottom of aggregate base. Material shall also be used within 45° bearing splay of all foundations from existing ground level to bottom of appropriate base of footing or foundation.
 - 2. Fill Type: Conforming to ASTM D2487 Group Symbol CL containing less than 40% silt or granular materials.
 - 3. Compact uniformly to minimum 98 percent of maximum density as determined by the Standard Proctor test ASTM D698.
- B. Subsoil Fill:
 - 1. Fill Type: As specified in Section 31 0513 – Soils for Earthwork.
 - 2. Compact uniformly to minimum 95 percent of maximum density as determined by the Modified Proctor test ASTM D1557.
- C. Topsoil Fill:
 - 1. Fill Type: As specified in Section 31 0513 – Soils for Earthwork.
 - 2. Compact uniformly to minimum 90 percent of maximum density as determined by the Modified Proctor test ASTM D1557.

END OF SECTION

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SECTION 31 2316 - EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating for Site structures.
 - 2. Excavating for landscaping.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals:
- B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- C. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

1.3 QUALITY ASSURANCE

- A. Prepare excavation protection plan under direct supervision of professional engineer experienced in design of this Work and licensed in State of Illinois.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PREPARATION

- A. Call JULIE not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, rock outcroppings, and other features remaining as portion of final landscaping.

- F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.2 EXCAVATION

- A. Excavate subsoil to accommodate building foundations, slabs-on-grade, paving and Site structures, construction operations, and landscaping.
- B. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction according to Section 31 2323 - Fill and Section 31 2317 - Trenching.
- C. Slope banks with machine to angle of repose or less until shored.
- D. Do not interfere with 45-degree bearing splay of foundations.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- F. Trim excavation. Remove loose matter.
- G. Remove lumped subsoil, boulders, and rock. Remove larger material as specified in Section 31 2323 - Fill.
- H. Notify Engineer of unexpected subsurface conditions.
- I. Correct areas over excavated or where unsuitable material is removed with CA-7 material. No fines.
- J. Remove excess and unsuitable material from Site.
- K. Repair or replace items indicated to remain damaged by excavation.

3.3 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Request inspection of excavation and controlled fill operations according to applicable code.
- C. Request visual inspection of bearing surfaces by Engineer and inspection agency before installing subsequent Work.

3.4 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

SECTION 31 2317 - TRENCHING

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating trenches for site piping and utilities from 5 feet outside building to utility service.
 - 2. Compacted fill from top of utility bedding to subgrade elevations.
 - 3. Backfilling and compaction.

1.2 DEFINITIONS

- 1. Utility: Any buried pipe, duct, conduit, or cable.

1.3 Submittals

- A. None required.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the Roadway Specifications and the Water & Sewer Specifications.
- B. Maintain one copy of each document on site.

1.5 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.6 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Initial Backfill and Trench Backfill: CA-7 coarse aggregate as described in Section 31 0516 – Aggregates for Earthwork. Aggregate for trench backfill shall be crushed, washed, angular, limestone with 6% max deleterious material. “PEA GRAVEL” AND “BUCKSHOT” ARE NOT ACCEPTABLE.
- B. Bedding and Haunching: FA-6 fine aggregate as described in Section 31 03516 – Aggregates for Earthwork. Aggregate for bedding and haunching shall be natural bank sand or sand produced via crushing and screening of oversized particles.

- C. Granular Structural Fill: CA-7 coarse aggregate as described in Section 31 0516 – Aggregates for Earthwork. Aggregate for structural fill shall be crushed limestone with 6% max deleterious material. “Breaker rock” is an acceptable alternative.
- D. Granular Fill: CA-6 coarse aggregate as described in Section 31 0516 – Aggregates for Earthwork. Aggregate for granular fill shall be crushed limestone with 6% max deleterious material.
- E. Subsoil Fill: Excavated material as described in Section 31 0513 – Soils for Earthwork.
- F. Concrete: Class SI concrete as described in Section 03 3000 – Cast-in-Place Concrete.

PART 3 EXECUTION

3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
 - 1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

- A. Call JULIE not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- D. Protect bench marks, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Maintain and protect above and below grade utilities indicated to remain.

3.3 TRENCHING

- A. Excavate subsoil required for site piping and utilities to utility service.
- B. Remove lumped subsoil, boulders, and rock.
- C. Perform excavation within 24 inches of existing utility service in accordance with utility’s requirements.
- D. Do not advance open trench more than 200 feet ahead of installed pipe.

- E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
- F. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.
- G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and utilities.
- H. Do not interfere with 45 degree bearing splay of foundations
- I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.
- K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with CA-7 material and compact to density equal to or greater than requirements for subsequent backfill material.
- L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- M. Correct areas over excavated with compacted backfill as specified for authorized excavation.
- N. Stockpile subsoil in area designated on site and protect from erosion.

3.4 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 4 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
- C. Design sheeting and shoring to be removed at completion of excavation work.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 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. Place material in continuous layers as follows:
 - 1. Bedding, Haunching and Initial Backfill: Maximum 8 inches compacted length.
 - 2. Over Excavation: Maximum 8 inches compacted length.
 - 3. Trench Backfill: Maximum 8 inches compacted depth.
- D. Employ placement method that does not disturb or damage foundation perimeter drainage or utilities in trench.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Do not leave more than 50 feet of trench open at end of working day.
- G. Protect open trench to prevent danger to Owner or the public.

3.6 TOLERANCES

- A. Section 01 4000 – Quality Requirements: Tolerances.
- B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.7 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements: Field testing, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D1557 (Modified Proctor).
- C. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D2922.
 - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

3.8 PROTECTION OF FINISHED WORK

- A. Section 01 7000 – Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subject to vehicular traffic during construction.

3.9 SCHEDULE

- A. Storm, Sanitary and Water Main Piping:
 - 1. Cover pipe and bedding with Fill Type: FA-6, CA-6 or CA-7.
 - 2. Compact uniformly to minimum 95 percent of maximum density in accordance with ASTM D1557 (Modified Proctor).
- B. Duct Bank:
 - 1. Cover duct and bedding with Fill Type FA-6.

2. Compact uniformly to minimum 95 percent of maximum density in accordance with ASTM D1557 (Modified Proctor).

END OF SECTION

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SECTION 31 2318 - AGRICULTURE IMPACT MITIGATION

WATER AND SEWER LINE CONSTRUCTION STANDARDS AND POLICIES

Established by
the
ILLINOIS DEPARTMENT OF
AGRICULTURE

The following standards and policies will serve to minimize the negative agricultural impacts that may result due to water and sewer line construction.

The standards and policies apply to construction activities occurring partially or wholly on privately owned agricultural land. They do not apply to construction activities occurring on highway or railroad right-of-way, or on publicly owned land. The only exceptions are the construction standards relating to the repair of drainage tile (Item No. 3). The tile line construction standards shall be implemented regardless of where drainage tile is encountered.

Conditions

The mitigative actions specified in the construction standards and policies will be implemented in accordance with the conditions listed below.

- A. All mitigative actions are subject to change by Landowners, provided such changes are acceptable to the Project sponsor.
- B. The Company may negotiate with Landowners to carry out the mitigation actions that Landowners wish to perform themselves. The Landowners will receive the area commercial rate for their labor and machinery costs.
- C. All mitigative actions, unless others specified, will be implemented within 45 days of completion of water or sewer line facilities on any affected property, weather and Landowners permitting. Temporary repairs will be made by the **Company** during the construction process as needed to minimize the risk of additional property damage that may result from an extended construction time period.
- D. All mitigative actions will extend to associated future construction, maintenance, and repairs.
- E. The Company will provide a copy of the IDOA's **Water and Sewer Line Construction Standards and Policies** to all owners of agricultural land that will be impacted by water and/or sewer line construction and will do at the time of easement contract negotiations.

Definitions

- Agricultural land - Land used for cropland, pastureland, managed woodlands, truck gardens, orchards, nurseries, and other related agricultural enterprises dependent upon soil integrity.
- Company - The entity proposing the construction of water or sewer lines and their related appurtenances.
- Cropland - Land used for growing row crops, small grains or hay; includes land which was formerly used as cropland but is currently in a government set-aside or conservation reserve program.
- Drainage Tile - Artificial subsurface drainage system including, but not limited to, clay and concrete tile, vitrified sewer tile, corrugated plastic tubing, and stone drains.
- Landowner - Person(s) responsible for making decisions regarding the restoration of the land adversely impact by a water or sewer line.
- Parent Material - Is the underlying geological material (generally bedrock or a superficial or drift deposit) in which soil horizons form. Soils typically inherit a great deal of structure and minerals from their parent material, and, as such, are often classified based upon their contents of consolidated or unconsolidated mineral material that has undergone some degree of physical or chemical weathering and the mode by which the materials were most recently transported.
- Prime farmland - Agricultural land comprised of soils defined by the USDA Natural Resources Conservation Service as being "Prime" soils (generally considered the most productive soils with the least input of nutrients and management).
- Right-of-Way (ROW) - Includes the permanent and temporary easements that the Company acquires for the purpose of construction water or sewer lines across privately owned land.
- Water or Sewer Line - Includes water transmission and distribution lines, sewer trunk lines, sewer gravity flow lines, interceptors or force mains and any related appurtenances.

WATER AND SEWER LINE CONSTRUCTION STANDARDS AND POLICIES

1. Water and Sewer Line Depth

- A. All water and sewer lines which are placed in trenches 24 inches in width or less will be buried a minimum of 42 inches (60 inches is suggested by the IL Dept of Agriculture) of top cover where they cross cropland.
- B. All water and sewer lines that are placed in trenches greater than 24 inches in width will be buried with 60 inches of topcover when they cross cropland.
- C. In terrain where bedrock prevents the placement of any water or sewer lines at the depths specified in 1.A. or 1.B above, the water or sewer lines will be buried as deep as is practicable and feasible.

2. Topsoil Replacement

The following standards apply only when water and sewer lines are buried in trenches that are greater than 24 inches.

- A. The topsoil depth shall be determined by a properly qualified soil scientist or soil technician who will set stakes or flags every 200 feet along the right-of-way identifying the depth of topsoil to be removed.
- B. The actual depth of the topsoil, not to exceed 36 inches, will first be stripped from the area to be excavated above the pipeline and from the adjacent subsoil storage area. The topsoil will be stored in a windrow parallel to the pipeline trench in such a manner that it will not become intermixed with subsoil materials.
- C. All subsoil material that is removed from the trench will be placed in a second windrow that is separate from the topsoil windrow.
- D. In backfilling the trench and other excavated areas, the stockpiled subsoil material will be placed back into the trench first. The topsoil will be replaced last so that it remains the top layer of soil. Parent material is not rooting material and should never be spread over the ROW. Any parent material encountered with excavation should be hauled off the right-of-way and disposed of as agreed by the Company and the Landowner.
- E. The topsoil and subsoil must be replaced within the trench and other excavated areas so that after settling occurs, the topsoil original depth and contour (with an allowance for settling) will be restored. The same should apply where excavations are made for roads, streams, drainage ditches, or other crossings. In no instance will the topsoil materials be used for any other purpose.
- F. The subsoil displaced by the water or sewer line should be hauled off the Landowner's premises

or disposed of on the Landowner's premises at a location that is acceptable to the Landowner.

3. Repair of Damaged Tile Lines

If underground drainage tile is damaged by water or sewer line construction, it shall be repaired in a manner that assures the tile line's proper operation at the point of repair. The following standards and policies shall apply to the tile line repairs.

- A. The Company will endeavor to locate all tile lines within the right of way prior to water or sewer line construction so repairs can be made if necessary. The Company will contact affected Landowners/Tenants for their knowledge of the tile line location prior to any water or sewer line installation. All identified tile lines will be staked or flagged prior to construction to alert construction crews to the possible need for tile line repairs.
- B. All tile lines that are damaged, cut, or removed shall be staked or flagged with the stakes or flags placed in such a manner they will remain visible until the permanent repairs are completed.
- C. If water is flowing through any damaged tile line, the tile line will be immediately and temporarily repaired until such time that permanent repairs can be made. If the tile lines are dry and water is not flowing, temporary repairs are not required if the permanent repairs can be made within 14 days of the time damage occurred; however, the exposed tile lines will be screened or otherwise protected to prevent the entry of foreign materials, small mammals, etc. into the tile lines.
- D. Where tile lines are severed by the pipeline trench, repairs shall be made using the IDOA Tile Line Repair Drawings, Temporary and Permanent, Figures 1 and 2.
- E. There will be a minimum of one foot of separation between the tile line and the pipeline whether the pipeline passes over or under the tile line.
- F. The original tile line alignment and gradient shall be maintained. A laser transit shall be used to ensure the proper gradient is maintained. A laser operated tiling machine shall be used to install or replace tiling segments of 100 linear feet or more.
- G. Before completing permanent tile repairs, all tile lines will be probed or examined by other suitable means on both sides of the trench for their entire length within any work areas to check for tile that might have been damaged by vehicular traffic or construction equipment. If tile lines are found to be damaged, they must be repaired so they operate as well after construction as before the construction began.
- H. All permanent tile line repairs must be made within 14 days of the time damage occurred on the Landowner's property, weather and soil conditions permitting.
- I. Following completion of the pipeline, the Company will be responsible for correcting all tile line repairs that fail due to pipeline construction, provided those repairs were made by the Company. The Company will not be responsible for tile line repairs that

the Company pays the Landowner to perform.

4. Installation of Additional Tile Lines

- A. The Company shall be responsible for installing such additional drainage tile and other drainage measures as are necessary to properly drain wet areas on the permanent and temporary easements caused by the construction and/or existence of the pipeline.
- B. Where the pipeline's route parallels an existing pipeline within a 200-foot perpendicular offset, the Company shall be responsible for installing tile and/or other drainage measures, as necessary, to properly drain the area between the two pipelines to the extent the wet areas between the pipelines are caused by the construction and/or existence of the pipeline.
- C. It is presumed that any wet areas located in permanent and temporary easements and/or between the two parallel pipelines are caused by the construction and/or existence of the new pipeline unless the Company can prove that the construction and/or existence of the new pipeline is not the cause of the wet areas.

5. Rock Removal

The following rock removal procedures only pertain to rocks found in the uppermost 42 inches of soil, the common freeze zone in Illinois.

- A. Before replacing any topsoil, all rocks greater than 3 inches in any dimension will be removed from the surface of all exposed subsoil and from all subsoil that is replaced back in the trench.
- B. As the topsoil is replaced, all rocks greater than 3 inches in any dimension will be removed from the topsoil.
- C. If trenching, blasting, or boring operations are required through rocky terrain, suitable precautions will be taken to minimize the potential for oversized rocks to become interspersed with adjacent soil material.
- D. Rocks and soil containing rocks removed from the subsoil areas, topsoil, or from any excavations, will be hauled off the Landowner's premises or disposed of on the Landowner's premises at a location that is mutually acceptable to the Landowner and the Company.

6. Removal of Construction Debris

All construction-related debris and material that are not an integral part of the water or sewer line will be removed from the Landowner's property. Such material to be removed would include litter generated by the construction crews. Litter shall be removed daily.

7. Compaction, Rutting, Fertilization, Liming

- A. After the topsoil has been replaced, all areas that were traversed by vehicles and construction equipment will be ripped at least 16 inches deep and all pasture and woodland will be ripped

at least 12 inches deep. The existence of tile lines or underground utilities may necessitate less depth. The entire right-of-way will then be disked. Decompaction shall be conducted according to the guideline provided in Appendices A and B.

- B. One disking pass will be made across any agricultural land that is ripped.
- C. All ripping will be done at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmland adjacent to the areas to be ripped.
- D. The Company will restore all rutted land to its original condition.

8. Land Leveling

- A. Following the completion of a water or sewer line, the Company will restore any right-of-way to its original pre-construction elevation and contour should uneven settling occur, or surface drainage problems develop as a result of a water or sewer line's construction.
- B. The Company will provide the Landowners with a telephone number and address that may be used to alert the Company of the need to perform additional land leveling services.
- C. If, in the future, uneven settling occurs or surface drainage problems develop as a result of the sewer or water line construction, the Company will provide such land leveling services within 45 days of a Landowner's written notice, weather and soil conditions permitting.
- D. If there is any dispute between the Landowner and the Company as to what areas need additional land leveling beyond that which was done at the time of construction, it shall be the Company's responsibility to disprove the Landowner's claim that additional land leveling is warranted.

9. Construction During Wet Weather

Except as provided below, construction activities are not allowed on farmland where normal farming operations, such as plowing, disking, planting, or harvesting, cannot take place due to wet soils. Wet weather conditions are to be determined on a field-by-field basis and not for a whole project.

- A. Construction activities on prepared surfaces, surfaces where topsoil and subsoil have been removed, heavily compacted in preparation, or otherwise stabilized (e.g., through cement mixing) may occur at the discretion of the Company in wet weather conditions.
- B. Construction activities on unprepared surfaces will be done only when work will not result in rutting creating a mixing of subsoil and topsoil. Determination as to the potential of subsoil and topsoil mixing will be in consultation with the underlying Landowner, or, if approved by the Landowner, his/her designated Tenant

10. Backfill Profile and Trench Crowning

- A. In all agricultural land areas, trench crowning shall occur during the trench backfilling operation using subsoil materials over the trench to allow for trench settling, to be followed by topsoil

replacement. Due to the increased elevation of the crown compared to the rest of the right-of-way, surface drainage across the trench may be hindered until the crown has settled completely.

- B. Surface drainage should not be permanently blocked or hindered in any way. If excess soil is encountered, it will be removed offsite to prevent ridging, unless the Landowner and the Company agree otherwise. Adding additional soil to the crown over the trench in excess of that required for settlement will not be permitted. In areas where minor trench settling occurs after topsoil spreading, land leveling or imported topsoil shall be used to fill each depression. In areas where major trench settling occurs after topsoil spreading, and land leveling cannot be utilized; imported topsoil shall be used to fill each depression of significant depth. Topsoil from the adjacent agricultural land outside of the construction footprint shall not be used to fill the depressions, unless approved by the Landowner.
- C. In agricultural areas where the materials excavated during trenching are insufficient in quantity to meet backfill requirements, the soil from any agricultural land adjacent to the trench and construction zone shall not be used as either backfill or surface cover material. Under no circumstances shall any topsoil materials be used for pipe padding material or trench backfill. In situations where imported soil materials are employed for backfill on agricultural lands, such materials shall be of similar texture and quality to the existing soils on site. Imported soils should be free from noxious weeds and other pests to the extent possible.

11. Prevention of Soil Erosion

- A. The Company will work with Landowners to prevent excessive erosion on land disturbed by construction. Reasonable methods will be implemented to control erosion. This is not a requirement; however, if the land across which a water or sewer line is constructed is bare cropland that the landowner intended to leave bare until the next crop is planted.
- B. If the Landowner and Company cannot agree upon reasonable methods to control erosion on the Landowner's right-of-way, the Company will follow the recommendation of the appropriate county Soil and Water Conservation District if the Landowner so requests.

12. Repair of Damaged Soil Conservation Practices

All soil conservation practices (such as terraces, grassed waterways, filter strips, concrete structure, dams, etc.) that are damaged by water or sewer line construction will be restored to reflect at least a substantially similar condition to its preconstruction condition in consultation with the local SWCD and in accordance with the USDA Natural Conservation Service Standards.

- A. If the Landowner and Company cannot agree upon a reasonable method to repair conservation practices, on the Landowner's right-of-way, the recommendations of the appropriate county Soil and Water Conservation District (SWCD) shall be considered by a Company and the Landowner.
- B. The work set forth in this section will be done within 45 days, weather and Landowner permitting, after the pipeline has been constructed.

13. Damages to Private Property

- A. The Company will reasonably compensate Landowners for any construction-related damages caused by the Company that occur on or off the established sewer or water line right-of-way.
- B. Compensation for damages to private property caused by the Company shall extend beyond the initial construction of the sewer and water line, to include those damages caused by the Company during future construction, operation, maintenance, and repairs relating to the sewer and water line.
- C. The Company will reimburse the Landowner, on a timely basis, for all agricultural production inputs (fertilizers of all types and kinds) needed to restore crop productivity to the right of way, the temporary workspace, or any other portion of Landowner's property where crop yields are diminished by reason of the construction, repair, maintenance, and inspection activities of the Company. This shall be a continuing obligation of the Company for as long as and to the extent that the Landowner can reasonably demonstrate diminished yields resulting from the above activities of the Company. Also, the Company shall make available to Landowner the name and contact information of a person acting on behalf of Company with whom the Landowner can communicate information with regard to diminished crop yields and need for reimbursement of cost of agricultural inputs. That person will have a background related to soil productivity and crop production.

14. Clearing of Trees and Brush from the Easement

- A. If the trees to be removed are from the right-of-way the Company will consult with the Landowner to see if there are trees of commercial or other value to the Landowner.
- B. If there are trees of commercial or other value to the Landowner, the Company will allow the Landowner the right to retain ownership of the trees with the disposition of the trees to be negotiated prior to the commencement of land clearing.
- C. Unless otherwise restricted by federal, state, or local regulations, the Company will follow the Landowner's regarding the removal and disposal of trees, brush and stumps of no value to the Landowner by burning, burial, etc., or complete removal from any affected property.

15. Interference with Irrigation Systems

- A. If a water or sewer line intersects an operational (or soon to be operational) spray irrigation system, the Company will establish with the Landowner an acceptable amount of time the irrigation system may be out of service.
- B. If, as result of sewer or water line construction activities, an irrigation system interruption results in crop damages, either on the water or sewer right-of-way or off the right-of-way, the Landowner will be compensated for all such crop damages.
- C. If it is feasible and mutually acceptable to the Company and the Landowner, temporary measures may be implemented to allow an irrigation system to continue to operate across land on which a water or sewer line is being constructed.

16. Ingress and Egress Routes

Prior to any water or sewer line construction, the Company and the Landowner will reach a mutually acceptable agreement on the route that will be utilized for entering and leaving the water or sewer line right-of-way should access to the right-of-way not be practical or feasible from adjacent segment of the water or sewer line right-of-way or from public highway or railroad right-of-way.

17. Temporary Roads

- A. The location of temporary roads to be used for construction purposes will be negotiated with the Landowner.
- B. The temporary roads will be designed to not impede surface drainage will be built to minimize soil erosion on new temporary roads.
- C. Upon abandonment, temporary roads may be left intact through mutual agreement of the Landowner and the Company unless otherwise restricted by federal, state, or local regulations.
- D. If the temporary roads are to be removed, the right-of-way upon which the temporary roads are constructed will be returned to their previous use(s) and restored to equivalent condition(s) as existed prior to their construction. All temporary access roads that are removed shall be ripped to a depth of 16 inches. All ripping will be done consistent with Items 7.A. through 7.F.

18. Weed Control

- A. On any right-of-way over which the Company has jurisdiction as the surface use (i.e., wellheads, pump or lift stations, valve sites, etc.), the Company will provide weed control in a manner that prevents the spread of weeds onto adjacent lands used for agriculture purposes. Spraying will be done by a pesticide applicator who is appropriately licensed for doing such work in the State of Illinois.
- B. The Company will be responsible for reimbursing all reasonable costs incurred by owners of land adjacent to surface facilities when the Landowners must control weeds on their land, which can be determined to have spread from land accommodating water or sewer line surface facilities, should the Company fail to do so after being given written notice and a 45-day opportunity to respond.

19. Pumping of Water from Open Trenches

- A. In the event it becomes necessary to pump water from open trenches, Company will pump the water in a manner which will avoid damaging adjacent agricultural land, crops and/or pasture. Such damages include, but are not limited to, inundation of crops for more than 24 hours, deposition of sediment in ditches the deposition of sediment in ditches and other water courses, and the deposition of subsoil sediment and gravel in fields and pastures.
- B. If it is impossible to avoid water-related damages as described in 19.A. above, the Company will

reasonably compensate the Landowners for the damages or will correct the damages to restore the land, water courses, etc.; to their pre-existing conditions.

- C. All pumping of water shall comply with existing drainage laws, local ordinances relating to such activities and provisions of the Federal Clean Water Act.

20. Aboveground Facilities

Locations for aboveground facilities shall be selected in a manner which will be as unobtrusive as reasonably possible to ongoing agricultural activities occurring on the lands adjacent to the facilities. First priority shall be made to locating aboveground facilities on right-of-way that is not used as cropland. If this is not feasible, such facilities shall be located so as to incur the least hindrance to the adjacent cropping operations (i.e., located in field corners or areas where at least one side is not used for cropping purposes).

21. Advance Notice of Access to Private Property

- A. The Company will provide the Landowner or tenant with a minimum of 24 hours prior notice before accessing his/her property for the purpose of constructing a water or sewer line.
- B. Prior notice shall first consist of a personal contact or a telephone contact, whereby the Landowner or tenant is informed of the Company's intent to access the land. If the Landowner or tenant cannot be reached in person or by telephone, the Project Sponsor will mail, or hand deliver to the Landowner or tenant's home a dated written notice of the Project Sponsor's intent. The Landowner or tenant need not acknowledge receipt of the written notice before the Project Sponsor can enter the Landowner's property.

22. Reporting of Inferior Agricultural Impact Mitigation Work

No later than 45 days prior to the commencement of the pipeline construction across a Landowner's property, the Company will provide the Landowner with a toll-free number the Landowner can call to alert the Company should the Landowners observe inferior agricultural impact mitigation work which is being done or has been carried out on his/her property.

23. Indemnification

The Company will indemnify all owners and farm tenants of agricultural land upon which such sewer line or water line is installed, their heirs, successors, legal representatives, assigns (collectively "Indemnitees"), from and against all claims by third parties losses incurred thereby, and reasonable expenses, resulting from or arising out of personal injury, death, injury to property, or other damages or liabilities of any sort related to the design, laying, maintenance, removal, repair, use or existence of such pipeline, whether heretofore or hereafter laid, including damages caused by such pipeline or any of its appurtenances and the leaking of its contents, except where claims, injuries, suits, damages, costs, losses, and expenses are caused by the negligence or intentional acts, or willful omissions of such Indemnitees provided further that such Indemnitees shall tender any such claim as soon as possible upon receipt of notice thereof to the Company.

Appendix A.

Guidelines for Conducting Proper and Successful Decompaction

1. Decompaction is required when all three conditions apply.
 - A. The area has been trafficked or traversed by vehicles or construction equipment, and
 - B. The soil penetrometer readings are 300 psi or greater, and
 - C. The soil strength (psi) in the right-of-way area is greater than that of the non-trafficked area.
2. An Environmental and/or Agricultural Inspector (AI), with experience and training in the proper identification of compacted soil and operation methods of deep decompaction tools is required to observe the daily operation of the ripper/subsoiler to ensure the conditions are appropriate for decompaction efforts and that the proper equipment is utilized, and that equipment is set-up and operated correctly.
3. To achieve the most effective shatter of the compacted soil the following guidelines have been established:
 - A. Conduct ripping when the soil is dry. Follow the “Soil Plasticity Test Procedures” detailed in Appendix B to determine if soil conditions are adequately dry to conduct decompaction efforts.
 - B. Deep ripping shall be conducted using a ripper or subsoiling tool with a shank length of no less than 18 inches and a shank spacing of approximately the same measurement as the shank length.
 - C. Use a ripper with a knife length of no less than 2 inches more than the desired depth of decompaction.
 - D. To best promote revegetation and restore crop production, a total depth of 30 or more inches of soil (topsoil plus subsoil) is required.
 - E. The minimum depths of decompaction stated above in 3.D. are required where possible. A safe distance from sub-surface structures (tile drains, pipelines, buried utilities, bedrock, etc.) must be maintained at all times. Where such structures exist, a lesser depth of decompaction will be required to prevent damage to equipment and the structures as well as to maintain a safe work environment. The allowable decompaction depth in these instances will be determined on a site-by-site basis.
 - F. When the knives are in the soil to the desired depth, the tongue of the ripper should be parallel to the surface of the ground.
 - G. Select a tractor that has enough horsepower to pull the ripper at a speed of 1.5 to 2 mph and whose footprint is of equal or lesser width than the ripper. Tracked equipment is preferred and typically

required to achieve this criteria.

- H. The ripper shanks should not create ruts, channels, or mixing of the sub-soil with topsoil. A speed of 1.5 to 2 mph is recommended to minimize the risk of rutting and soil mixing. The ideal operating speed can vary with soil characteristics, tractor and ripping tool used. An excessive travel speed will often increase mixing of soil horizons.
- I. When the equipment is set up and operated correctly, the ripper should create a wave across the surface of the ground as it lifts and drops the soil.
- J. Make one ripping pass through the compacted area. Using a penetrometer, the AI will measure the PSI between the ripped knife tracks to determine if the single ripping pass was successful. Additional passes should only be used where needed as they may reduce the effectiveness of the ripping by recompacting the soil shattered in the previous pass.
- K. If the first pass does not successfully decompact the soil, additional passes will be needed. Should multiple passes of the ripper be needed to achieve decompaction between the knives tracks of the ripping tool, the subsequent passes should be positioned so the knife tracks from the previous pass are split by the second pass. If three or more passes have been made and sufficient decompaction has not yet been achieved the AI may choose to halt further decompaction efforts in that area until conditions improve or better methods are determined.
- L. Following ripping, all stone and rock three or more inches in size which has been lifted to the surface shall be collected and removed from agricultural areas.
- M. After ripping has been conducted, do not allow unnecessary traffic on the ripped area.
- N. In agricultural lands and croplands that will not be replanted to vegetation by the Company, recommend to landowners to plant a cover crop (cereal rye, clover, alfalfa, tillage radish, turnips, etc.) following decompaction. Reduced compaction created by the ripper pass will not remain over time without subsequent root penetration. Root penetration into the shattered soil is necessary to establish permanent stabilized channels to conduct air and water into the soil profile. Two good sources for landowner cover crop education are:
<http://www.mccc.msu.edu/CCinfo/cropbycrop.html> and <http://mcccdev.anr.msu.edu/>.
For local expertise, consult with your county's Soil and Water Conservation District /USDA Natural Resource Conservation Service (NRCS) office for cover crop selection and compliance with NRCS planting deadlines.

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Appendix B.

Soil Plasticity Test Procedures

The Agricultural Inspector will test the consistency of the surface soil to a depth of approximately 4 to 8 inches using the Field Plasticity Test procedure developed from the Annual Book of ASTM Standards, Plastic Limit of Soils (ASTM D-4318).

1. Pull a soil plug from the area to be tilled, moved, or trafficked to a depth of 4-8 inches.
2. Roll a portion of the sample between the palms of the hands to form a wire with a diameter of one-eighth inch.
3. The soil consistency is:
 - A. Tillable (able to be worked) if the soil wire breaks into segments not exceeding 3/8 of an inch in length.
 - B. Plastic (not tillable) if the segments are longer than 3/8 of an inch before breaking.
4. This Procedure is to be used to aid in determining when soil conditions are dry enough for construction activities to proceed.
5. Once the soil consistency has been determined to be of adequate dryness, the plasticity test is not required again until the next precipitation event.

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SECTION 31 2319 - DEWATERING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Dewatering system.
 - 2. Surface water control system.
 - 3. System operation and maintenance.
 - 4. Water disposal.

1.2 DEFINITIONS

- A. Dewatering includes the following:
 - 1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations and trenches.
 - 2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations and trenches.
 - 3. Disposing of removed water.
- B. Surface Water Control: Removal of surface water within open excavations.

1.3 SYSTEM DESCRIPTION

- A. Provide dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.
- B. Furnish standby equipment stored at Project site and ready for immediate use upon failure of dewatering equipment. This shall include standby diesel generator for backup power and pumps that are critical to the dewatering system.

1.4 PERFORMANCE REQUIREMENTS

- A. Design dewatering systems to:
 - 1. Lower water table within areas of excavation to minimum three (3) feet below bottom of excavation to permit Work to be completed on dry and stable subgrade.
 - 2. Relieve hydrostatic pressures in confined water bearing strata below excavation to eliminate risk of uplift or other instability of excavation.
 - 3. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.
 - 4. Prevent loss of fines, quick condition, or softening of foundation subgrade.
 - 5. Maintain stability of sides and bottoms of excavations and trenches.
- B. Design surface water control systems to:
 - 1. Collect and remove surface water and seepage entering excavation.

1.5 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate dewatering system layout, well depths, well screen lengths, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
 - 2. Indicate primary and standby power system location and capacity.
 - 3. Indicate layout and depth of monitoring wells, piezometers and flow measuring devices for system performance measurement.
 - 4. Include detailed description of dewatering system installation procedures and maintenance of equipment.
 - 5. Include description of emergency procedures to follow when problems arise.
- C. Product Data: Submit data for each of the following:
 - 1. Dewatering Pumps: Indicate sizes, capacities, priming method, motor characteristics.
 - 2. Pumping equipment for control of surface water within excavation.
- D. Design Data: Signed and sealed by professional engineer.
 - 1. Indicate design values, analyses, and calculations to support design.
 - 2. Include description and profile of geology, soil, and groundwater conditions.
- E. Field Reports: Test and monitoring reports as specified in Field Quality Control article.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

1.7 QUALITY ASSURANCE

- A. Comply with authorities having jurisdiction for the following:
 - 1. Drilling and abandoning of wells used for dewatering systems.
 - 2. Water discharge and disposal from pumping operations.

1.8 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this Section with minimum of 15 years documented experience and responsible for design, operation, and maintenance of dewatering system.
 - 1. Assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.

1.9 SEQUENCING

- A. Section 01 1000 – Summary: Requirements for sequencing.
- B. Sequence work to obtain required permits before start of dewatering operations.
- C. Sequence work to install and test monitoring systems minimum 7 days before testing and operating dewatering systems.
- D. Sequence work to install and test dewatering and surface water control systems minimum 7 days before starting excavation and trenching.

1.10 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Requirements for coordination.
- B. Coordinate work to permit the following construction operations to be completed on dry stable substrate.
 - 1. Excavation for structures specified in Section 31 2316 – Excavation.
 - 2. Trenching for utilities specified in Section 31 2317 – Trenching.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

- A. Select dewatering equipment to meet specified performance requirements.

2.2 ACCESSORIES

- A. Valves and Fittings: Furnish valves and fittings to isolate each well from header pipe and to prevent loss of pump prime.
- B. Filter Sand: ASTM C33; natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded to suit well screen.
- C. Grout: Mixture of Portland cement and bentonite clay or sand suitable for sealing abandoned wells and piping.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Verification of existing conditions before starting work.
- B. Conduct additional borings and investigations to supplement subsurface investigations identified in Section 31 0510 – Subsurface Investigation as required to complete dewatering system design.

- C. Call JULIE not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- D. Employ licensed land surveyor to provide following documentation:
 - 1. Survey existing adjacent buildings, structures, and improvements for position and elevation of principal elements before and after completion of dewatering operations.

3.2 PREPARATION

- A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

3.3 DEWATERING SYSTEM

- A. Install dewatering system in accordance with shop drawings.
- B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and existing public rights-of-way, sidewalks, and adjacent buildings, structures, and improvements.
- C. Drill wells in sizes and to depth indicated. Provide temporary surface casing when required to stabilize soil while advancing well.
- D. Contractor shall provide dewatering equipment as required to maintain a dry and stable bottom trench for the installation of all sanitary sewer, water main, process piping, foundation excavation, etc.
- E. Dewatering may require the use of well points or wells to lower the water table below the trench or foundation excavation or the use of a sump pump.
- F. Contractor shall furnish, operate and maintain all dewatering equipment including providing electrical service to operate the equipment.
- G. Test well for proper water flow through well screen and pumping rate for dewatering system.
- H. Cover and seal top of well until pump is installed.
- I. Install pumps in accordance with manufacturer's instructions.
- J. Connect pumps to discharge header. Install valves to permit pump isolation.

3.4 SURFACE WATER CONTROL SYSTEM

- A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area as specified in Section 31 2500 – Erosion and Sedimentation Controls.
- B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels in accordance with requirements of agencies having jurisdiction.

- C. Control and remove unanticipated water seepage into excavation.

3.5 SYSTEM OPERATION AND MAINTENANCE

- A. Operate dewatering system continuously until backfilling is complete.
- B. Provide supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.
- C. Conduct daily observation of dewatering system and monitoring system. Make required repairs and perform scheduled maintenance.
- D. Fill fuel tanks before tanks reach 25 percent capacity.
- E. Start emergency generators at least twice each week to check operating condition.
- F. When dewatering system cannot control water within excavation, notify Engineer and stop excavation work.
 - 1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
 - 2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.
- G. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.
- H. Correct unanticipated pressure conditions affecting dewatering system performance.
- I. Do not discontinue dewatering operations without Engineer's approval.

3.6 WATER DISPOSAL

- A. Discharge water into area drainage.
- B. Provide erosion control for the water discharge.

3.7 SYSTEM REMOVAL

- A. Remove dewatering and surface water control systems after dewatering operations are discontinued.
- B. Abandon dewatering wells in accordance with the Illinois Department of Public Health requirements.
- C. Repair damage caused by dewatering and surface water controls systems or resulting from failure of systems to protect property.

3.8 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. After dewatering system is installed, perform pumping test to determine when selected pumping rate lowers water level in well below pump intake. Adjust pump speed, discharge volume, or both to ensure proper operation of each pump.
 - 1. Ground water elevation.
- C. Monitor ground water discharge for sand content. Sample and test water from each well weekly for sand content. Maximum permitted sand content 5 parts per million.
- D. Survey existing adjacent buildings, structures, and improvements to detect movement in comparison to original elevations during dewatering operations.
 - 1. Notify Engineer immediately of measured movement.
- E. Submit initial installation reports including the following:
 - 1. Installation and development reports for well points and pumps.
 - 2. Test reports of monitoring well water analysis.
 - 3. Initial dewatering flow rates.
- F. Submit weekly monitoring reports including the following:
 - 1. Dewatering flow rates.
 - 2. Test reports of discharge water analysis.
 - 3. Maintenance records for dewatering and surface water control systems.

END OF SECTION

SECTION 31 2323 - FILL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Backfilling Site structures to subgrade elevations.
 - 2. Fill under paving.
 - 3. Fill for over-excavation.
 - 4. Flowable fill under building foundation.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in air-tight containers, an adequate quantity of the material sample for laboratory testing.
- C. Materials Source: Submit name of imported fill materials and suppliers.
- D. Gradation Report: Submit aggregate gradation report demonstrating aggregates meet IDOT requirements.
- E. Submit laboratory testing results for maximum dry density for aggregate ballast.
- F. Mix Design: Submit mix design for flowable fill (CLSM).

1.3 QUALITY ASSURANCE

- A. Perform Work according to the Roadway Specifications.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Subsoil Fill: As specified in Section 31 0513 – Soils for Earthwork.
- B. Granular Structural Fill: CA-6 and CA-7.
- C. Cohesive Structural Fill: As specified in Section 31 2213 – Rough Grading.
- D. Granular Fill: FA-6, CA-6 and CA-7 as specified in Section 31 0516 – Aggregate for Earthwork. Granular materials excavated from the site structures will be acceptable as long as it doesn't contain a significant amount of clay and silts.
- E. Flowable Fill (Controlled Low Strength Material – CLSM): As specified in Article 1019 of the Roadway Specifications.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Coordination and project conditions.
- B. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- D. Verify structural ability of unsupported walls to support loads imposed by fill.

3.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with granular fill and compact to density equal to or greater than requirements for subsequent fill material.
- C. Scarify subgrade surface to depth of 2 inches.
- D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Place fill material and compact in continuous layers as follows:
 - 1. Subsoil Fill: Maximum 9 inch loose lift depth for cohesive soils and 12 inch loose lift depth for granular soils and compacted.
 - 2. Structural Fill: Maximum 12 inch loose lift depth and compacted.
 - 3. Granular Fill: Maximum 12 inch loose lift depth and compacted.
 - 4. Where area to be filled is inaccessible to compaction equipment such as below the bottom pile-supported slab, use flowable fill (CLSM) and consolidate in a manner to fill all voids.
- D. Employ placement method that does not disturb or damage other Work.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. When approved by Engineer, backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- G. When approved by Engineer, backfill simultaneously on each side of unsupported foundation walls until supports are in place.

- H. Slope grade away from building minimum 2 percent slope for minimum distance of 10 feet, unless noted otherwise.
- I. Make gradual grade changes. Blend slope into level areas.
- J. Remove surplus backfill materials from Site.
- K. Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES

- A. Section 01 4000 – Quality Requirements: Tolerance.
- B. Top Surface of Backfilling within Building Areas: Plus or minus 1/4 inch from required elevations.
- C. Top Surface of Backfilling under Paved Areas: Plus or minus 1/4 inch from required elevations.
- D. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D698.
- C. Perform in place compaction tests according to following:
 - 1. Density Tests: ASTM D6938.
 - 2. Moisture Tests: ASTM D6938.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
- E. Frequency of Tests: As recommended in the Report of Soils Exploration and by a geotechnical consultant.
- F. Proof roll compacted fill surfaces under slabs-on-grade, paving.

3.6 PROTECTION OF FINISHED WORK

- A. Section 01 7000 – Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic.

3.7 SCHEDULE

- A. Interior Slab-On-Grade:

1. Fill Type: Cohesive structural fill, construct to the bottom of the aggregate base for slab-on-grade, 8 inch loose lifts, compacted to 100 percent of the Standard Proctor maximum density.
 2. Aggregate Base: IDOT Gradation CA-6 compacted to 100 percent Standard Proctor maximum density.
- B. Exterior Side of Foundation Walls:
1. Fill Type: CA-6, 10 inches below the finished grade elevation, 12 inch thickness per lift, compact uniformly to 98 percent of the Standard Proctor maximum density.
- C. Underground Tanks or Building Floor Slabs:
1. Subgrade Fill Type: IDOT Gradation CA-6, 12 inch thickness for lift, vibratory compaction to 98% of its Standard Proctor maximum density.
- D. Fill under Grass Areas:
1. Fill Type: Subsoil fill as required in Section 31 0513 – Soils for Earthwork, to 8 inches below finish grade, compact uniformly to 98 percent Standard Proctor maximum density.
- E. Fill under Aggregate Entrance and Sidewalks:
1. Compact subsoil to 98 percent of its Standard Proctor maximum dry density.
 2. Fill Type: Subsoil fill as required in Section 31 0513 – Soils for Earthwork, 13 to 15 inches below finished grade for aggregate driving areas and 10 inches below finished grade for sidewalks, compact uniformly to 98 percent of Standard Proctor maximum density.
- F. Fill to Correct Over-Excavation:
1. Fill Type: CA-6. Vibratory compaction.

END OF SECTION

SECTION 31 2500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Silt fence.
 - 2. Culvert inlet protection – silt fence.
 - 3. Dewatering.
 - 4. Dust control.
 - 5. Temporary concrete washout facility.
 - 6. Erosion control blanket.
 - 7. Site stabilization.
 - 8. Field quality control.
 - 9. Cleaning.
 - 10. Protection.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Execution and Closeout Requirements: Requirements for submittals.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with requirements of all related Sections.
- B. Perform Work in accordance with the Illinois Urban Manual.
- C. Maintain one copy of each document on site.

1.5 PRE-INSTALLATION MEETINGS

- A. Section 01 3000 – Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this Section.

1.6 ENVIRONMENTAL REQUIREMENTS.

- A. Section 01 6000 – Product Requirements: Environmental conditions affecting products on site.

PART 2 PRODUCTS

2.1 ROCK, GEOTEXTILES, AGGREGATE, AND OTHER REQUIRED MATERIALS

- A. Furnish materials in accordance with the Illinois Urban Manual.

2.2 PLANTING MATERIALS

- A. Seeding and Soil Supplements: Class 2 mix, as specified in the Roadway Specifications. Fertilize as specified in the Roadway Specifications.
- B. Heavy Duty Erosion Control Blanket: Knitted straw mat as specified in the Roadway Specifications.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted subgrade granular base, stabilized soil is acceptable and ready to support devices and imposed loads.
- C. Verify gradients and elevations are correct.

3.2 SILT FENCE

- A. In accordance with Standard Drawing IUM-620 and Code 920 of the Illinois Urban Manual.

3.3 CULVERT INLET PROTECTION – SILT FENCE

- A. In accordance with Standard Drawing IL-508SF and Code 808 of the Illinois Urban Manual.

3.4 DEWATERING

- A. In accordance with Code 813 of the Illinois Urban Manual.

3.5 DUST CONTROL

- A. In accordance with Code 825 of the Illinois Urban Manual.
- B. If water is used to control dust, the Contractor shall apply as needed or as directed by the Engineer or Owner.

3.6 TEMPORARY CONCRETE WASHOUT FACILITY

- A. In accordance with Code 954 and Standard Drawing IUM-654SB, IUM-654BW or IUM-654ET, Contractor's choice, of the Illinois Urban Manual.

3.7 EROSION CONTROL BLANKET

- A. In accordance with Standard Drawing IUM-530 and Code 830 of the Illinois Urban Manual.

3.8 SITE STABILIZATION

- A. Incorporate erosion control devices indicated on the Drawings or described herein into the Project at the earliest practicable time.
- B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.
- C. Stockpile and waste pile heights shall not exceed 35 feet. Slope stockpile sides at 2:1 or flatter.
- D. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.
 - 1. During non-germinating periods, apply mulch at recommended rates.
 - 2. Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Section 32 9219 – Seeding at 50 percent of permanent application rate with no topsoil.
 - 3. Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with Section 32 9219 – Seeding.
- E. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.9 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements and Section 01 7000 – Execution Requirements: Field inspecting, testing, adjusting and balancing.

3.10 CLEANING

- A. Section 01 7000 – Execution Requirements: Requirements for cleaning.
- B. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.
- C. Do not damage structure or device during cleaning operations.
- D. Do not permit sediment to erode into construction or site areas or natural waterways.
- E. Clean channels when depth of sediment reaches approximately one half channel depth.

3.11 PROTECTION

- A. Section 01 7000 – Execution Requirements: Requirements for protecting finished Work.

3.12 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

END OF SECTION

SECTION 32 3113 - CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fence framework, fabric, and accessories.
 - 2. Excavation for post bases.
 - 3. Concrete foundation for posts.
 - 4. Manual gates and related hardware.

1.2 SYSTEM DESCRIPTION

- A. Fence Height: 6 feet nominal with 3 strands of barbed wire on top.
- B. Line Post Spacing: At intervals not exceeding 10 feet.
- C. Fence Post and Rail Strength: Conform to ASTM F1043 Heavy Industrial Fence quality.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- C. Product Data: Submit data on fabric, posts, accessories, fittings, and hardware.
- D. Manufacturer's Installation Instructions: Submit installation requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Procedures for submittals.

1.5 QUALITY ASSURANCE

- A. Perform installation according to ASTM F567 and manufacturer's instructions.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this Section with a minimum of three years documented experience.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Section 01 6000 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.
- C. Identify each package with manufacturer's name.
- D. Store fence fabric and accessories in secure and dry place.

PART 2 PRODUCTS

2.1 DIMENSIONAL DATA

- A. General:
 - 1. Pipe sizes indicated are commercial pipe sizes.
 - 2. Tube sizes indicated are nominal outside dimensions.
 - 3. H-section sizes indicated are normal flange dimensions.
 - 4. Roll-formed section sizes indicated are the nominal outside dimensions.

2.2 GALVANIZING

- A. On steel framework and appurtenances, provide galvanized finish with not less than the following weight of zinc per square feet.
 - 1. Pipe: 2.0 oz. complying with ASTM A120.
 - 2. H-sections and square tubing: 2.0 oz., complying with ASTM A123.
 - 3. Hardware and accessories: Comply with Table I of ASTM A153.
 - 4. Fabric: 2.0 oz., complying with Class II of ASTM A121.

2.3 FABRIC

- A. New fabric shall be Number 9 gauge or 0.148" wires in 2" mesh, with top and bottom selvages twisted and barbed. Fabric shall be galvanized after weaving.
- B. Provide fabric in one-piece, in widths to match existing.

2.4 BARBED WIRE

- A. Provide three (3) strands of aluminum-coated, 12-1/2 gauge twisted wire with 14 gauge, 4 point round aluminum bars spaced 5" conforming to ASTM A-585.

2.5 POSTS, RAILS, AND ASSOCIATED ITEMS

- A. End, Corner, Slope, and Pull Posts: Provide all new material with the following minimum sizes and weights:

<u>Material and Dimensions</u>	<u>Lbs. per Lineal Feet</u>
Pipe, 2.875" outside dimension:	5.79
Tubing, 2-1/2" square:	5.70
Roll-formed section, 3-1/2" x 3-1/2":	5.14

- B. Line Posts: Provide all new material with minimum sizes and weights as follows (match existing):

<u>Material and Dimensions</u>	<u>Lbs. per Lineal Feet</u>
Pipe, 2.375" outside dimension:	3.65
H-section, 2.25" x 1.95" x 0.143":	0.10

- C. Gate Posts: Provide new gate posts for supporting gate leafs, of double gate installation, for nominal leaf widths as follows:

<u>Material and Dimensions</u>	<u>Lbs. per Lineal Feet</u>
Pipe, 4" outside dimension:	9.10
Tubing, 3" square:	9.10
H-section, 4":	14.00

1. Over 13-feet wide leafs and up to 18-feet wide: Use 6.625" outside diameter pipe weighing 14.0 lbs. per lineal foot.
2. Over 18-feet wide leafs: Use 8.625" outside diameter pipe weighing 24.70 lbs. per lineal foot.
3. Provide means for attaching top rail securely to each gate, corner, pull, slope, and end post.

- D. Post Brace Assemblies:

1. Provide slope and pull posts, with horizontal brace located at mid-height of fabric at end and gate posts, and at both sides of corner posts.
2. Use 1.660" outside diameter pipe weighing 1.80 lbs. per lineal foot for horizontal brace.
3. Use 3/8" diameter rod with turnbuckle for diagonal truss.

- E. Tension Wire: Provide Number 7 gauge galvanized, coiled spring wire at bottom of fabric.

- F. Top Rail: Shall be 1.6" O.D. pipe weighing 2.27 lbs/ft.

- G. Post Tops:

1. Provide steel, wrought iron or malleable iron designed as weathertight closure cap, which will accommodate barbed wire.
2. Provide one cap for each post.
3. Provide line post loop tops for top rail.

- H. Stretcher Bars:

1. Provide one-piece lengths equal to full height of fabric, with a minimum cross-section of 3/16" x 3/4".
2. Provide one stretcher bar for each gate and end post, and two for each corner, slope, and pull post, except where fabric is woven integrally into the post.

I. Stretcher bar bands:

1. Provide steel, wrought iron, or malleable iron spaced not over 15" on centers, to secure stretcher bars to end, corner, pull, slope, and gate posts.
2. Bands may be used also with special fittings for securing rails to end, corner, pull, slope, and gate posts.

2.6 GATES

A. Chain Link Swing Gates:

1. Gate frames shall be fabricated in accordance with ASTM F900 using galvanized steel tubular members of sufficient size, shape and weight. Provide welded connections forming rigid one-piece unit.
2. Chain link fence fabric mesh, gauge and color shall match fence. Install fabric with hook bolts and tension bars at all sides, no substitution. Attach to gate frame at not more than 15" on center.
3. Hardware materials: Hot dipped galvanized or malleable iron shapes to suit gate size.
4. Hinges: Structurally capable of supporting gate leaf and allow opening and closing without binding. Non-liftoff type hinge design shall permit gate to swing 180° inward.
5. Latch: Forked type capable of retaining gate in closed position and have provisions for padlock. Latch shall permit operation from either side of gate.
6. Keeper: Provide keeper for each gate leaf over 5 feet wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.
7. Double gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of latch, requiring one padlock for locking both gate leaves.
8. Barbed wire top: Incorporate provisions for barbed extensions by extending vertical members 13" to accommodate three strands of barbed wire.

B. Cantilever Slide Gates: In compliance with ASTM F1184 Type II

1. Class 1-External Roller Design: Horizontal top and bottom steel pipe "track" members to be 2.375 in. OD (60.3 mm). Vertical and internal members, 1.900 in. O.D. in compliance with ASTM F1083 schedule 40 galvanized steel pipe. Gate frame to be fabricated by welding, vertical and horizontal members installed no greater than 8 ft. (2440 mm) apart. Welded joints are to be protected by applying zinc-rich paint in accordance with ASTM Practice A780. Gates designed to open or close by applying an initial pull force no greater than 40 lbs. (18.14 kg). Match chain link fabric to that of the fence system. Positive locking pressed steel latch, galvanized after fabrication. Galvanized steel drop bars provided with double gates. Gateposts, 4.000 in. OD (101.6 mm) schedule 40 pipe per ASTM F1083. Provide safety protective guards for the top and bottom external rollers following ASTM F1184 guidelines.

C. Electrically operated horizontal slide gates must be manufactured and installed to comply with the safety requirements of ASTM F2200 and UL 325.

2.7 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Wire Ties:

1. For tying fabric to the line posts, use Number 9 gauge wire ties spaced 12" on centers.

2. For tying fabric to rails and braces, use Number 9 gauge wire ties spaced 24" on centers.
 3. For tying fabric to tension wire, use Number 11 gauge hog rings spaced 24" on centers.
 4. Manufacturer's standard wire ties will be acceptable if of equal strength and durability.
- B. Concrete: Comply with provisions of Section 03 3000 – Cast-in-Place Concrete for 2,500 psi concrete.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. General:
1. Install posts at a maximum spacing of 10 feet on centers.
 2. Install corner or slope posts where changes in direction or grade exceed a 30° deflection.
- B. Excavating:
1. Drill holes for post footings in firm, undisturbed or compacted soil strictly adhering to the dimensions and spacing shown.
 2. Post hole dimensions:
 - a. Provide 30" deep by 8" dia. foundations for line posts for five foot fabric height and less.
 - b. Provide 36" deep by 8" dia. foundations for line posts for fabric heights exceeding five feet.
 - c. Provide 36" deep by 12" diameter foundations for all other posts.
 3. Spread soil from excavations uniformly adjacent to the fence line, or on adjacent areas of the site if so directed.
 4. When solid rock is encountered near the surface, drill the rock at least 12" for line posts and at least 18" for end, pull, gate, and corner posts. Drill hole at least 1" greater dia. than the largest dimension of the post to be placed.
 5. If solid rock is below soil overburden, drill to full depth required, except penetration into rock need not exceed minimum depths specified above.
- C. Setting Posts:
1. Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.
 2. Center and align posts in holes.
 3. Place concrete around posts in a continuous pour, and vibrate or tamp for consolidation.
 4. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.
 5. At gate posts only, the top 12" of concrete footing shall be formed with a circular paper form. Provide a 1/2" chamfer on exposed edge. Top of footing shall be troweled smooth and sloped or domed to direct water away from posts.

6. Extend footings for gate posts to the underside of bottom hinge.
 7. Set keepers, stops, sleeves, and other accessories into concrete as required. All exposed concrete edges shall be chamfered.
 8. Keep exposed concrete surfaces moist for at least seven days after placement, or cure with membrane curing material or other curing method approved by the Engineer.
 9. Grout-in those posts which are set into sleeved holes, concrete constructions, or rock excavations using non-shrink Portland cement grout or other grouting material approved by the Engineer.
- D. Concrete Strength:
1. Allow concrete to attain at least 75 percent of its minimum 28-day strength before rails, tension wires, and/or fabric is installed.
 2. Do not, in any case, install such items in less than seven days after placement of concrete.
 3. Do not stretch and tension fabric and wire, and do not hang gates until concrete has attained its full design strength.
- E. Rails and Bracing:
1. Install fence with a top rail and bottom tension wire.
 2. Install tension wires parallel to the line of fabric by weaving through the fabric and tying to each post with not less than Number 6 gauge galvanized wire, or by securing the wire to the fabric.
- F. Installing Fabric:
1. Leave approximately 2" between finish grade and bottom selvage.
 2. Excavate high points in the ground to clear the bottom of the fence.
 3. Place and compact fill to within 1" of the bottom of the fabric in depressions.
 4. Pull fabric taut and tie to posts, rails, and tension wires.
 5. Install fabric on outward side facing side of fence, and anchor to framework so that the fabric remains in tension after pulling force is removed.
 6. Install stretcher bars by threading through or clamping to fabric on 4" centers, and secure to posts with metal bands spaced 15" on centers.
- G. Installing Gates:
1. Install gates plumb and level, and secure for full opening without interference.
 2. Install ground-set items in concrete for anchorage in accordance with the fence manufacturer's recommendations and as approved by the Engineer.
 3. Lubricate and adjust the hardware for smooth operation.
 4. Set keeper, stops, and sleeves into concrete.
- H. Miscellaneous:
1. Use U-shaped tie wires, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least two full turns.
 2. Bend ends of wire to minimize hazards to persons and clothing.
 3. Fasteners:
 - a. Install nuts for tension band and hardware bolts on side of fence opposite fabric side.
 - b. Peen the ends of bolts to prevent removal of nuts.
 4. Repair coatings damaged in the shop or field erection using hot-applied repair compound applied in accordance with its manufacturer's recommendations as approved by the Engineer.

Chamlin & Associates, Inc.
4152 Progress Boulevard Peru, IL 61354
(Phone) 815-223-3344 (Fax) 815-223-3348

END OF SECTION

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SECTION 33 0513 – MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Monolithic concrete manholes and structures with transition to cover frame, covers, anchorage, and accessories.
 - 2. Modular precast concrete manhole and structures with tongue-and-groove joints with transition to cover frame, covers, anchorage, and accessories.
 - 3. Bedding and cover materials.

1.2 DESIGN REQUIREMENTS

- A. Equivalent strength: Based on structural design of reinforced concrete as outlined in ACI 318.
- B. Design of Lifting Devices for Precast Components: In accordance with ASTM C913.
- C. Design of Joints for Precast Components: In accordance with ASTM C913; maximum leakage of 0.025 gallons per hour per foot of joint at 3 feet of head.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate manhole and structure locations, elevations, piping sizes and elevations of penetrations.
- C. Product Data: Submit cover and frame construction, features, configuration, and dimensions.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the requirements of this Section and Water and Sewer Specifications.
- B. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 – Product Requirements: Product storage and handling requirements.

- B. Comply with precast concrete manufacturer's instructions for unloading, storing, and moving precast manholes and structures.
- C. Store precast concrete manholes and structures to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.
- D. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 6000 – Product Requirements.
- B. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.
- C. Cold Weather Requirements: ACI 530.

PART 2 PRODUCTS

2.1 MANHOLES AND STRUCTURES

- A. Manufacturers:
 - 1. Welch Brothers
 - 2. Norwalk Tank Company
 - 3. Leman Precast
 - 4. Concrete Specialties Co.
 - 5. GP Concrete, Inc.
 - 6. Substitutions: Section 01 6000 – Product Requirements.
- B. Manhole and Structure Sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C443.
 - 1. Joints for Precast Manholes and Structures: In accordance with ASTM C913; maximum leakage of 0.025 gallons per hour per foot of joint at three feet of head. Joints shall be tongue-and-groove type.
 - 2. Cone Top Section: Eccentric type.
 - 3. Foundation Slab: Precast concrete poured monolithically with manhole barrel section.
 - 4. Flat Top Slab: Provide as vertical depth requires. Shall have a two foot diameter opening when castings will be set directly on top of the slab. Shall have a four foot diameter opening when barrel sections shall be set directly on the slab.
 - 5. Manholes five foot in diameter or larger may use flat top slabs with standard four foot diameter risers and cones.

2.2 FRAMES AND COVERS

- A. Manufacturers:
 - 1. Neenah Foundry Co.

2. East-Jordan Iron Works Co.
 3. Substitutions: Section 01 6000 – Product Requirements.
- B. Product Description: ASTM A48/A48M, Class 30B; Cast iron construction.
1. Sanitary sewer manhole castings: American-made, heavy duty frame, machined flat bearing surface, and removable lid. Lid shall be a closed lid with pick holes, self-sealing gasket, and lid marked “SANITARY.”
 2. Sanitary sewer manhole castings:
 - a. Neenah Model R-1404-AUB or EJ1020APT 1050Z1PT Manhole Frame with Bolted and Gasketed Solid Lid, Heavy Duty, with anchor holes.
 - b. Where Drawings indicate bolt-down lid not required, use Neenah Model R1713, or EJ 1020 AGS 1050Z.

2.3 ACCESSORIES

- A. Manhole and Structure Steps: Formed polypropylene rungs; 3/4 inch diameter; 12 inches wide; 16 inches on center vertically. Formed integral with manhole sections.
- B. Sanitary Manhole Chimney Seal: External type; constructed out of EPDM rubber with a minimum thickness of 60 mil; width at required minimum 7 inches; “C” shaped mechanical upper compression band. Shall be “SURSEAL” type as manufactured by Mar Mac Construction Products, or equal. The use of external type seal with flat slab top shall not be permitted unless the flat slab top has an integrally cast curb around opening of a height of 2 inches minimum.
- C. Sanitary Manhole Chimney Seal: Internal type; rubber sleeve 8-3/8 inches wide, minimum with two 1-3/4 inch stainless steel expansion bands as manufactured by Cretex, or approved equal.
- D. Sanitary Manhole Joint Seals: Reference paragraph 3.4.E of this Section.
- E. Sanitary Manhole, Pipe to Manhole Connector: In accordance with ASTM C923; flexible, rubber compression type connectors; cast into the manhole section. Reference paragraph 3.4.H of this Section.
- F. Manhole and Structure Joint Sealants:
 1. Preformed Joint Sealants: In accordance with ASTM C990.
 2. Elastomeric Joint Sealants: In accordance with ASTM C920.

2.4 BEDDING AND COVER MATERIALS

- A. Bedding: CA-7 coarse aggregate or FA-6 fine aggregate as specified in Section 31 2317.
- B. Aggregate Backfill: Trench backfill, CA-7 coarse aggregate or FA-6 fine aggregate as specified in Section 31 2317 – Trenching, in areas to be paved or within two feet of paved area.
- C. Soil Backfill from Above Pipe to 6” Below Finish Grade: Excavated subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter in areas to be seeded. Reference Section 31 0513 – Soils for Earthwork and Section 31 2317 – Trenching.

- D. The Contractor shall strictly follow the manufacturer's backfilling directions and shall use materials in accordance with those directions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify items provided by other sections of Work are properly sized and located.
- C. Verify built-in items are in proper location, and ready for roughing into Work.
- D. Verify correct size of manhole and structure excavation.

3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.
- B. Do not install manholes and structures where site conditions induce loads exceeding structural capacity of manholes or structures.
- C. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify manholes and structures are internally clean and free from damage. Remove and replace damaged units.

3.3 INSTALLATION – GENERAL

- A. Excavation and Backfill:
 - 1. Excavate for manholes and structures in accordance with Section 31 2316 – Excavation in location and to depth shown. Provide clearance around sidewalls of manhole or structure for construction operations and granular backfill.
 - 2. When groundwater is encountered, prevent accumulation of water in excavations in accordance with Section 31 2319 – Dewatering. Place manholes or structures in dry trench.
 - 3. Where possibility exists of watertight manhole or structure becoming buoyant in flooded excavation, anchor manhole or structure to avoid flotation.
- B. Place manhole sections plumb and level, trim to correct elevation.
- C. Install manholes and structures supported at proper grade and alignment on crushed stone bedding and as shown on Drawings.
- D. Backfill excavations for manholes and structures in accordance with Section 31 0516 – Aggregates for Earthwork, Section 31 2317 – Trenching, and the Drawings.
- E. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour to form continuous drainage channel.

3.4 PRECAST CONCRETE MANHOLE AND STRUCTURE INSTALLATION

- A. Lift precast manholes and structures at lifting points designated by manufacturer.
- B. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure interior of pipeline and manhole or structure remains clean.
- C. Set precast manholes and structures bearing firmly and fully on crushed stone bedding.
- D. Assemble multi-section manholes and structures by lowering each section into excavation. Lower, set level, and firmly position base section before placing additional sections.
- E. Joint Sealants: All joints in precast sections shall be sealed by application of Ram-Nek RN 103 joint sealant butyl rope (3/4 inch thickness min.) applied to both the shoulder and ledge to form continuous seal for full perimeter of precast structure. In addition, the Contractor shall apply to each joint a Press Seal Corporation EZ-Wrap 12 inch butyl joint wrap applied in accordance with the manufacturer's recommendations.
- F. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide devices affixed to lower section.
- G. Verify manholes and structures installed to satisfy required alignment and grade.
- H. Pipe Connections for Field-Created Opening in Structure: Install grouting ring (A-Lok or Press-Seal Gasket Corporation WS Waterstop or approved equal) and seal with non-shrink concrete grout, as indicated on Drawings.
- I. Cut pipe to finish flush with interior of manhole or structure.
- J. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour to form continuous drainage channel.

3.5 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements and Section 01 7000 – Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Sanitary manholes shall be vacuum tested in accordance with the Water and Sewer Specifications.
- C. In all cases, maintain sewer/water separation in accordance with the Water and Sewer Specifications.

END OF SECTION

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SECTION 33 0523 – BORING, JACKING, AND TUNNELING CONDUITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavation for approach trenches and pits.
 - 2. Casing pipe.
 - 3. Carrier pipe.

1.2 REFERENCES

- A. American Railway Engineering and Maintenance-of-Way Association:
 - 1. AREMA - Manual for Railway Engineering.
- B. ASTM International:
 - 1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2. ASTM A849 – Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe.
 - 3. ASTM C55 - Standard Specification for Concrete Brick.
 - 4. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- C. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
- D. National Utility Contractors Association:
 - 1. NUCA - Pipe Jacking & Microtunneling Design Guide.
 - 2. NUCA - Trenchless Excavation Construction Equipment & Methods Manual.

1.3 DESIGN REQUIREMENTS

- A. Design casing pipe and tunnel liner joints of leak proof construction. Design for earth and/or other pressures present.
 - 1. Highway Crossings: Design casing for earth and other pressure loads present, plus AASHTO H20 live loading.
- B. Design bracing, backstops, and use jacks of sufficient rating for 24-hour continuous jacking without stoppage, except for adding pipe sections and as conditions permit, to minimize tendency of ground material to "freeze" around casing pipe.
- C. Design steel casing in accordance with AREMA Manual for Railway Engineering, Section 4.15.5.

1.4 SUBMITTALS

- A. Section 01 3300 - Submittal Procedures: Requirements for submittals.

- B. Shop Drawings: Prepare scaled shop Drawings to supplement Contract Drawings, signed and sealed by a Professional Engineer licensed by the State of Illinois.
 - 1. Include details of casing, jacking head, sheeting, and other falsework for trenches and pits, field sketches, and other details, to complete the Work.
 - 2. Show relation of proposed installation to features over installation, angle of installation, right-of-way lines and general layout of built facilities.
 - 3. Show cross section or sections from field survey, showing installation in relation to actual profile of ground.
- C. Design Data: Submit casing design calculations and manufacturer's data on casing pipe including sizes, shapes, methods of attachment and connection details, and details of grout holes, signed and sealed by Professional Engineer licensed by the State of Illinois.
- D. Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.
- E. Installation Plan: Submit description of proposed construction plan, dewatering plan, and plan to establish and maintain vertical and horizontal alignment.
- F. Submit emergency response procedures to handle situations when conduit is compromised and jeopardizes integrity of installation or safety.
- G. Submit written report results of visual check prior to installation of carrier of entire length of casing, to verify there are no voids or defective joints.
- H. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 7000 - Execution Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of casing, carrier pipe, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with NUCA Trenchless Excavation Construction Equipment & Methods Manual, NUCA Pipe Jacking & Microtunneling Design Guide, AREMA, and Association guidelines.
- B. When boring, jacking or tunneling under State highways and railroads, strictly comply with the conditions of the construction permits obtained by the Owner.
- C. Perform Work in accordance with these Specifications.
- D. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this section with minimum 10 years documented experience.
 - 1. Work Experience: Include projects of similar magnitude and conditions.
 - 2. Furnish list of references upon request.
- B. Design pipe jacking installation and load bearing falsework under direct supervision of Professional Engineer experienced in design of this Work and licensed by the State of Illinois.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping system pieces from entry of foreign materials and water by temporary covers, completing sections of work, and isolating parts of completed system.
- D. Accept system components on site in manufacturer's original containers or configuration. Inspect for damage.
- E. Use wooden shipping braces between layers of stacked pipe. Stack piping lengths no more than 3 layers high.
- F. Store field joint materials indoors in dry area in original shipping containers. Maintain storage temperature of 60 to 85 degrees F.
- G. Support casing and carrier pipes with nylon slings during handling.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 6000 - Product Requirements: Environmental conditions affecting products on site.
- B. 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.

1.10 FIELD MEASUREMENTS

- A. Verify invert elevations of existing work prior to excavation and installation of casing.

1.11 COORDINATION

- A. Section 01300 - Administrative Requirements: Requirements for coordination.

PART 2 PRODUCTS

2.1 CASING AND JACKING PIPE MATERIALS

- A. Steel Casing Pipe: ASTM A53/A53M, 35,000 psi minimum yield strength, minimum wall thickness of 0.875-inch for 42" carrier pipe, 0.75± inch for 36" carrier pipe and 0.500-inch for 15" carrier pipe, 0.375" for 12" and less, full circumference welded joints in accordance with AWS D1.1 to withstand excavation forces. The inside diameter shall be a minimum of 4" greater than the largest outside diameter of carrier pipe joints or couplings.

2.2 CARRIER PIPE MATERIALS

- A. Water Mains: As specified in Section 33 1113 – Water Mains.

2.3 COVER MATERIALS

- A. Granular Backfill for Trench Approaches and Pits to Finish Grade: Trench backfill meeting the requirements of Section 31 2317 - Trenching.
- B. Soil Backfill for Trench Approaches and Pits to Finish Grade: Subsoil with no rocks over 4 inches in diameter, frozen earth or foreign matter.

2.4 ACCESSORIES

- A. Casing Spacers:
 - 1. Steel and Plastic: 14 gage stainless steel band, 10 gage stainless steel risers, 5/16-inch stainless steel flange bolts, heavy duty PVC liner, polyethylene runners.
 - 2. Stainless steel joint restraint casing spacers shall be provided on each side of a pipe joint for large diameter gravity sewer pipes. Spacers shall be Cascade Waterworks MFG., Model CCS-JR, joint restraint casing spacer, or approved equal.
- B. Casing End Seals:
 - 1. Neoprene rubber with stainless steel clamping bands; the end seals can be either seamless pull over style or wrap around style with adhesive strips.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify connection to existing piping system size, location, and invert elevations are in accordance with Drawings.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities indicated to remain from damage.
- C. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 DEWATERING

- A. Intercept and divert surface drainage precipitation and groundwater away from excavation through use of dikes, curb walls, ditches, pipes, sumps or other means.
- B. Develop substantially dry subgrade for prosecution of subsequent operations.
- C. Comply with Storm Water Pollution Prevention Plan for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.
- D. Dewatering shall be incidental to the Contract.

3.4 EXISTING WORK

- A. As much as is reasonable, maintain access to existing roadways, facilities, and other remaining active installations requiring access. Modify installation as necessary to maintain access.

3.5 PITS OR APPROACH TRENCHES

- A. Excavate approach trenches or pits in accordance with installation plan, in accordance with shop drawings and as site conditions require.
- B. Ensure casing entrance face as near perpendicular to alignment as conditions permit.
- C. Establish vertical entrance face at least 1 foot above top of casing.
- D. Install dewatering measures and excavation supports as specified in Section 31 2319 - Dewatering.

3.6 CASING PIPE INSTALLATION

- A. Boring:
 - 1. Push pipe into ground with boring auger rotating within pipe to remove spoil. Do not advance cutting head ahead of casing pipe except for distance necessary to permit cutting teeth to cut clearance for pipe. Arrange machine bore and cutting head to be removable from within pipe. Arrange face of cutting head to provide barrier to free flow of soft material.

2. When unstable soil is encountered during boring retract cutting head into casing to permit balance between pushing pressure and ratio of pipe advancement to quantity of soil.
 3. When voids develop greater than outside diameter of pipe by approximately one inch, grout to fill voids.
 4. When boring is obstructed, relocate, jack, or tunnel as directed by the Engineer.
- B. Jacking
1. Construct adequate thrust wall normal to proposed line of thrust.
 2. Impart thrust load to pipe through suitable thrust ring sufficiently rigid to ensure uniform distribution of thrust load on full pipe circumference.

3.7 CARRIER PIPE INSTALLATION

- A. Clean, inspect, and handle pipe in accordance with Section 33 1113 – Water Mains.
- B. Place carrier pipe in accordance with Section 33 1113 – Water Mains. Exercise care to prevent damage to pipe joints when carrier pipe is placed in casing.
- C. Support pipeline within casing so no external loads are transmitted to carrier pipe. Attach spacers to barrel of carrier pipe; do not rest carrier pipe on bells. Distance between spacers shall be per the Manufacturer's recommendations.
- D. Seal ends of casing with neoprene rubber end seals.

3.8 BACKFILLING OF PITS OR APPROACH TRENCHES

- A. Backfill as specified in Section 31 2317 – Trenching.

3.9 TOLERANCES

- A. Do not over cut excavation by more than 1 inch greater than outside diameter of casing pipe.
- B. Install casing pipe to vertical and horizontal alignment on Drawings within plus or minus 3 inches prior to installation of carrier pipe.
- C. Install pipe bells with minimum 2 inch clearance to casing.

3.10 FIELD QUALITY CONTROL

- A. Sections 01 4000 - Quality Requirements and 01 7000 – Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Compaction Testing: As specified in Section 31 2317 – Trenching.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Compaction Testing: One for each lift.

3.11 MANUFACTURER'S FIELD SERVICES

- A. Section 01 4000 - Quality Requirements: Requirements for manufacturer's field services.
- B. Furnish field technical assistance during following periods of casing installation:
 - 1. Unloading of casing materials and components.
 - 2. Prior to commencing excavation and during excavation as requested.

3.12 REMOVAL OF FACILITIES AND CONTROLS

- A. Remove temporary facilities for casing installation and jacking operations in accordance with Section 01 5000 - Temporary Facilities and Controls.

END OF SECTION

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SECTION 33 0524 – UTILITY HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavation for approach trenches and pits.
 - 2. Horizontal directional drilling.
 - 3. Pipe.
- B. Related Sections:
 - 1. Section 31 0513– Soils for Earthwork.
 - 2. Section 31 2316 – Excavation.
 - 3. Section 31 2323 – Fill.
 - 4. Section 31 2317 – Trenching.
 - 5. Section 33 3113 – Sanitary Sewer System.
 - 6. Section 33 0132 – Sewer and Manhole Testing.

1.2 MEASUREMENT

- A. Horizontal Directional Drilling:
 - 1. Basis of Measurement: By linear foot.
- B. Design of Lifting Devices for Precast Components: In accordance with ASTM C913.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. ASSHTO T180 – Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in) Drop.
- B. ASTM International:
 - 1. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1557 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 3. ASTM D2922 – Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 4. ASTM D3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - 5. ASTM F1962 – Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings.
- C. National Utility Contractors Association:
 - 1. NUCA – HDD Installation Guidelines.
- D. State of Illinois Standards:

1. Illinois Department of Transportation – Standard Specifications for Road and Bridge Construction, latest edition.
2. Illinois Department of Transportation Highway Standards, latest edition.
3. Standard Specifications for Water & Sewer Main Construction in Illinois, current edition.

1.4 DESIGN REQUIREMENTS

- A. Design Criteria:
 1. Drilling Steering System: Remote with continuous electronic monitoring of boring depth and location.
 2. Directional Change Capability: 90 degree with 35 foot radius curve.
 3. Ratio of Reaming Diameter to Pipe Outside Diameter:
 - a. Nominal Pipe Diameter of 6 Inches and Smaller: 1.5 maximum.
 - b. Nominal Pipe diameter larger than 6 Inches: Submit recommended ratio and reaming procedures for review.

1.5 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 1. Submit technical data for equipment, method of installation, and proposed sequence of construction.
 2. Include information pertaining to pits, dewatering, method of spoils removal, equipment size and capacity, equipment capabilities including installing pipe on radius, type of drill bit, drilling fluid, method of monitoring line and grade and detection of surface movement, name plate data for drilling equipment and mobile spoils removal unit.
- C. Installer Qualifications: Submit history of previous work completed of equivalent nature and scope. Include qualification and experience of key personnel.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of pipe and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- D. Record actual depth of pipe at 50 feet intervals.
- E. Record actual horizontal location of installed pipe.
- F. Show depth and location of abandoned bores.
- G. Record depth and location of drill bits and drill stems not removed from bore.

1.7 QUALITY ASSURANCE

- A. Perform work in accordance with the following:
 - 1. NUCA HDD Installation Guidelines.
 - 2. ASTM F1962.
- B. Perform Work in accordance with the Standard Specifications for Road and Bridge Construction, current edition.
- C. Perform Work in accordance with the Standard Specifications for Water & Sewer Main Construction in Illinois, current edition.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Provide temporary end caps and closures on piping and fittings until pipe is installed.
- C. Protect pipe from entry of foreign materials and water by temporary covers, completing sections of work, and isolating parts of completed system.
- D. Accept products on site in manufacturer's original containers or configuration. Inspect for damage.
- E. Use shipping braces between layers of stacked pipe. Stack piping lengths no more than 3 layers high.
- F. Store field joint materials indoors in dry area in original shipping containers. Maintain storage temperature of 60 to 85 degrees F.
- G. Support pipes with nylon slings during handling.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 6000 – Product Requirements: Environmental conditions affecting products on site.
- B. 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.

1.10 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Requirements for coordination.
- B. Coordinate work with utilities within construction area.

PART 2 PRODUCTS

2.1 DRILLING FLUID

- A. Drilling Fluid: Liquid bentonite clay slurry; totally inert with no environmental risk.

2.2 PIPE

- A. Furnish materials in accordance with the Standard Specifications for Water & Sewer Main Construction in Illinois, Current Edition.
- B. Sanitary Sewage System Pipe: as specified in Section 33 3100 – Sanitary Sewer Systems.
- C. Water Main Pipe: as specified in Section 33 1113 – Water Mains.

2.3 FILL MATERIALS

- A. Subsoil Fill: Type as specified in Section 31 0513 – Soils for Earthwork.

2.4 WATER SOURCE

- A. Water: Potable, obtained from utility source.

2.5 ACCESSORIES

- A. Grout: Non-Shrink cementitious grout per the Standard Specifications for Road and Bridge Construction, current edition.
- B. Trace Wire: #12 AWG steel core with copper metallurgically bonded to it which is intended to be used with horizontal directional drilling operation as manufactured by Copperhead Industries or approved equal. Provide manufacturer approved splice connectors where required.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify connection to existing piping system size, location, and invert elevations are in accordance with Drawings

3.2 PREPARATION

- A. Call Local Utility Line Information Service not less than three working days before performing work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.

- B. Locate, identify, and protect utilities indicated to remain from damage.
- C. Identify required lines, levels, contours, and datum locations.
- D. Protect plant life, lawns, rock outcroppings and other features remaining as portion of final landscaping.
- E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 DEWATERING

- A. Intercept and divert surface drainage, precipitation, and groundwater away from excavation through use of dikes, curb walls, ditches, pipes, sumps or other means.
- B. Develop and maintain substantially dry subgrade during drilling and pipe installation.
- C. Comply with State of Illinois requirements for discharging water to watercourse, preventing stream degradation, and erosion and sediment control.

3.4 EXCAVATION

- A. Excavate subsoil as specified in Section 31 2316 – Excavation and Section 31 2317 – Trenching.
- B. Excavate approach trenches and pits as site conditions require. Minimize number of access pits.
- C. Provide sump areas to contain drilling fluids.
- D. Install excavation supports as specified in Section 31 2316 – Excavation and Section 31 2317 – Trenching.
- E. Restore areas after completion of drilling and carrier pipe installation.

3.5 DRILLING

- A. Drill pilot bore with vertical and horizontal alignment as indicated on Drawings.
- B. Guide drill remotely from ground surface to maintain alignment by monitoring signals transmitted from drill bit.
 - 1. Monitor depth, pitch and position.
 - 2. Adjust drill head orientation to maintain correct alignment.
- C. Inject drilling fluid into bore to stabilize hole, remove cuttings, and lubricate drill bit and pipe.
- D. Continuously monitor drilling fluid pumping rate, pressure, viscosity, and density while drilling pilot bore, back reaming, and installing pipe to ensure adequate removal of soil cuttings and stabilization of bore.
 - 1. Provide relief holes when required to relieve excess pressure.
 - 2. Minimize heaving during pullback.

- E. Calibrate and verify electronic monitor accuracy during first 50 feet of bore in presence of the Engineer before proceeding with other drilling. Excavate minimum of four test pits spaced along first 50 feet bore to verify required accuracy. When required accuracy is not met, adjust equipment or provide new equipment capable of meeting required accuracy.

- F. After completing pilot bore, remove drill bit.

3.6 DRILLING OBSTRUCTIONS

- A. When obstructions are encountered during drilling, notify the Engineer immediately. Do not proceed around obstruction without the Engineer's approval.
- B. Maintain adjusted bore alignment within easement or right-of-way.

3.7 PIPE INSTALLATION

- A. After completing pilot bore, remove drill bit. Install reamer and pipe pulling head.
 - 1. Select reamer with minimum bore diameter required for pipe installation.
- B. Attach pipe to pipe pulling head. Pull reamer and pipe to entry pit along pilot bore.
- C. Inject drilling fluid through reamer to stabilize bore and lubricate pipe.
- D. Install piping with horizontal and vertical alignment as shown on Drawings.
- E. Protect and support pipe being pulled into bore so pipe moves freely and is not damaged during installation.
- F. Do not exceed pipe manufacturer's recommended pullback forces.
- G. Provide sufficient length of pipe to extend past termination point to allow connection to other pipe sections.
- H. Allow minimum of 24 hours for stabilization after installing pipe before making connections to pipe.
- I. Mark location and depth of bore with spray paint on paved surfaces, and wooden stakes on non-paved surfaces at 50 foot intervals.

3.8 SLURRY REMOVAL AND DISPOSAL

- A. Contain excess drilling fluids at entry and exit points until recycled or removed from site. Provide recovery system to remove drilling spoils from access pits.
- B. Remove, transport and legally dispose of drilling spoils.
 - 1. Do not discharge drilling spoils in sanitary sewers, storm sewers, or other drainage systems.
 - 2. When drilling in suspected contaminated soil, test drilling fluid for contamination before disposal.

- C. When drilling fluid leaks to surface, immediately contain leak and barricade area from vehicular and pedestrian travel before resuming drilling operations.
- D. Complete cleanup of drilling fluid at end of each work day.

3.9 BACKFILL

- A. Install backfill as specified in Section 31 2323 – Fill and 31 2317 – Trenching.
- B. Backfill approach trenches and pits with fill to contours and elevations indicated on Drawings.
- C. Compact subsoil fill as specified in Sections 31 2323 – Fill and 31 2317 – Trenching.

3.10 ERECTION TOLERANCES

- A. Section 01 4000 – Quality Requirements: Tolerances.
- B. Maximum Variation From Horizontal Position: 12 inches.
- C. Maximum Variation From Vertical Elevation: 2 inches.
- D. Minimum Horizontal and Vertical Clearance From Other Utilities: 12 inches.
- E. When pipe installation deviates beyond specified tolerances, abandon bore, remove installed pipe, re-bore, and reinstall pipe in correct alignment.
- F. Fill abandoned bores greater than 3 inches in diameter with grout or flowable fill material.

3.11 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements and 01 7000 – Execution Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Upon completion of pipe installation, test pipe in accordance with the following:
 - 1. Sanitary Sewer Pipe Testing: Section 33 3100 – Sanitary Sewer Systems.
- C. Compaction Testing: As specified in Section 31 2323 - Fill.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.12 MANUFACTURER FIELD SERVICES

- A. Section 01 4000 – Quality Requirements: Requirements for manufacturer's field services.
- B. Certify that equipment for drilling has been properly set-up and is ready for drilling.

3.13 CLEANING

- A. Upon completion of drilling and pipe installation, remove drilling spoils, debris, and unacceptable material from approach trenches and pits. Clean up excess slurry from ground.

- B. Restore approach trenches and pits to original condition.
- C. Remove temporary facilities for drilling operations in accordance with Section 01500 – Temporary Facilities and Controls.

END OF SECTION

SECTION 33 1113 – WATER MAINS

PART 1 GENERAL

1.1 SUMMARY

- A. Work included: Provide water mains where shown on the Drawings, as specified herein, and as needed for a complete and proper installation, including, but not necessarily limited to:
 - 1. Distribution main and connection to existing lines.
 - 2. Necessary valves, fittings and appurtenances

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Codes and regulations:
 - 1. In addition to complying with the specified requirements, comply with the pertinent regulations of the Water & Sewer Specifications.

1.3 SUBMITTALS

- A. Comply with the pertinent provisions of Section 01 3300 – Submittals.
- B. Product data: Within 15 calendar days after the Contractor has received the Owner's "Notice to Proceed", submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturers' specifications, catalog cuts, and other data needed to prove compliance with the specified requirements. All material to be used shall be clearly marked and differentiated from any materials not to be used if on the same catalog sheet.
 - 3. Shop drawings and other data as required indicating method of installing and attaching equipment, except where such details are fully shown on the drawings.
- C. Disinfection certificate:
 - 1. Upon completion of water line disinfection in accordance with Article 41-2.15 A thru I of the Water & Sewer Specifications, deliver to the Engineer two (2) copies of an acceptable "Certificate of Performance" for that activity.

1.4 PRODUCT HANDLING

- A. Piping and fittings shall be stored according to manufacturer's limitations of stacking, and exposure to sunlight and weather.
- B. Stacked piping shall be covered with a heavy vinyl tarp, firmly tied into place. Piping shall be fully supported off the ground.

- C. Do not stack other materials on top of stored piping and conduit.
- D. The ends of carrier piping and conduit shall be securely covered, such that moisture, dirt, animals and vermin cannot gain entrance.
- E. Do not place pipe or other water main materials on private property or in areas obstructing pedestrian or vehicular traffic.
- F. Block individual or stockpiled pipe lengths to prevent movement.

PART 2 PRODUCTS

2.1 WATER PIPING

- A. Polyvinyl Chloride (PVC): AWWA C900
 - 1. Pipe Class: DR 18, Class 235.
 - 2. Joints: Push-on type with PVC flexible elastomeric seals conforming to ASTM D3139 and ASTM F477. Solvent-cement couplings are not permitted.
 - 3. Fittings: Ductile iron, AWWA C153, mechanical joint, pressure rated for 350 psi.
 - a. Coating and lining:
 - 1) Bituminous Coating: AWWA C110
 - 2) Cement Mortar Lining: AWWA C104, single thickness.
 - 4. Restrained Glands: Mega-lug type glands as manufactured by EBAA Iron or equal. All mechanical joints shall have restrained glands.
 - 5. Pipe installed within casing pipes shall be provided with restrained joints.
 - a. The restrained joint system shall be one of the following:
 - 1) North American Specialty Products: Certa-Lok C900/905 RJ.
 - 2) North American Specialty Products: Certa-Lok C900/RJIB.
 - 3) JM Eagle: Eagle Loc 900.

2.2 VALVE AND BOX

- A. Valves: Resilient wedge gate valves with non-rising stem conforming to AWWA C509 or AWWA C515. Inlet and outlet shall be mechanical joints conforming to AWWA C111.
 - 1. Manufacturers:
 - a. American Flow Control Series 2500
 - b. Clow Valve
 - c. Kennedy Valve
 - d. Substitutions: as approved by Engineer.
- B. Valve Box: Shall be Tyler Union cast/ductile iron, 5-1/4" inside diameter, two (2) piece, screw-type adjustable, with cast iron lid marked "WATER". Valve boxes shall be provided with a rubber leveling/centering gland to be placed in the bottom of valve box to ensure the operating nut is centered in the valve box.

2.3 PUMPER HYDRANTS

- A. Hydrants shall be Kennedy K81, complying with AWWA Standard C-502. All hydrants shall be furnished with 6" mechanical joint shoe with 5-1/4" inlet with compression-type main valve. Standard bury shall be 5'-6". Hydrants shall have 3-way nozzles (5" Storz nozzle and two 2-1/2" hose) with National Standard Threads. Hydrants shall have traffic break away feature and shall open counter-clockwise. Finish paint color shall be red with nozzle caps color-coded in accordance with Water Department policy. The nozzles shall be located 18" to 24" above finished grade.
- B. Fire hydrant valves as shown on Drawings shall be mechanical joint cast iron bodied, resilient wedge gate valves, Mueller, Clow or equal, with non-rising stem and two rubber O-ring packing. Valve shall be furnished with a cast iron road box with a cover marked "WATER."
- C. Pumper Hydrant Extensions: Provide extension kits of length specified by the Engineer in the field manufactured by same manufacturer as pumper hydrant. Extension kit shall be designed to lengthen the barrel of the particular model of pumper hydrant to be extended.

2.4 UNDERGROUND PIPE MARKERS

- A. Plastic Ribbon Tape: Bright colored, continuously printed, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service. Caution tape shall be marked "CAUTION WATER MAIN BELOW".
- B. Trace Wire: #10 AWG solid steel core with copper metallurgically bonded to it, as manufactured by Copperhead Industries or approved equal.

2.5 BACKFILL MATERIALS

- A. As per the requirements of Section 31 2317-Trenching, Subsection 2.1.B of the specifications.

2.6 ACCESSORIES

- A. Concrete for Thrust Restraints:
 - 1. Poured-in-place concrete shall be Class SI concrete meeting the requirements of Section 1020 of the roadway Specifications. Fitting shall be wrapped with visqueen before concrete is placed.
 - 2. Pre-cast concrete blocks shall be of the type designed for burial service and for use as thrust restraint.
- B. Steel rods, bolt, lugs and brackets: ASTM A36/A36M or ASTM A307 carbon steel.

PART 3 EXECUTION

3.1 PREPARATION

- A. Pre-Construction Site Photos:

1. Take photographs along centerline of proposed pipe trench; minimum one photograph for each 50 feet of pipe trench.
 2. Show mail boxes, curbing, lawns, driveways, signs, culverts, and other existing site features.
 3. Include project description, date taken and sequential number on back of each photograph or with electronic submittal.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs. Use only equipment specifically designed for pipe cutting. The use of chisels or hand saws will not be permitted. Grind edges smooth with beveled end for push-on connections.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare pipe connections to equipment with flanges or unions.

3.2 BEDDING

- A. Excavate pipe trench in accordance with Section 31 2317 - Trenching for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.
- B. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- C. Provide sheeting and shoring in accordance with Section 31 2317 - Trenching.
- D. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 4 inches compacted depth; compact to 95 percent.

3.3 INSTALLATION - PIPE

- A. Install all pipe, fittings, valves and other related items as shown on the plans or mentioned in these specifications and reconnect all service connections in strict accordance with manufacturer's specifications and recommendations.
- B. Provide thrust blocking to prevent movement of lines under pressure at bends, tee, caps, and hydrants. Thrust blocks shall be Portland Cement Concrete, a minimum of twelve (12) inches thick, and shall be a minimum of 1/4 cubic yard in volume, placed between solid ground and the fittings, shall be anchored in such a manner that pipe and fitting joints will be accessible for repairs.
- C. All bends of 11-1/4° or greater, and all tees shall be thrust protected to prevent movement of the lines under pressure as shown on the plans. Where unstable soil or backfill conditions exist, it may be necessary to install thrust blocking at deflected sections as well as at fittings. If required by the Engineer, deflection blocking shall be installed at a point approximately one-fifth of the pipe length each side of the coupling. Couplings shall not be blocked. See AWWA Manual M-17.
- D. Where conditions prevent the use of concrete thrust blocks, tied joints or restrained joints of a type approved by the Engineer shall be used.

- E. Refer to the details in the Drawings for proper placement of thrust blocking. Thrust blocks shall be allowed to set for one hour before backfilling.
- F. Warning/locator tape shall be laid in the trench between 24 and 30 inches below final grade. Install trace wire continuous over top of pipe. Tracer wire shall be attached to the top of the water main pipe via tape or other adhesive.
- G. Unless otherwise instructed, all existing valves, valve boxes, blow-off assemblies and hydrants to be removed shall be delivered to the Owner.
- H. It shall be the Contractor's responsibility to notify any water customers, the Owner, Fire Department and Engineer, 48 hours in advance of any shut-downs or boil orders. This requirement applies to the reconnection of service lines and main lines. Shut-downs will only be allowed to begin after 8:00 a.m. and cannot extend beyond 5:00 p.m. Contractor shall notify affected utility customers of the outage by placing a notification on their door or in their mailbox.
- I. Without prior written approval from the Owner, the maximum allowed time for any shut down shall be 4 hours.
- J. The use of "Hydra-Stop" line stopping method of shutting down a specific area shall only be allowed with the Owner's approval. Should the Contractor use this method without written approval from the Owner, the cost of this operation shall be the sole responsibility of the Contractor.
- K. Maintain 10 ft. horizontal separation and 18" vertical separation of water main from sewer piping in accordance with the Water and Sewer Specifications.
- L. Install pipe to indicated elevation within tolerance of 5/8 inches.
- M. Prevent foreign material from entering pipe during placement.
- N. Close pipe openings with watertight plugs during work stoppages.
- O. Install access fittings or whips to permit flushing and disinfection of water system.
- P. Establish elevations of buried water piping with not less than 4 feet of cover. Measure depth of cover from final surface grade to top of pipe barrel.
- Q. The Contractor should anticipate that every existing water main within the construction zone is constructed of old (40+ years), oversized, cast iron water main. In every location where the proposed water main is to be connected to an existing oversize cast iron main, the Contractor should use a Hymax coupling or oversized cutting-in sleeve as the method of connection. The use of these fittings shall be considered incidental to the cost of the project.
- R. The City of Oglesby's (Owner's) Public Works Department shall be responsible for opening and shutting any water main valves in the Owner's water system during the construction of the Project. The Contractor is to notify the Public Works Department, with appropriate lead time, prior to the necessity for the valve operations. The Contractor should not operate a water main valve unless an emergency requires the operation.

3.4 INSTALLATION – VALVES

- A. Install valves in accordance with the Shop Drawings and the manufacturer's recommendations.
- B. All valves shall be installed with restrained glands on the inlet and outlet and shall have a minimum of one (1) square foot as measured looking top down, of thrust restraint installed below the valve.

3.5 INSTALLATION – HYDRANTS

- A. Install hydrants in accordance with the Shop Drawings and the manufacturer's recommendations.
- B. All hydrants shall be installed with an anchor coupling between the tee and the isolation valve in addition to restrained glands installed at each mechanical joint fitting.
- C. A minimum of 1 cubic yard of coarse stone wrapped in geotextile fabric shall be installed at the barrel drain of the hydrant as shown in the detail on the Drawings. Concrete thrust blocking shall be provided at the hydrant as shown on the Drawing details. Coarse stone and thrust blocking shall be considered incidental to the hydrant.
- D. Install hydrant extensions in accordance with the extension kit manufacturer's instructions.

3.6 BACKFILLING

- A. Backfill around sides and top of pipe in accordance with Section 31 2317 – Trenching.

3.7 DISINFECTION OF WATER MAINS

- A. The Owner will operate any existing valves required to complete the flushing and disinfection. A minimum of 24 hours' notice must be given the Owner prior to beginning this process.
- B. The Contractor will be responsible for the main being flushed and disinfected. Any additional service/main taps (whips), fittings, valves, hydrants, etc., required for flushing, disinfection, and testing shall be incidental to the water main. The Contractor shall be responsible for taking all water samples and delivery to the testing laboratory. The costs of testing shall be paid for by the Contractor. The Contractor shall take turbidity samples prior to starting the disinfection process. The Contractor will collect bacteriological samples, record chlorine levels and deliver them to the specified laboratory directed by the Engineer by 2:00 P.M., Monday through Thursday.
 - 1. As a minimum the Contractor shall collect bacteriological samples and record chlorine levels at the ends of runs and at 1,200 foot intervals along the water main. The locations of sampling points shall be as directed by the Engineer. A minimum of two consecutive satisfactory test results from each sample location taken a least 24 hours apart showing no bacterial contamination shall be obtained prior to placing the water main into service. Each test result shall include data on the free and total chlorine residual measured and recorded at the time each sample was taken.

- C. The mains shall be flushed prior to disinfection in accordance with Section 41-2.15A of the “Water and Sewer Specifications” and disinfected in accordance with Section 41-2.15B through I.
- D. After final flushing and before pipeline is connected to the existing system or placed in service, employ an approved independent laboratory to test samples and issue a bacteriological report. Minimum report contents include:
 - 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 24 hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Certify water conforms, or fails to conform, to bacterial standards of the Illinois Environmental Protection Agency.
 - 8. Free and total chlorine concentrations, reported in mg/L.

3.8 TESTING

- A. Pressure and Leakage Testing – Unless approved otherwise, the leakage testing shall be performed according to Article 41-2.14, parts A, B & C of the “Water and Sewer Specifications.”
- B. Provide personnel and equipment, and arrange for and pay the cost of, all required tests and inspections required. The pressure gauge supplied for the test shall read up to 120 psi and shall have tick marks at intervals of not more than 2 psi. The pressure test will not be permitted to begin if the gauge does not meet the requirements of this section.
- C. Where test shows materials or workmanship to be deficient, replace or repair as necessary, and repeat the tests until the specified standards are achieved.
- D. The Owner will operate any existing valves required to complete the pressure testing. A minimum of 24 hours’ notice must be given to the Owner prior to beginning this process.

END OF SECTION

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SECTION 33 1223 – PACKAGE WELL HOUSE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Technical specifications for a complete package well house.
- B. The Owner will purchase the well house prior to the Contract. The Contractor shall be responsible for unloading and installing the well house per the Plans and Specs.

1.2 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data as appropriate for a complete package water booster station.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 7000 – Execution and Closeout Requirements: Requirements for submittals.
- B. Operation and Maintenance Data: Provide O & M manuals as required.

1.4 QUALITY ASSURANCE

- A. Perform Work according to these Specifications.

PART 2 PRODUCTS

2.1 ABOVE GROUND WELL HOUSE WITH MODULAR BUILDING

- A. The Contractor shall install a factory designed and assembled well house with all necessary internal valves, piping, electrical controls, and accessories as shown on the Drawings and specified herein.
- B. The station shall be complete with all needed equipment factory installed on a fabricated steel base and enclosed in an insulated modular steel building.
- C. Well house shall be as manufactured by:
 - 1. Precision Systems
- D. To ensure total quality control, the complete unit will be designed, fabricated, assembled and tested in-house by the manufacturer. The complete well house will be UL listed with applicable UL certifications.

2.2 EQUIPMENT BASE

- A. The equipment chamber's common base shall be fabricated from a minimum 3/8" structural grade steel plate, reinforced with adequately sized steel channels to prevent deflection due to equipment weight and stresses imposed from lifting and setting of equipment.
- B. Bolt on lifting eyes shall be placed about the perimeter of the equipment base to facilitate lifting and handling of the well house. The lifting eyes shall be easily removable after the well house has been set in place.
- C. The steel plate and structural employed in the base shall meet or exceed the requirement of ASTM-A36.

2.3 EQUIPMENT BUILDING

- A. The well house will be complete with a factory assembled modular building affixed to the steel equipment base supporting the piping and valves as shown on the Drawings. The completed well house shall be one piece when delivered and require only off loading, installation on the prescribed foundation slab, pipe line hook up and electrical service to complete the installation. Field erected buildings or buildings using steel C studs as wall framing members and C joists as roof trusses will not be acceptable.
- B. The polyurethane foam core shall be classified by Underwriters Laboratories as having flame spread of 25 or lower and smoke generation of less than 450 when tested in accordance with UL Standard 723 (ASTM Standard E-84).
- C. All sidewall and ceiling panels shall consist of interior and exterior metal skins formed with steel dies and roll-forming equipment and checked with gauges for uniformity and accuracy. The panel shall be furnished with an embossed finish pressed into the galvanized steel panel. Polyurethane shall be foamed-in-place (poured, not frothed) and, when completely heat-cured, shall bond to the metal skins to form a rigid 4" thick insulated panel. Overall coefficient of heat transfer ("U" factor) shall be a minimum of .033 (R-30) for 4" thick walls. Wood reinforcement shall be placed inside the wall and ceiling panels where required to support the station equipment loads. Any wood reinforcement in a wall and ceiling panel shall be totally enclosed within the panel and clad with the exterior and or interior metal skins. To ensure tight joints, panel edges must have foamed-in-place tongues and grooves with a flexible vinyl gasket also foamed-in-place on the interior and exterior of all tongue edges.
- D. Panels shall be equipped with cam lock joining devices. The distance between locks shall not exceed 46". Each locking device shall consist of a cam-action, hooked locking arm placed in one panel, and a steel rod positioned in the adjoining panel, so that when the locking arm is rotated, the hook engages over the rod and draws the panel tightly together with cam action. The locking arms and steel rods shall be housed in individual steel pockets set into the panel. Press fit caps shall be provided to close lock wrench holes. A cam lock wrench shall be supplied with the building.
- E. Exterior of building shall be a minimum of .018" (26 ga.) thick galvanized steel panel. The building exterior shall be covered with Hardie Plank Lap Siding. The color shall be as selected by the Owner.

- F. Interior of building shall be a minimum of .018" (26 ga.) thick galvanized steel panel, protected by a spray and baked white color polyester protective coating. The use of FRP (fiberglass reinforced plastic) sheeting attached to plywood sheets as an interior finish is not acceptable.
- G. Hinged entrance door shall be a steel commercial type, insulated hollow core. Matching metal jambs shall be furnished to fit prefab panels without the use of any interior framing. Jamb members shall attach to panels with sheet metal screws. The door shall be supplied with weather-stripping and a wiper gasket. Entrance opening shall be a minimum 36" x 78" clear opening size. Hardware for doors shall be cylindrical lockset with satin stainless steel finish. Each door shall have three tamper-proof pinned butt hinges. All doors for outdoor structures shall be supplied with a metal shield above the door to divert rain and snow from the door opening. An extruded aluminum sill plate shall be provided on outdoor buildings.
- H. The ceiling panels shall be covered by a single piece EPDM rubber membrane to provide a waterproof covering. The membrane shall be white and a minimum of 45 mil. The roof shall be peaked with a center ridge 12" high.

2.4 LIFTING DEVICE

- A. A spreader bar type lifting device, built to lift the modular building from each corner of deck structure without impinging the lifting chain/cables on the modular building sidewalls, shall be provided by the installing contractor.

2.5 WELDING

- A. All welding shall be in accordance with standard AWS practices, with proper section and continuity to assure a sound, watertight structure. All 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.

2.6 PROTECTIVE COATING

- A. All mill scale, rust, weld flux and other foreign matter shall be removed from all steel surfaces by steel shotblasting to SSPC SP-10 specification for near-white blast cleaning. Surface irregularities shall be removed by grinding.
- B. Steel and cast/ductile iron surfaces shall receive a minimum of two coats of hi-build epoxy coating. The coating material shall show excellent resistance to immersion in seawater as well as to splash or spillage of water, petroleum products, and salt solutions.
- C. The surfaces shall receive two coats a minimum of 3 mils each to a total of 6 mils dry.
- D. Paint touch-up kits shall be provided with the well house for coating areas damaged in shipping.
- E. The floor in all working areas within the well house shall be protected with heavy neoprene matting.

2.7 WELL HOUSE PIPE AND FITTINGS

- A. All internal transmission pipe, valves and fittings shall be NSF 61 certified.
- B. All piping shall be sized as shown on the Drawings.
- C. Ductile Iron Fittings:
 - 1. AWWA C151, Class 53 or as shown: mortar lined, no exterior coating, shop primed for painting.
 - 2. Fittings shall be flanged or grooved joints. Grooved joints shall conform to applicable sections of ANSI/AWWA C606/A21.1. Grooved joint fittings and couplings shall be ductile iron conforming to ASTM A395 and A536 or cast iron conforming to ASTM A48. All grooved materials and tools shall be from one manufacturer. Acceptable grooved manufacturers: Victaulic Company of America or Engineer-approved equal.
- D. Ductile Iron Pipe:
 - 1. AWWA C151, Class 53 or as shown.
 - 2. Fittings shall be flanged joint.

2.8 VALVES

- A. Gate Valves: Valves 3" and larger shall be Mueller Resilient Wedge Gate Valves or approved equal, with flanged joints and with non-rising stems with handwheels and position indicators for interior application.
- B. Ball Valves: Ball valves shall be low lead brass, full port, threaded joint as manufactured by NIBCO, ANSI Class 150 or approved equal, with operating handle.
- C. Check Valves: Check valves 4" and larger shall be lever and weight swing style, as manufactured by Val-Matic, flanged, or Victaulic Series 317 Grooved Check Valves, or approved equal. All grooved end valves shall meet AWWA C-509 laying length requirements and Class 150 flanges or approved equal.

2.9 WATER METERS

- A. A flanged in-line bi-directional magnetic flow meter shall be used to measure flows in lower piping. The meter shall be fabricated from carbon steel and internally lined with polyurethane or Ebonite hard rubber. The meter housing shall be rated for a pressure of 200 psi or higher. The meter shall include one (1) stainless steel ground ring, shipped loose for installation on one side of the meter. Full face gaskets shall be installed between grounding ring and the flanged ends of the meter. The meter shall be furnished with a remote mount converter housed in a NEMA 4 enclosure with readout display. The meter shall be fitted with an integral transmitter capable of producing pulse and analog output signals. Acceptable manufacturers are Rosemount, Siemens, or equal.

2.10 ELECTRICAL CONTROL SYSTEM

- A. The electrical control system shall be assembled into a NEMA I enclosure fabricated of 14 gauge steel. Clear space shall be provided in front of the panel to adequately meet the requirement of Article 110-16 of the National Electrical Code in regard to working space.
- B. The control panel shall be constructed in compliance with Underwriter's Laboratories Industrial Control Panels listing and follow-up service, utilizing UL listed recognized components where applicable. The control panel shall bear a UL 508 serialized label.
- C. Properly sized, UL listed, molded case circuit breakers shall be provided for each pump motor and the lighting distribution interior.

2.11 PANEL MOUNT LOAD CENTER

- A. As part of the well house control panel, an electrical distribution center consisting of thermal magnetic circuit breakers with a capacity of 20 amps, shall be provided for each branch circuit including the following:
 - 1. Control
 - 2. Blower
 - 3. Heater/Air Conditioner (current capacity as required)
 - 4. Convenience Receptacle
 - 5. Lighting
- B. The circuit breakers shall indicate when the circuit is open and shall have means provided for manual switching. All breakers shall be labeled as to function with permanently attached phenolic nameplates.

2.12 WIRING

- A. All wiring shall comply with the National Electric Code and applicable state and local codes. Wiring shall be completely factory installed except for the power lines that run to the control panel continuously from the external disconnect switch.
- B. All wiring within the equipment chamber and outside the control panel shall be run in PVC rigid conduit except for the liquidtight metallic flexible conduit to connect the pump motors. Accessory items such as the sump pump, dehumidifier, etc. with approved manufacturer's rubber cord may be plugged into polarized grounded outlets.
- C. It shall be the responsibility of the local electrical contractor to furnish and install correctly sized service wires from the service pole outside the equipment chamber to the control panel. It shall also be the responsibility of the electrical contractor to furnish and install, if required, any exterior disconnects or switching mechanisms.

2.13 BUILDING FEATURES

- A. Lights:

1. The well house shall be well lighted by 2 LED light fixtures with guards installed within the equipment chamber. A manual light switch shall be provided and shall be conveniently located near the entrance door.
- B. Ventilation System:
 1. A ventilating system shall be provided to maintain a fresh air system in the equipment chamber. The exhaust blower shall be sized and rated to change the equipment chamber air 6 times per hour. The blower shall be of the centrifugal, squirrel cage design with statically balanced wheel to assure quiet performance and maximum air delivery. The blower shall be thermostatically controlled and shall also be provided with an automatic and a manual switch located near the door.
- C. Air Conditioner/Heater:
 1. Provide a wall mount, self contained, air conditioner/heating unit. Include aluminum finned copper coils and twin multi-speed blowers and compressors. House in a galvanized, 20 gauge, zinc coated steel cabinet. The unit shall include an economizer which allows 100% outside air through air inlet openings.
 2. Size unit to maintain interior temperature at 70 degrees F with outside temperature of 100 degree F and sized to account for pumping and other equipment heat rejection with all the equipment operating. Heating capabilities shall be provided to maintain 65 degree F interior temperature at -20 degrees F outside temperature.
 3. Include all thermostats and controls.

PART 3 EXECUTION

3.1 INSPECTION AND TEST

- A. Prior to assembly, all station components shall be inspected for quality and tested for proper function and freedom from defects. Any deficiencies or irregularities shall be corrected at the factory. Automatic controls shall be adjusted to approximate job requirements.

3.2 INITIAL OPERATION

- A. After the job installation is complete, the manufacturer shall provide the services of a factory-trained representative for a maximum period of two days (allowing for two separate trips) to perform initial start-up of the well house, troubleshooting, and to instruct the Owner's operating personnel in the operation and maintenance of the equipment. Four (4) copies of O & M manuals will be supplied to the Owner prior to initial operation.

3.3 GUARANTEE

- A. The manufacturer of the well house shall guarantee for a period of one year from the date well house is placed into operation or eighteen months from date of shipment, whichever occurs first, that the entire well house and all equipment therein shall be free from defects in design, materials and workmanship. In the event a component fails or is proven defective during the guarantee period, the manufacturer will provide a replacement part without cost, upon return of the defective part. Normal use items, such as grease, light bulbs, mechanical seals, packing and belts are excluded.

SECTION 33 2113 - PUBLIC WATER SUPPLY WELLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Well finishing and installation of permanent equipment.
 - 2. Disinfection of pump, piping and well.
- B. Summary of Work: Finishing of 2 deep water supply wells in the City of Morris in accordance with these specifications and applicable rules and regulations of the State of Illinois. All site restoration to conditions equivalent to pre-construction conditions shall be incidental to the Contract. The scope of this work includes finishing two previously drilled, tested, and capped deep wells. Work will include, removal of the cap, installation of the pitless adapter, installation of all pumping equipment (pump, motor, column pipe cable, air liner, etc.)

PART 2 PRODUCTS

2.1 DEEP WELL SUBMERSIBLE PUMP

- A. This specification and plan covers the installation of one (1) new 1,500 gpm submersible pump in newly completed Wells No. 8 & 9 and all incidental construction as called for in these specifications or in the accompanying plans.
- B. Descriptive Data:
 - 1. Contractor shall submit with their proposal complete dimensional and cross sectional drawings and diagrams of the equipment covered by their proposal including pump performance curves which shall show the head capacity, pump efficiency and brake horsepower over the complete range of the bowl assembly.
 - 2. For the safety and protection of the Owner's water supply, only such types of equipment will be considered that have been in successful operation for a period of not less than ten (10) years. Contractor shall submit with a bid a list of at least twenty (20) similar installations in Illinois that have been in continuous successful operation for a period of not less than ten (10) years.
- C. Pump Testing Factory: Non-witness factory testing of the pumping equipment shall be as prescribed in Section A6 of AWWA Standard E101-88. Certified copies of all tests shall be filed with the Engineer for approval prior to shipment of the pump.
- D. Submersible Well Pump: The Contractor shall furnish and install a submersible pump, Bryon Jackson or equal, capable of the following:

PUMP	FLOW (GPM)	TDH (ft.)	MOTOR (hp)	SETTING DEPTH	COLUMN PIPE SIZE

Well 8	1,500	536	300	600	8"
Well 9	1,500	562	300	600	8"

- E. Submersible Pump Bowl: The submersible pump bowl assembly shall be of the multi-stage vertical turbine-type. The pump bowl casting shall be bronze and free of blow holes or sand holes and other defects. Each intermediate bowl stage shall be fitted with a bronze sleeve-type bearing. The impellers shall be bronze of the closed-type and shall be secured to the impeller shaft with stainless steel collets. The impeller shaft shall be proper size to carry motor horsepower and shall be of 316 stainless steel. The top case of the bowl assembly shall contain an extra-long bronze sleeve bearing surrounded by a grease chamber filled with a special hydraulic grease with a life from ten to fifteen years. A strainer and water intake shall be built into the lower part of the bowls in which shall be mounted two extra-long bronze guide sleeve bearings. The stainless steel shaft shall protrude through the strainer and shall be equipped with a flexible jaw-type coupling for connection to the submersible motor.
- F. Submersible Electric Motor: Bryon Jackson or Sun Star, 4-pole, 1,800 rpm submersible motor of sufficient horsepower required to operate the pump without overloading shall be furnished and installed. The motor shall be of the completely enclosed-type for continuous duty underwater operation and shall be for use with 3-phase, 60 cycle, AC power of the voltage shown. The motor shall be filled with a high dielectric strength mineral oil and the oil shall be circulated throughout the motor for cooling the rotor, stator winding and bearings. Bronze sleeve bearings shall be provided at each end of the rotor and a pivot shoe-type thrust bearing shall carry the weight of all rotating parts and the hydraulic thrust of the pump. The motor shall contain a balance tube from the bottom of the motor into the motor shaft coupling compartment above the motor. The balance tube shall cause a hydrostatic balance between the water outside and the oil within the motor.
- G. Power Cable: The Contractor shall furnish and install with the pump a sufficient amount of submersible power cable of the proper size and voltage rating to prevent a voltage drop in excess of 5% of the line voltage between well top and motor when the motor is operating under full load. In no case shall the cable size be less than that shown. The cable shall have three (3) copper conductors plus ground of not less than seven (7) strands, each conductor to be in an insulating watertight synthetic rubber or plastic jacket; the whole to be enclosed in an outer neoprene, synthetic rubber or plastic jacket which shall be impervious to oil. The power cable shall be supported on the column pipe by means of stainless steel bands at intervals not exceeding 10 feet. The cable shall extend not less than 10 feet above the top of the pitless adapter. A cable guard shall be placed over the cable at all high points (pump, pipe connections).
- H. Discharge Column:
1. Sufficient discharge column shall be furnished of the diameter and wall thickness shown to allow the minimum pump setting indicated. The column pipe material shall be:
 - a. Stainless steel, minimum wall thickness of 0.3", with sacrificial anodes on inside of all joints and on the outside of all joints below 250 feet. Anodes shall be 1/8" thick, 8" long and rolled to fit pipe. Solder each sleeve in place.
 2. Steel pipe shall meet all AWWA requirements.
 3. Fitting and joints shall be spline-lock fittings, by Roscoe Moss or approved equal per the manufacturing recommendation.

- I. Column Surge Control Valve: The Contractor shall furnish and install a stainless steel vertical column surge control-type valve with stainless steel pin at the location(s) above the bowl assembly as indicated. This vertical check valve shall be of the same diameter as the column pipe and shall allow the column to drain back slowly into the well.
- J. Pitless Adapter: The Contractor shall furnish and install a Baker-Monitor pitless adapter of sufficient size or equivalent to provide a clear opening through the pitless adapter to equal or exceed the well casing inside diameter. The pitless adapter shall be manufactured for the specified bury depth with an underground outlet of the diameter and type specified. The pitless adapter body shall be welded to the well casing. The exterior of the pitless body shall be sandblasted and shall be coated with two coats of Kopper's Bitumastic Tank Solution. The pitless adapter cap shall include a screened well vent, an airline connection, a conduit connection for the electrical power cable, and a gasket to adequately seal the top of the pitless adapter body. The well vent shall meet all applicable standards as set forth in Section 3.2.7.5 of the "Recommended Standards for Water Works," current edition.
- K. Water Level Indicator: An airline (or airlines) of one-quarter inch outside diameter (1/4" O.D.) tubing of the material shown above shall be furnished and installed in sufficient length to extend from the surface to the top of the bowl assembly and it shall be installed with the necessary fittings and an altitude gauge.

PART 3 EXECUTION

3.1 DISINFECTION OF PUMP, PIPING AND WELL

- A. The Contractor shall perform necessary preventive actions and procedures to provide a water well meeting the bacteriological requirements of the Illinois Environmental Protection Agency as stated in 35 IL Adm. Code, Section 652.603 and Section 3.2.5.12 of the "Recommended Standards for Water Works," current edition. The method for chlorinating the well may be any of those methods listed in AWWA Standard A100 entitled "Standard for Water Wells," and AWWA Standard C654 entitled "Standard for Disinfection of Wells." After chlorinating, the Contractor shall secure a sample of the well water on two (2) consecutive days and submit them to an approved testing laboratory for bacteriological analysis. Upon receiving favorable bacteriological results, the disinfection will be accepted.

END OF SECTION

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SECTION 33 3100 – SANITARY SEWER SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sanitary sewer pipe and fittings for open-cut interceptor and final effluent piping.
2. Underground pipe markers.
3. Bedding and cover materials.

1.2 SUBMITTALS

A. Section 01 3330 – Submittal Procedures: Requirements for submittals.

B. Product Data: Submit catalog cuts and other pertinent data indicating proposed materials, accessories, details, and construction information.

C. Submit reports indicating field tests made and results obtained.

D. Manufacturer's Installation Instructions:

1. Indicate special procedures required to install product specified.
2. Submit detailed description of procedures for connecting new sewer to existing sewer line and directional drilling and/or pipe jacking installation.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.3 CLOSEOUT SUBMITTALS

A. Section 01 7000 – Execution Requirements: Requirements for submittals.

B. Project Record Documents: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the Roadway Specifications.

B. Perform Work in accordance with the Water and Sewer Specifications.

1.5 PRE-INSTALLATION MEETINGS

A. Section 01 3000 – Administrative Requirements: Pre-installation meeting.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 6000 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Block individual and stockpiled pipe lengths to prevent moving.

1.7 COORDINATION

- A. Section 01 3000 – Administrative Requirements: Requirements for coordination.
- B. Coordinate the Work with authorities having jurisdiction.
- C. Notify affected utility companies per utility company requirements.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPE AND FITTINGS

A. Open Cut Sewers:

- 1. Sanitary Sewer Pipe and Fittings 4” to 16”:
 - a. Plastic Pipe: ASTM D3034, Type PSM, Poly Vinyl Chloride (PVC) material; SDR 26; bell and spigot rubber ring seal gasket joint.
 - 1) Fittings: PVC; SDR 26. Insertion type tees are not allowed on smaller pipe unless approved by the Engineer in writing prior to installation.
 - 2) Joints: ASTM D3212 elastomeric joints meeting ASTM F477.
- 1. Sanitary Sewer Pipe and Fittings 18” and larger:
 - a. Contractor shall install one of the following pipe materials for the large diameter sewer. Alternatives must be pre-approved in writing by the Engineer prior to bidding and will not be approved after the bidding process.
 - b. Plastic Pipe: ASTM F679, Poly Vinyl Chloride (PVC) Material; PS115; bell and spigot style rubber ring sealed gasket joint.
 - 1) Fittings: PVC, PS115
 - 2) Joints: ASTM D3212, elastomeric gaskets, meeting ASTM F477.
 - c. Ductile Iron Pipe: AWWA C150, AWWA C151 and ASTM A746, Class 52 or above, bell and spigot ends.
 - 1) Outside Coating: AWWA C151, asphaltic coating, 1 mil uniform thickness.
 - 2) Lining: Cement mortar lined in accordance with AWWA C104.
 - 3) Fittings: AWWA C153 or AWWA C110, ductile iron, Class 52 or above cement mortar lined in accordance with AWWA C104.
 - 4) Mechanical Joints: AWWA C111, rubber gasket joint devices.
 - d. Water Main Quality Sewer Pipe: AWWA C-900/C-905, DR-25, Class 165 to ASTM D3139 and ASTM F477.

B. Trenchless Sewers:

- 1. Sanitary Sewer Pipe 4” to 16”:

- a. Plastic Pipe: AWWA C900 Certa-Lok RJIB; DR-18; restrained joint.
 - 1) Joints: Push-on type with PVC flexible elastomeric seals conforming to ASTM 3139 and ASTM F477.

2.2 UNDERGROUND PIPE MARKERS

- A. Open cut sewers only.
- B. Plastic Ribbon Tape: Bright colored, continuously printed, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.3 BEDDING AND COVER MATERIALS

- A. Bedding and Haunching:
 - 1. Open cut sewers only.
 - 2. Fill Type as specified in Section 31 2317 – Trenching.
- B. Initial Backfill:
 - 1. Open cut sewers only.
 - 2. Fill Type as specified in Section 31 2317 – Trenching.
- C. Final Backfill:
 - 1. Soil Backfill: As specified in Section 31 0513 – Soils for Earthwork.
 - 2. Trench Backfill: As specified in Section 31 2317 – Trenching.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 3000 – Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on the Drawings.

3.2 PREPARATION

- A. Correct over excavation with coarse aggregate.
- B. Remove large stones or other hard matter capable of damaging pipe or impeding consistent backfilling or compaction.
- C. Protect and support existing sewer lines, utilities and appurtenances.
- D. Maintain profiles of utilities. Coordinate with other utilities to eliminate interference. Notify the Engineer where crossing conflicts occur.

3.3 BEDDING

- A. Excavate pipe trench in accordance with Section 31 2316 – Aggregates for Earthwork.
- B. Excavate to lines and grades shown on the Drawings or required to accommodate installation of encasement.
- C. Dewater excavations to maintain dry conditions and preserve final grades at bottom of excavation.
- D. Provide sheeting and shoring in accordance with Section 31 2317 – Trenching.
- E. Place bedding material at trench bottom, level materials in continuous layer.

3.4 INSTALLATION – PIPE

- A. Open Cut:
 - 1. Install pipe, fittings, and accessories in accordance with ASTM D2321.
 - 2. Lay pipe to slope gradients noted on the Drawings. Begin at downstream end and progress upstream.
 - 3. Assemble and handle pipe in accordance with manufacturer's instructions except as modified on the Drawings or by the Engineer.
 - 4. Keep pipe and fittings clean until work is completed and accepted by the Engineer and Owner. Cap open ends during periods of work stoppage.
 - 5. Lay bell and spigot pipe with bells upstream.
 - 6. Install plastic ribbon continuous over top of pipe buried two foot above pipe line; coordinate with Section 31 2317 – Trenching.
 - 7. Provide bypass pumping of sanitary sewage around work areas as required.

3.5 BACKFILLING

- A. Backfill around sides and to top of pipe in accordance with 31 2317 – Trenching.
- B. Maintain optimum moisture content of bedding material to attain required compaction density.

3.6 FIELD QUALITY CONTROL

- A. Section 01 4000 – Quality Requirements and Section 01 7000 – Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform low pressure air testing and deflection testing on sanitary sewers in accordance with the Water and Sewer Specifications. Minimum test pressure shall be 8 psi.
- C. Compaction Testing: In accordance with ASTM D1157, ASTM D698, AASHTO T180, ASTM D2922, and ASTM 3017.
- D. When tests indicate Work does not meet specified requirements, remove work, replace and retest.
- E. In all cases, maintain sewer/water separation in accordance with Water and Sewer Specifications.

3.7 PROTECTION OF FINISHED WORK

- A. Section 01 7000 – Execution Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

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SECTION 40 0513 – PIPING

PART 1 GENERAL

1.1 SUMMARY

- A. Work included: Provide piping, within plant site where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:
 - 1. All process piping and connection of equipment.
 - 2. Floor drain piping.
 - 3. Sanitary service piping.

1.2 QUALITY ASSURANCE

- A. Codes and regulations:
 - 1. In addition to complying with the specified requirements, comply with pertinent regulations of:
 - a. Local Building Code.
 - b. Illinois Department of Public Health Plumbing Code.
 - c. Water and Sewer Main Specifications.
 - d. NSF/ANSI Standard 61 and NSF/ANSI Standard 327.
 - 2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirements will govern when so directed by the Engineer.

1.3 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 3300 – Submittal Procedures.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's "Notice to Proceed," submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications, catalog cuts, and other data needed to prove compliance with the specified requirements.
 - 3. Shop drawings and other data as required to indicate method of installing and attaching equipment, except where such details are fully shown on the Drawings.

1.4 PRODUCT HANDLING

- A. Piping and fittings shall be stored according to manufacturer's limitations of stacking, and exposure to sunlight and weather.
- B. Stacked piping shall be covered with a heavy black vinyl tarp, firmly tied into place. Piping shall be fully supported off the ground.
- C. Do not stack other materials on top of stored piping and conduit.

- D. The ends of carrier piping and conduit shall be securely covered, such that moisture, dirt, animals and vermin cannot gain entrance.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS

A. Ductile Iron:

1. Buried:
 - a. AWWA C151, Class 53 or as shown: mortar lined, asphaltic coating on exterior.
 - b. Fittings shall be mechanical joint.
 - c. Pipe joints shall be push-on style.
2. Plant Piping:
 - a. AWWA C151, Class 53 or as shown: mortar lined, no exterior coating, shop primed for painting per Section 09-9000 - Paints and Coatings.
 - b. Fittings shall be flanged or grooved joints. Grooved joints shall conform to applicable sections of ANSI/AWWA C606/A21.1. Grooved joint fittings and couplings shall be ductile iron conforming to ASTM A395 and A536 or cast iron conforming to ASTM A48. All grooved materials and tools shall be from one manufacturer. Acceptable grooved manufacturers: Victaulic Company of American or Engineer-approved equal.

B. P.V.C.:

1. Buried:
 - a. Gravity Sewers/Drain
 - 1) ASTM D3034, minimum SDR 26.
 - 2) Pipe joints shall be push-on ASTM D3212.
 - b. Pressure Pipe
 - 1) AWWA C900, class as shown.
 - 2) ASTM D2241, DR 18, Class 200.
 - 3) Fittings shall be ductile iron mechanical joint.
 - 4) Pipe joints shall be push-on style, ASTM F477.
2. Plant Piping:
 - a. PVC 1120, Schedule 40 or Schedule 80.
 - b. Fittings shall be PVC ASTM D2466 and D2467.

C. Steel:

1. Buried:
 - a. Black steel pipe, Schedule 40 with welded joints.
 - b. Fittings shall be black steel, Schedule 40 with welded joints.
 - c. Provide a multi-layer of fusion-bonded epoxy on all pipe and fittings. All field welds and damaged coating shall be painted with factory-supplied coating system compatible with fusion-bonded epoxy.
2. Plant Piping:
 - a. Black steel pipe, Schedule 40.
 - b. Fittings shall be black steel, Schedule 40 for welded or threaded joints. Grooved fittings shall be ductile iron, conforming to ASTM A395, Grade 65-45-15, and A536, Grade 65-45-12; forged steel, conforming to ASTM A234, Grade WPB; or fabricated from carbon steel pipe, conforming to ASTM A43, Grade B mechanically coupled

grooved type. Grooved joints shall be mechanically coupled rigid or flexible grooved type with ductile iron housings conforming to ASTM A395, Grade 65-45-15, and A536, Grade 65-45-12, with EPDM pressure responsive synthetic rubber gaskets. Rigid coupling housings shall be cast with offsetting, angle-pattern bolt pads shall be used to provide system rigidity and support and hanging in accordance with ANSI B31.1 and B31.9. Victaulic Style 07. Flexible couplings shall be used in locations where vibration attenuations and stress relief are required. Flexible couplings may be used in lieu of flexible connectors at equipment connections. Three couplings shall be placed in close proximity to the vibration source. Victaulic Style 77.

D. HDPE:

1. Buried:
 - a. HDPE Pressure Rating DR11.
 - b. Pipe joints shall be Heat Fused ASTM F2620.

2.2 PIPE HANGERS/SUPPORTS

A. Pipe Hangers:

1. The Contractor shall provide properly sized and spaced commercially manufactured pipe supports. The supports shall be pipe saddle with U-Bolts or flange support type. Both having the ability to be vertically adjusted. The support stand pipe shall be SCH 40 steel having min. dia. Of 3" for 6" through 12" pipe, 4" for 14" through 18" pipe and 6" for 20" and larger pipe or as determined by pipe support manufacturer. All supports shall be painted. Shop drawing submittals are required, including loading capacity per support.
2. Pipes larger than 6" shall not be installed on hanger.

B. Supports:

1. Pipe supports shall be as described on plan sheets.
2. Pipe racks may be used in areas when pipe is "stacked."

2.3 WALL PENETRATIONS

- A. Any pipe penetration through a concrete wall or floor shall use a wall pipe with appropriate end fittings and integrally cast water stop/thrust wall collar.

2.4 TRACER WIRE

- A. Tracer wire shall be 12 gauge copper, metallurgically bonded to a steel core and covered with a minimum of 30 mil of HDPE as manufactured by Copperhead Industries or approved equal. Make splices using manufacturer-approved connector.
- B. Tracer wire shall be installed with all buried pipe.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install all pipe, fittings, fixtures and other related items as shown on the Drawings or mentioned in these specifications in strict accordance with the manufacturer's specifications.
- B. Potable water main and non-potable water main shall have tracer wire attached directly on top of pipe and have a warning tape labeled "WATER MAIN BELOW," 18" below final grade. The tracer wire shall be extended to the surface through each valve box and attached to fire hydrants or yard hydrants.
- C. The Contractor shall be responsible for providing the Engineer two sets of drawings showing accurately the location of all underground sewers, drains, water mains, water service, electric conduit and all other underground pipe not mentioned, but installed or encountered as part of this project.

3.2 TESTING AND ADJUSTING

- A. Provide personnel and equipment, and arrange for and pay the costs of all required tests and inspections required.
- B. Where tests show materials or workmanship to be deficient, replace or repair as necessary, and repeat the tests until the specified standards are achieved.
- C. Adjust the system to optimum standard of operation.
- D. In all cases of potable water line construction, provide disinfection and maintain sewer/water separation in accordance with the Water and Sewer Specifications.

END OF SECTION

SECTION 40 0523 – VALVES AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Work included: Provide valves and accessories where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:
 - 1. All process related valves, operators, hydrants and appurtenances.
- B. Section does not include valves and accessories provided by AeroMod.

1.2 QUALITY ASSURANCE

- A. Codes and regulations:
 - 1. In addition to complying with the specified requirements, comply with pertinent regulations of:
 - a. Local Building Code.
 - b. Illinois Department of Public Health Plumbing Code.
 - c. Water & Sewer Main Specifications.
 - d. NSF/ANSI Standard 61 and NSF/ANSI Standard 327.
 - 2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent will govern when so directed by the Engineer.

1.3 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Requirements for submittals.
- B. Product data: Within 30 calendar days after the Contractor has received the Owner's "Notice to Proceed," submit:
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's specifications, catalog cuts, and other data needed to prove compliance with the specified requirements.
 - 3. Shop drawings and other data as required to indicate method of installing and attaching equipment, except where such details are fully shown on the drawings.

PART 2 – PRODUCTS

2.1 VALVES AND ACCESSORIES

- A. Gate Valves:
 - 1. Valves 3" and larger shall be Mueller Resilient Wedge Gate Valves or approved equal, with flanged joints and with non-rising stems with handwheels and position indicators for interior application, or with mechanical joints and wrench nut with cast iron valve box having a minimum 5-1/4" dia., and lid for buried locations. Lid shall be labeled "WATER."

2. Buried valves shall be Kennedy resilient wedge, mechanical joint, left open with operating nut, non-rising stem and 5 ¼" valve box with stabilizer and lid labeled "water".
- B. Ball Valves:
1. Ball valves 4" and larger shall be Jamesbury Series 5000 Flanged Joint Ball Valves, ANSI Class 150 or approved equal, with operating handle.
 2. Ball valves 3" and smaller on PVC piping shall be NIBCO Tru-Union Ball Valves or their approved equal. Valves shall be furnished with flanged fittings and shall be for 150 PSI water pressure. Each valve shall be furnished with operating handle.
- C. Check Valves:
1. Check valves 4" and larger shall be lever and weight swing style, as manufactured by Val-Matic, flanged, or Victaulic Series 317 Grooved Check Valves, or approved equal. All grooved end valves shall meet AWWA C-509 laying length requirements and Class 150 flanges or approved equal.
 2. Check valves 3" and smaller shall be NIBCO Tru-Union PVC Ball Check Valves with Class 150 flanges or approved equal.
- D. Butterfly Valve:
1. Butterfly valves shall be used for air supply system throughout the plant. As a minimum, the valve shall be constructed as follows:
 - a. Cast iron body.
 - b. Ductile iron disc.
 - c. Stainless steel shaft.
 - d. EPDM seating and gaskets.
- E. Gas Valve:
1. Gas valves shall be cast bronze, screw joints, square head and be suitable for 125 psi pressure rating.

PART 3 EXECUTION

3.1 TESTING AND ADJUSTING

- A. Provide personnel and equipment, and arrange for and pay the costs of, all required tests and inspections required.
- B. Where tests show materials or workmanship to be deficient, replace or repair as necessary, and repeat the tests until the specified standards are achieved.
- C. Adjust the system to optimum standard of operation.

END OF SECTION

SECTION 40 7100 – FLOW INSTRUMENTATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Flow Transmitters:
 - 1. Magnetic Flow Meters (Inline).

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Gas Association (AGA):
 - a. Gas Measurement Committee Report #3.
 - 2. American Society of Mechanical Engineers (ASME):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - c. B16.5, Pipe Flanges and Flanged Fittings.
 - d. B626, Standard Specification for Welded Nickel and Nickel-Cobalt Alloy Tube.
 - e. PTC 19.5, Application of Fluid Meters, Part 2.
 - 3. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - 4. American Water Works Association (AWWA).
 - 5. National Sanitation Foundation (NSF).
 - 6. US Department of Interior Bureau of Reclamation (USDIBR):
 - a. Water Measurement Manual.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 3300 – Submittal Procedures

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the Articles describing the elements are acceptable.
- B. Submit request for substitution in accordance with Specification Section 01 2500.

2.2 FLOW TRANSMITTERS

- A. Magnetic Flow Meters (Inline):

1. Acceptable manufacturers:
 - a. Endress + Hauser (ProMag).
 - b. ABB (WaterMaster).
 - c. Krohne (OPTIFLUX).
 - d. Rosemount (8700 Series).
 - e. Siemens ((SITRANS F M).
 - f. Or Pre-Approved Equal.
2. Design and fabrication:
 - a. Utilize characterized field principle of electromagnetic induction to produce signal directly proportional to flow rate.
 - b. High input impedance pre-amplifiers.
 - 1) Minimum impedance: 10^{10} ohms.
 - c. Provide flanged end connections per ASME B16.5 up 4 to 24 IN and wafer body design for connections 4 IN or less rated for piping system operating and test conditions. Meter body shall be rated to same pressure as the flanges.
 - d. Grounding requirements:
 - 1) Nonmetallic or lined pipe:
 - a) Inlet and outlet grounding rings of same material as electrode or as recommended by manufacturer to meet process requirements.
 - 2) Conductive piping:
 - a) Conductive path between the meter and the piping flanges.
 - e. Provide cable between magnetic flow meter and transmitter.
 - 1) Cable shall be potted and fitted by manufacturer at the factory.
 - f. Pulsed DC magnetic field excitation.
 - g. Automatic zero.
 - h. Adjustable low flow cutoff.
 - i. Minimum signal lock (empty tube zero) to prevent false measurement when tube is empty.
 - j. Inaccuracy: $\pm 0.4\%$ of rate.
 - k. Flow Rate and Flow Total information to be provided to the process control system utilizing Ethernet/IP digital communications.
 - l. Power supply: 117 V $\pm 10\%$, 60 Hz.
 - m. Indication of flow rate and totalized flow.
 - 1) At transmitter.
 - 2) At HMI
 - n. Meter operable as specified in liquids with 5.0 micro mho/cm or more conductivity.
 - o. Transmitter electronics shall use microprocessor based architecture and be configured using parameters.
 - p. Complete schedules showing all magmeter components. Allow no more than 1 PCT of meter ID as maximum step change from pipe to meter.
3. Flow Meter Schedule:

TAG	FLOW METER EQUIPMENT DESCRIPTION	SIZE	SUPPLIER
WL-8M	Well 8 Flow Rate/Total	10 inch	Tonka
WL-9M	Well 9 Flow Rate/Total	10 inch	Tonka
M-4	Brine Flow Rate/Total	1 inch	Tonka

M-1	HSP 1 Flow Rate/Total	8 inch	Tonka
M-2	HSP 2 Flow Rate/Total	8 inch	Tonka
M-3	HSP 3 Flow Rate/Total	8 inch	Tonka
M-6	Aeration Flow Rate/Total	14 inch	Tonka
M-7	Finished Water Flow Rate/Total	16 inch	Tonka

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

END OF SECTION

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SECTION 40 7200 – LEVEL INSTRUMENTATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Level Transmitters:
 - a. Ultrasonic Level Sensor and Transmitter.
 - b. Submersible Level Sensor and Transmitter.
 - 2. Level Switches:
 - a. Float-Tilt Type Level Switch.

1.2 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B16.5, Pipe Flanges and Flanged Fittings.
 - 2. ASTM International (ASTM):
 - a. A106, Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service.
 - b. A743, Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 3300 – Submittal Procedures

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the Articles describing the elements are acceptable.

2.2 LEVEL TRANSMITTERS

- A. Radar Level Sensor and Transmitter:
 - 1. Manufacturers:
 - a. E&H FMR30
 - b. Pre-Approved Equal.
 - 2. Specifications:
 - a. General:
 - 1) Measurement Principle: Radar, time-of-flight.
 - a) Automatic temperature compensation with internal temperature sensor.
 - b) Able to ignore false targets.
 - c) Maximum Beam Angle: 10 DEG (±5.0 DEG).

- 2) Measurement Range: See Schedule.
 - a) Liquids: Up to 33 FT.
 - b) Solids: Up to 32 FT.
- 3) Level Resolution: 0.10 IN.
- 4) Accuracy $\pm 0.25\%$ of measured distance or 0.25 IN.
- 5) Blanking Distance: 12 IN.
- 6) Update: 200 msec.
- b. Process Connection:
 - 1) Mounting Thread Size: 2 IN NPT.
 - 2) Optional: Flange connection.
- c. Display and Configuration:
 - 1) Integral Display for live measurement and configuration.
 - 2) Adjustable zero and span.
 - 3) Output variables: Level; optional: Volume, Flow (Open Channel Flow).
 - 4) Output Units: Feet, inches, meters, or millimeters (mm).
- d. Electrical:
 - 1) Signal Power: Loop-powered, 2-wire, 24 VDC.
 - 2) Current Output: Analog 4-20 mA into a 400 ohm loop.
 - 3) High/Low signal alarms: < 4.0 mA and > 20.0 mA.
 - 4) Optional Communication: HART.
 - 5) Configuration: With remote hand-held configurator.
 - 6) Optional Relays: Two SPDT rated at 1A @ 30 VDC or 5A @ 120 VAC.
 - 7) Cable entry: 1/2 IN NPT connection.
- e. Materials of Construction.
 - 1) Wet-side material: PVDF, PVC, polypropylene, or Kynar.
 - 2) Body: Polyurethane-covered aluminum or cast aluminum.
- f. Environment:
 - 1) Ambient Temperature: -40 to 158 DEGF (-40 to 70 DEGC).
 - 2) Humidity: Up to 95%, non-condensing.
 - 3) Process Temperature: -4 to 158 DEGF (-20 to 70 DEGC).
 - 4) Process Pressure: 0 to 35 PSIG.
 - 5) Protection: Refer to Area Classification Drawings.

3. Radar Level Schedule:

TAG	RADAR LEVEL EQUIPMENT DESCRIPTION	SUPPLIER
A-2	Aeration Level	Micro-Comm

B. Submersible Level Sensor Transmitter:

1. Manufacturers:
 - a. Endress+ Hauser.
 - b. Micro-Comm L5A
 - c. Or Pre-Approved Equal.
2. Specifications:
 - a. General:
 - 1) Measurement Principle: Differential-pressure (hydrostatic) based on the height of the liquid head with the use an integrated strain gauge or Ceramic Capacitive Sensor (CCS).

- a) Open (to atmosphere) or Closed Tanks.
- b) Fully submersible.
- c) Vented cable.
- 2) Minimum/Maximum Span: 1 to 100 PSIG (2.31 to 230.67 FT).
- 3) Accuracy: $\pm 0.25\%$ of span.
- b. Process Connection:
 - 1) None: Mount vertically at the bottom of tank.
 - 2) Option: 1/4 IN NPT connection on tank.
- c. Display and Configuration:
 - 1) Output variables: Pressure (converted to level).
 - 2) Output Units: psi.
- d. Electrical:
 - 1) Signal Power: Loop-powered, 2-wire, 24 VDC.
 - 2) Current Output: Analog 4-20 Ma into a 600 ohm loop.
 - 3) Cable entry: 1/4 IN NPT connection to attached jacketed cable.
- e. Materials of Construction:
 - 1) Probe: 316SS, Viton, Titanium.
 - 2) Cable: Hytrel, FEP, HDPE
- f. Environment:
 - 1) Ambient Temperature: -40 to 212 DEGF (-40 to 1000 DEGC).
 - 2) Humidity: Up to 100%, non-condensing.
 - 3) Process Temperature: -4 to 104 DEGF (-20 to 60 DEGC).
 - 4) Process Pressure: 0 to 35 PSIG.

3. Level Transducer Schedule:

TAG	SUBMERSIBLE LEVEL EQUIPMENT DESCRIPTION	SUPPLIER
LIT-W8	Well 8 drawdown Level	Micro-Comm
LIT-W9	Well 9 drawdown Level	Micro-Comm
LIT-CW	Clearwell Level	Micro-Comm

2.3 LEVEL SWITCHES

- A. Float- Tilt Type Level Switch:
 - 1. Manufacturers:
 - a. Anchor Scientific Inc.
 - b. Consolidated Electric.
 - c. Contegra.
 - d. Or Pre-Approved Equal.
 - 2. Materials:
 - a. Float material: Polypropylene or Teflon coated type 316 stainless steel.
 - b. Cable jacket: PVC, neoprene.
 - c. Cable clamp: Polypropylene or 316 stainless steel.
 - 3. Design and fabrication:
 - a. Mercury-free switch.
 - b. Provide switch complete with flexible electrical cables.
 - c. DPST contact rated at 1 amp at 120 VAC.
 - d. Direct acting float switch:

- 1) Switch actuates on rising level.
- 2) Switch deactuates when liquid falls 1 IN below actuation level.
- e. Terminate cables in junction box.
- f. Process temperature: max. 120 DEGF.
- g. Install floats per drawing details.
4. Level Switch Schedule:

TAG	LEVEL SWITCH EQUIPMENT DESCRIPTION	SUPPLIER
RPZ-1	RPZ Flood Sensor	Micro-Comm
A-3H	Aeration Tank High	
A-3L	Aeration Tank Low	

2.4 ACCESSORIES

- A. Furnish all mounting brackets, hardware and appurtenances required for mounting primary elements and transmitters.
 1. Materials, unless otherwise specified, shall be as follows:
 - a. Bolts, nuts, washers, expansion anchors: 316 stainless steel.
 - b. Mounting brackets:
 - 1) Standard: 316 stainless steel.
 - 2) Highly corrosive areas: Aluminum.
 - c. Mounting plates, angles:
 - 1) Standard: Carbon steel.
 - 2) Corrosive areas: 316 stainless steel.
 - d. Instrument pipe stands:
 - 1) Standard: Hot-dip galvanized 2 IN schedule 40, ASTM A106, Grade B carbon steel.
 - 2) Corrosive areas: 316 stainless steel.
- B. Provide handheld communicator compatible for all intelligent transmitters furnished.
 1. Hand held communicator shall provide capability to check calibration, change transmitter range, and provide diagnostics.
 2. If these features are provided with the intelligent transmitter that is accessible, the hand held communicator is not required.
- C. Cable lengths between sensors and transmitters shall be continuous (without splices) and as required to accommodate locations as shown on Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install instrument mounting pipe stands level and plumb.

- C. Locate instrument piping and tubing so as to be free of vibration and interference with other piping, conduit, or equipment.
- D. Keep foreign matter out of the system.
- E. Remove all oil on piping and tubing with solvent before piping and tubing installation.
- F. Plug all open ends and connections to keep out contaminants.
- G. Threaded Connection Seals:
 - 1. Use Tite-Seal or acceptable alternate.
 - 2. Use of lead base pipe dope or Teflon tape is not acceptable.
 - 3. Do not apply Tite-Seal to tubing threads of compression fittings.
- H. Instrument Mounting:
 - 1. Mount all instruments where they will be accessible from fixed ladders, platforms, or grade.
 - 2. Mount all local indicating instruments with face forward toward the normal operating area, within reading distance, and in the line of sight.
 - 3. Mount instruments level, plumb, and support rigidly.
 - 4. Mount to provide:
 - a. Protect from heat, shock, and vibrations.
 - b. Provide accessibility for maintenance.
 - c. Free from interference with piping, conduit and equipment.

END OF SECTION

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SECTION 43 7300 – PRESSURE INSTRUMENTATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pressure Transmitters.
 - a. Pressure Transmitters (Gauge and Absolute).
 - b. Differential Pressure Transmitters.
 - 2. Pressure Switches.
 - a. Electro-Mechanical.
 - 3. Pressure Indicators
 - a. Pressure Gauges – Mechanical.
 - 4. Isolation Devices.
 - a. Diaphragm Seals.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B16.5, Pipe Flanges and Flanged Fittings
 - 2. ASTM International (ASTM):
 - a. A106/A106M, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 3300 – Submittal Procedures.
- B. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 78 23 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content of Operation and Maintenance Manuals.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the Articles describing the elements are acceptable.

2.2 PRESSURE TRANSMITTERS

- A. Pressure Transmitters (Gauge and Absolute):
 - 1. Manufacturers:

- a. MicroComm (L5A)
- b. Endress + Hauser (Cerabar S).
- c. Or Pre-Approved Equal.
2. Material:
 - a. Process flanges and adapters: 316 stainless steel.
 - b. Vent/drain valve. 316 stainless steel.
 - c. Isolating diaphragm. 316 stainless steel.
 - d. Housing: Aluminum.
 - e. Fill Fluid:
 - 1) Utilize halocarbon fill for process applications involving strong oxidizing agents.
 - a) Agents include but are not limited to: Cl₂, KMN0₄, FeCl, NaOH, and NaOCl.
 - 2) Utilize manufacturer's standard fill for other applications.
 - a) Ensure fill is suitable for application temperatures.
 - f. Meet the requirements of NSF/ANSI 61 for wetted or submerged service.
3. Design and fabrication:
 - a. Signal Output: 4-20 mA DC proportional to pressure.
 - b. Power supply: 24 VDC Loop Power.
 - c. Temperature limits:
 - 1) -20 to 140 DEGF (without digital display).
 - d. Over pressure limits: Withstand 300% of stated maximum service pressure without damage.
 - e. Accuracy (includes effects of linearity, repeatability and hysteresis): $\pm 0.10\%$ of calibrated span.
 - f. Stability: $\pm 0.2\%$ of upper range limit for 12 months.
 - g. Temperature effect:
 - 1) Total effect including span and zero errors: + 0.2% of upper range limit per 100 DEGF.
 - h. Minimum 1/2 IN pressure connection.
4. Pressure Transmitter Schedule:

TAG	PRESSURE EQUIPMENT DESCRIPTION	SUPPLIER
SP-HSP	High Service Pump Suction Pressure	Micro-Comm
DP-HSP	High Service Pump Discharge Pressure	Micro-Comm
FWP-1	Finished Water Pressure Transmitter	Micro-Comm

2.3 ACCESSORIES

- A. Furnish all mounting brackets, hardware and appurtenances required for mounting primary elements and transmitters.
 1. Materials, unless otherwise specified, shall be as follows:
 - a. Bolts, nuts, washers, expansion anchors: 316 stainless steel.
 - b. Mounting brackets:
 - 1) Standard 316 stainless steel.

- 2) Highly corrosive areas: Aluminum.
 - c. Mounting plates, angles:
 - 1) Standard: Carbon steel.
 - 2) Corrosive areas: Aluminum.
 - d. Instrument pipe stands:
 - 1) Standard: Hot-dip galvanized 2 IN schedule 40, ASTM A106, Grade B carbon steel.
 - 2) Corrosive areas: Aluminum.
- B. Tubing Support Angles and Brackets:
 - 1. Any of the following materials are acceptable:
 - a. Aluminum support with dielectric material between support and tubing.
 - b. Type 316 stainless steel.
 - c. Fiberglass.
- C. Tubing Tray or Channel:
 - 1. Aluminum.
 - 2. Provide dielectric material between tray or channel and tubing.
- D. Provide handheld communicator compatible with all intelligent transmitters furnished.
 - 1. Hand held communicator shall provide capability to check calibration, change transmitter range, and provide diagnostics.
 - 2. If these features are provided with the intelligent transmitter, the hand held communicator is not required.
- E. Cable lengths between sensors and transmitters shall be continuous (without splices) and as required to accommodate locations as shown on Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install instrument mounting pipe stands level and plumb.
- C. Instrument Valves:
 - 1. Orient stems for proper operation.
 - 2. Install arrays orderly and neat in appearance with true horizontal and vertical lines.
 - 3. Provide a minimum of 2 IN clearance between valve handle turning radii where there are multiple valve handles appearing in a straight line.
 - 4. Valves shall have bonnets and any soft seals removed during welding or soldering into the line.
 - a. When cool, reassemble the valves.
 - 5. Support each valve individually.
 - a. The tubing system does not qualify as support for the valve.

- D. Locate instrument piping and tubing so as to be free of vibration and interference with other piping, conduit, or equipment.
- E. Keep foreign matter out of the system.
- F. Remove all oil on piping and tubing with solvent before piping and tubing installation.
- G. Plug all open ends and connections to keep out contaminants.
- H. Threaded Connection Seals:
 - 1. Use Tite-Seal or acceptable alternate.
 - 2. Use of lead base pipe dope or Teflon tape is not acceptable.
 - 3. Do not apply Tite-Seal to tubing threads of compression fittings.
- I. Instrument Mounting:
 - 1. Mount all instruments where they will be accessible from fixed ladders, platforms, or grade.
 - 2. Mount all local indicating instruments with face forward toward the normal operating area, within reading distance, and in the line of sight.
 - 3. Mount instruments level, plumb, and support rigidly.
 - 4. Mount to provide:
 - a. Protection from heat, shock, and vibrations.
 - b. Accessibility for maintenance.
 - c. Freedom from interference with piping, conduit and equipment.

END OF SECTION

SECTION 40 7500 – CONTINUOUS CHLORINE ANALYZER

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Chlorine Residual (Total) Analyzer.
 - 2. Free Chlorine Analyzer.

1.2 QUALITY ASSURANCE

- A. National Electrical Manufacturers Association (NEMA):
 - 1. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 3300 – Submittal Procedures

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the Articles describing the elements are acceptable.
- B. Chlorine Residual (TOTAL) Transmitters:
 - 1. Manufacturers:
 - a. Hatch CL17sc and model SC4500 series controller (transmitter).
 - b. Or Engineer Pre-Approved Equal.
 - 2. Materials:
 - a. Enclosure: ABS plastic with clear polycarbonate windows.
 - 3. Design and fabrication:
 - a. Utilize colorimeter with seal-free, solid state mixing system, including self-cleaning stir bar.
 - b. Accuracy: $\pm 5\%$ or ± 0.035 MG/L as Cl_2 , whichever is greater.
 - c. Operate from 120 VAC power.
 - d. Provide with one-month supply of reagents.
 - e. Transmitter:
 - 1) Local digital display:
 - a) LCD or LED.
 - b) Minimum 3-1/2 digit.
 - 2) Current output: Isolated 4-20 mA DC.
 - 3) Power supply: 120 VAC.
 - 4) Ambient temperature: 0 to 122 DEGF.
 - 5) Ambient humidity: 0-95%.
 - 6) Schedule: None required

C. Free Chlorine Transmitters:

1. Manufacturers:
 - a. Hatch Model CL17.
 - b. Or Engineer Pre-Approved Equal.
2. Materials:
 - a. Enclosure: plastic with clear polycarbonate windows.
3. Design and fabrication:
 - a. Utilize colorimeter with seal-free, solid state mixing system, including self cleaning stir bar.
 - b. Accuracy: $\pm 5\%$ or ± 0.035 MG/L as Cl_2 , whichever is greater.
 - c. Operate from 120 VAC power.
 - d. Provide with amplifiers, signal converting circuitry, range and zero adjustment, all with coupling and voltage regulation circuitry as required to enable chlorine residual transmitter to meet criteria specified.
 - e. Provide with one-month supply of reagents.

2.2 MANUFACTURER'S SERVICE AND START-UP

- A. Contractor will include the manufacturer's services to perform start-up on instrument to include basic operational training and certification of performance of the instrument.
- B. Contractor will include a manufacturer's Service Agreement that covers all the manufacturer's recommended preventative maintenance, and any necessary repairs beginning from the time of equipment startup through to end user acceptance / plant turnover and the first 12 months of end-user operation post turnover.
- C. Items A and B are to be performed by manufacturer's factory-trained service personnel. Field service and factory repair by personnel not employed by the manufacturer is not allowed.
- D. Use of manufacturer's service parts and reagents is required. Third-party parts and reagents are not approved for use.
- E. Schedule:

TAG	CL2 Analyzer DESCRIPTION	ACCESSORIES	SUPPLIER
CCA-1	Finished Water CL2	none	Micro-Comm
CCA-2	Finished Water CL2	none	Micro-Comm

END OF SECTION

SECTION 43 2113 – HORIZONTAL SPLIT CASE CENTRIFUGAL PUMPS

PART 1 GENERAL

1.1 DESCRIPTION

- A. The Contractor shall furnish materials, equipment and labor to furnish, install and test the pumping system complete with the pumps, motors, mounting bases, piping, valves and appurtenances, as indicated on the Drawings and as herein specified.

1.2 QUALITY ASSURANCE

- A. Codes and Regulations:
 - 1. NSF/ANSI Standard 61 and NSF/ANSI Standard 327.

1.3 INSTALLATION

- A. The Contractor shall insure that the pumps and motors are properly installed with no pipe strain transmitted to the pump casing.

1.4 RESPONSIBILITY

- A. To assure a properly integrated and compatible system, all equipment described in this section shall be furnished by the Pump Manufacturer, who shall assume full responsibility for the proper operation of the pumps and associated equipment.

1.5 SUPERVISION

- A. The Contractor shall arrange for the Pump Manufacturer to provide a factory-trained representative as required for the purpose of supervision installation, start-up, final field acceptance testing, and providing instruction to the Owner's operating personnel in the proper operation and maintenance of the equipment in this section.

1.6 REFERENCE STANDARDS

- A. The work in this section is subject to the requirements of applicable portions of the following standards:
 - 1. Hydraulic Institute Standards
 - 2. IEEE Standards
 - 3. NEMA Standards
 - 4. OSHA Rules and Regulations

PART 2 PRODUCTS

2.1 GENERAL DESCRIPTION

- A. Furnish and install as shown on the plans three (3) right-hand Grundfos Model 4015-9/0 kp horizontal split-case, double suction, single stage centrifugal pump. The pump shall be capable of delivering at design conditions a capacity of 1,050 gpm when operating against a total dynamic head of 236 feet and at this condition, shall have a minimum efficiency of 75%. Minimum shut-off head acceptable will be 257 feet. Pump shall operate at a maximum synchronous speed of 1775 rpm.
- B. A unit operating at a lesser rotative speed will be considered but in no event will a pump operating at more than the maximum speed specified be acceptable.

2.2 CASING ASSEMBLY

- A. Pump casing shall be of close-grained cast-iron construction conforming to ASTM A48 CL30, free from blow and sand holes, with a minimum tensile strength of 30,000 PSI, a nominal wall thickness of 0.46 inches, and suitable for a maximum working pressure of 250 PSI when 125# ANSI flanges are used.
- B. Casing shall withstand a minimum 200 PSI hydrostatic test.
- C. Casing shall consist of upper and lower half castings containing the volute and suction passages, and removable bearing housings that are doweled and securely bolted to the lower half casing, inboard and outboard bearings shall be replaceable without the need for field alignment.
- D. Casing shall be axially split along the horizontal shaft centerline with flat-faced 6" x 4" suction and discharge flanges and mounting feet cast integral with the lower half casing.
- E. Casing shall be line-bored to assure concentricity and angular alignment.
- F. The upper and lower half casings shall be single volute, doweled to permit easy removal, and accurate replacement of the upper half for inspection and maintenance. The upper half casing shall be completely removable without disturbing the suction or discharge piping connections.
- G. Suction and discharge connections shall be sized to reduce hydraulic friction losses and to reduce turbulence and pipe noise. All suction and discharge flanges shall be designed for straight through nut-and-bolt flange connections with 125# ANSI drilling.
- H. Upper half casing shall have a drilled and tapped connection at the highest point on the casing for the purpose of pump priming or air release. Lower half casing shall be drilled and tapped to allow for drainage piping.

2.3 IMPELLER

- A. The impeller shall be of the enclosed type, double suction, Francis vane design, to minimize inlet losses and accommodate high suction lifts.

- B. Impeller shall be statically and dynamically balanced to reduce bearing loading.
- C. Impeller shall be precision cast in one piece with smooth flow contours to promote maximum efficiency.
- D. Impeller shall be fixed axially along the shaft by shaft sleeves and nuts and secured to the shaft through a precision fit and full-length key.
- E. The impeller hub shall have sufficient metal thickness to allow machining for installation of impeller wear rings.
- F. Impeller shall be manufactured of Nickel Aluminum Bronze to ASTM A148 USN C95800 having a minimum tensile strength of 55,000 PSI. Impeller minimum weight shall be 26.5 Lbs.

2.4 SHAFT

- A. The pump shaft shall be manufactured of high quality heat treated steel of sufficient diameter to allow no greater than 0.003" maximum deflection measured at the sealing box for all normal performance conditions on the curve.
- B. Shaft shall be manufactured to meet stiff shaft construction with a critical speed at least 25% in excess of operating speed, in order to prevent vibration and fatigue.
- C. The shaft shall be accurately machined along its entire length. No threads shall be machined adjacent to the impeller.

2.5 SEALING BOX

- A. The sealing box shall be machined into the casing.
- B. Sealing box shall contain a single-piece gland and a single unbalanced mechanical seal similar to a John Crane type 21.
- C. Seal faces shall be carbon vs. ceramic and internal hardware shall be stainless steel.
- D. External piping complete with snubber valves shall be installed from the casing to each sealing box to circulate sealing water.

2.6 PUMP MOTOR

- A. The pumps shall be flexible coupled to a standard horizontal NEMA, 100 HP, 3 phase, 60 Hertz, 230/460 volts, 1775 RPM, Premium-efficient, Inverter-duty rated with a 1.15 service factor.
- B. The pump shall be driven by a horizontal motor and shall be non-overloading anywhere on the hydraulic curve.
- C. Pump and motor shall be mounted on a common heavy baseplate of formed steel. Pump and motor must be checked for alignment after the pump base has been installed and routed in place,

in accordance with the standards of the Hydraulic Institute. There shall be no strain transmitted to the pumps.

PART 3 EXECUTION

3.1 INSPECTION AND FACTORY TESTS

- A. The Engineer and/or Owner shall have the right to witness, at their cost, the factory tests and inspect any equipment to be furnished under this section prior to their shipment from place of manufacture.
- B. Testing may be performed using factory (shop) Motor and VFD.
- C. A certified Hydrostatic and Performance test shall be performed on each pumping unit in accordance with Hydraulic Institute standards, latest edition. Tests shall be sufficient to determine the curves of head input horsepower, and efficiency relative to capacity from shutoff to 150% of design flow.
- D. A minimum of six points, including shutoff, shall be taken for each test.
- E. At least one point of the six shall be taken as near as possible to each specified condition.
- F. Certified copies of the Hydrostatic and Performance Test Report shall be supplied prior to shipment.
- G. Cast surface of all components shall be examined by visual inspection per MSS-SP-55.

3.2 INSTALLATION AND ACCEPTANCE TESTS

- A. The pumping units shall be installed in accordance with the instruction of the manufacturer and as shown on the drawings by the Contractor.
- B. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.

END OF SECTION

SECTION 43 2220 – FORCED DRAFT AERATOR SPECIFICATION

PART 1 GENERAL

1.1 GENERAL

- A. This specification describes a complete operational system to be furnished by a single responsible equipment manufacturer. The equipment described herein is based on products and services as manufactured by Tonka Water, a Kurita brand, of Minneapolis, MN.
- B. It is the intent of this specification that the aerator manufacturer assume system and process responsibility for the aeration equipment, ion exchange equipment and appurtenances. Therefore the aeration equipment manufacturer shall provide the aeration equipment and all appurtenances described in this section of the specification.
- C. This specification has been prepared on the basis of the specific requirements for this application. These specifications require modification of manufacturer's standard equipment design. It will be mandatory that all equipment manufacturers meet all requirements of this specification. Equipment manufacturer shall modify their standard designs and recommended operational parameters to meet all requirements of this specification. Any claims to the contrary, whether specific or implied, indicating that the equipment may not meet the specifications, will be considered grounds for rejection of the bid.
- D. The equipment manufacturer must have a quality management system that is ISO 9001:2015 certified. Certification must remain in effect throughout the project start-up.

1.2 QUALITY ASSURANCE

- A. Reference Standards. AWWA, ANSI, ASME, FDA, and NSF.
- B. Qualification of Manufacturers
 - 1. All bidding contractors shall base their bids on systems and equipment manufactured by the named base bid manufacturer, Tonka Water, a Kurita brand, of Minneapolis, MN.

1.3 SUBMITTALS/SHOP DRAWINGS

- A. Shop Drawings: Submit complete set electronically for approval prior to fabrication.
- B. O&M manuals: Provide 1 printed copy and 1 digital media copies.

PART 2 PRODUCTS

2.1 MATERIALS/EQUIPMENT

- A. All components of the system herein described shall be fabricated and manufactured from new, unused materials, free from defects, of the highest quality possible.

- B. The materials and equipment shall be of the configuration, quantity and design features as described on the Equipment Schedule found in this specification.

2.2 DETAILS OF VESSEL CONSTRUCTION

A. Aerator

1. The aerator body shall be of a square configuration. The unit chamber shall be minimum 3/16" thick 5052 aluminum plate construction. The body, top and bottom plates shall be appropriately reinforced with structural aluminum members. The aerator chamber shall be continuously fillet welded throughout on both the interior and exterior of the unit. All welds shall be of the same size as the thickness of the plate specified.
2. The aerator chamber shall be supplied with a hinged full width side access panel. The hinged side panel shall be designed to swing out of the way to permit access to the internal tube trays. The side access panel shall be gasketed to prevent leakage around the perimeter surfaces of the door. The door shall be equipped with a no-bolt entry system that will permit the door to be opened without having to loosen any perimeter bolts and nuts or latches.
3. Structural support legs shall be fabricated of the same materials of construction as the aerator chamber. The support legs shall be equipped with mounting holes. Anchor bolts provided by the Contractor as shown on the plans.
4. The aerator chamber shall include a flanged raw water influent connection, plain end effluent connection, and inspection hatch as described in the Equipment Schedule.
5. The top of the aerator shall be provided with an air exhaust curb for mounting the air exhaust assembly.

2.3 AERATOR COMPONENTS

- A. The aerator shall include a raw water header-lateral distribution system incorporating Tonka Water low head, hollow cone pattern spray nozzles. The nozzles shall be a non-clog design, constructed of Sch. 80 PVC. The nozzles shall be designed to operate with at the design flow, but not to exceed a pressure drop of 3.5 psi. The header and laterals shall be supported and braced to withstand all hydraulic forces encountered during operation. Systems utilizing distribution pans with target nozzles to distribute the water shall not be acceptable, due to the inability of this design to create a fine water droplet.
- B. An all aluminum moisture separator shall be located within the aerator housing air exhaust curb. The moisture separator shall be designed to remove excess moisture from the air stream before it enters the exhaust ventilator. The separator shall require the air flow to go through four changes of direction and include suitable condensate troughs for drainage.
- C. The air exhaust housing shall be all aluminum construction equipped with a 24 mesh stainless steel screened hood assembly to prevent water and debris from entering into the housing.
- D. Ten tiers of PVC trays shall be provided. The PVC trays shall be installed and supported on a series of aluminum grids welded to the aerator sidewalls and located perpendicular to the removable side opening. Support grids shall be provided along the length of the tubes at no greater than 24" centers to prevent sagging. The design of the PVC tray support grid shall be such that each individual PVC tray member can be removed permitting cleaning without having

to remove the entire internal tray assembly. The PVC trays shall not have a separation greater than 6 inches.

- E. The forced draft aerator chamber shall be equipped with a sufficiently sized air inlet assembly. The assembly shall be designed so as not to impede the flow of air required for proper aeration. The assembly shall be fabricated of the same materials specified for the aerator chamber.
- F. The air inlet assembly shall include a deflector baffle assembly. The deflector baffle assembly shall be designed to properly distribute the inlet air throughout the cross sectional area of the aerator.
- G. An air seal assembly shall be provided to prevent air from entering the effluent pipe. This air seal shall be vented and positive draining.

2.4 BLOWER ASSEMBLY

- A. A spark resistant forced draft centrifugal blower shall be provided and installed as shown on the plans. The fan blades shall be backwardly inclined, belt driven and arranged such that air is discharged horizontally. The centrifugal blower assembly shall be arranged for easy access to motor, drive and bearings for ease in installation, lubrication belt adjustment and wiring. The blower shall be licensed to bear the AMCA Seal. The blower shall be heavy gauge all welded steel construction. Blower shall be supplied with self aligning single row ball bearings. Bearings to have a 100,000 average life hours based on the maximum design of the blower Motor base shall be adjustable and pivoted on one end for easy drive adjustment. The centrifugal blower assembly shall be equipped with a weatherproof enclosure. The inlet to the blower shall be covered with a 24 mesh stainless steel screen. The blower shall be statically and dynamically balanced for quiet operation and sized to provide the air volume and pressure as listed on the Equipment Schedule.
- B. Guards shall be provided to protect all moving parts from general traffic conditions. All equipment, guards, and protective devices shall meet or exceed OSHA safety regulations. The fan shall be equipped with a flexible connection and transition duct for connecting the blowers to the aerator.
- C. An aluminum intake box with 304 stainless steel screen shall be provided to be attached to the blower in the field by installing contractor.
- D. Transition ductwork between blower and aerator, including a flexible connector, shall be supplied by installing contractor.

2.5 FINISHES

- A. All exterior surfaces of the aerator shall receive a buff-blast finish prior to shipment of the unit.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Delivery and Storage
 - 1. Upon delivery of the equipment to the jobsite, the contractor shall take inventory of the shipment and immediately report to the equipment manufacturer any discrepancies between the equipment manufacturer's packing lists and shipping documents.
 - 2. The contractor shall be responsible for off-loading and protection of all equipment against damage and during on-site storage and installation. Damaged equipment and materials will be replaced by the contractor at the contractor's expense.
- B. Manufacturer's Instructions. Installation shall be as shown on the plans and in accordance with the manufacturer's recommendations, installation instructions and assembly drawings. Manufacturer's installation instructions and assembly drawings shall be submitted and approved by the engineer prior to shipment of equipment.

3.2 FACTORY SERVICES AND START-UP

- A. System Start-Up and Training
 - 1. The contractor will verify in writing that the project is ready for manufacturers field services. Copies of written verification shall be given to the manufacturer, engineer and owner prior to scheduling field services.
 - 2. The contractor shall provide the services of a factory representative during start-up of the treatment equipment. The contractor shall provide the number of days on site for start-up supervision as outlined in the Equipment Schedule. At a minimum, the equipment manufacturer's technician shall perform the following start-up functions:
 - a. Inspect the final installation to assure proper installation, connection and wiring of all equipment of the manufacturer's supply.
 - b. Start-up of the equipment in the presence of the Contractor and Owner's operating personnel.
 - c. Training of Owner's operating personnel in proper operation and maintenance procedures, start-up/shutdown procedures, response to emergency conditions, and troubleshooting. The responsibility of the Contractor and the factory service representative with regard to start-up shall be fulfilled when the start-up is complete, the equipment is functioning properly, operating personnel have been trained and the equipment has been accepted by the Owner.

EQUIPMENT SCHEDULE

2.1 MATERIALS AND EQUIPMENT

Plant Flow Rate:	2500 GPM
Number of Aerators:	ONE (1)
Aerator Dimensions:	10 ft. square
Body Height:	9 ft.
Leg Height:	12 in.
Surface Area:	100 sq. ft. per vessel
Packing Type:	SDR 21 Tubes
Nozzle Sizing:	
	Flanged Influent: 14"
	Plain End Effluent: 16"
Inspection Hatches:	
	Upper Hatch: 12" x 16"
	Lower Hatch: 14" x 18"
Door:	
	Single or Double: Double
	Bolted or Boltless: Boltless

2.4 BLOWER

Number of Blowers:	ONE (1)
Required Capacity per Blower:	8400 CFM
Static Pressure:	3/8"
H.P.:	3
Voltage Requirements:	230/460

3.2.A FACTORY SERVICES & START-UP

Included with Ion Exchange Startup

END OF SECTION

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SECTION 43 2221 – CATION EXCHANGE SYSTEM SPECIFICATION

PART 1 GENERAL

1.1 SUMMARY

- A. This specification describes a complete operational system to be furnished by a single responsible equipment manufacturer. The equipment described herein is based on products and services as manufactured by Tonka Water, a Kurita brand, of Minneapolis, MN.
- B. It is the intent of this specification that the ion exchange equipment manufacturer assumes system and process responsibility for the ion exchange equipment, forced draft aerator and appurtenances. Therefore, the ion exchange equipment manufacturer shall provide the ion exchange equipment and all appurtenances described in this section of the specification including but not limited to; facepiping, valves, controls, etc.
- C. This specification has been prepared on the basis of the specific requirements for this application. These specifications require modification of manufacturer's standard equipment design. It will be mandatory that all equipment manufacturers meet all requirements of this specification. Equipment manufacturer shall modify their standard designs and recommended operational parameters to meet all requirements of this specification. Any claims to the contrary, whether specific or implied, indicating that the equipment may not meet the specifications, will be considered grounds for rejection of the bid.
- D. The equipment manufacturer must have a quality management system that is ISO 9001:2015 certified. Certification must remain in effect throughout the project start-up.
- E. The Owner has ordered the pressure vessels directly. The Contractor shall be responsible for unloading, installing and any other work required for a functional system per the Plans, Specs, and manufacturers recommendation.

1.2 QUALITY ASSURANCE

- A. Reference Standards. AWWA, ANSI, ASME, FDA, and NSF.
- B. Qualification of Manufacturers
 - 1. All bidding contractors shall base their bids on systems and equipment manufactured by the named base bid manufacturer, Tonka Water, a Kurita brand, of Minneapolis, MN.

1.3 SUBMITTALS/SHOP DRAWINGS

- A. Shop Drawings: Submit complete set electronically for approval prior to fabrication.
- B. O&M manuals: Provide 1 printed copy and 1 digital media copy.

PART 2 PRODUCTS

2.1 MATERIALS/EQUIPMENT

- A. All components of the system herein described shall be fabricated and manufactured from new, unused materials, free from defects, of the highest quality possible.
- B. The materials and equipment shall be of the configuration, quantity and design features as described on the Equipment Schedule found in this specification.

2.2 DETAILS OF CONSTRUCTION

- A. Vessel
 - 1. All pressure vessels shall conform to the Equipment Schedule and be constructed in accordance with Section VIII of the ASME code requirements for cold fired pressure vessels, and shall bear the ASME stamp. Minimum thicknesses shall be furnished in accordance with ASME code requirements. Verification of ASME code design to include calculated head and shell thicknesses. They shall be submitted with the first submittal drawing and be approved by the engineer prior to authorization of fabrication. Vessels shall be fabricated in a facility holding a current ASME U-stamp. Facilities holding an ASME R ("repair") or other certification shall not be considered acceptable for vessel fabrication.
 - 2. All flanges, plates, angles, channels, beams, etc., shall be joined by fillet welds, all sides continuous welded per AWS D1.1. Flanges shall be factory welded on split centers prior to shipment.
- B. Vessel Interior Construction
 - 1. Raw Water Distributor/Backwash Collection System
 - a. The vessel shall be equipped with a raw water distribution/backwash waste collection system consisting of a steel header-lateral with upturned elbows. The header-lateral shall be designed for equal distribution and collection of water across the entire surface area of the media. Splash plate systems are not acceptable.
 - b. The header-lateral shall be designed to accept a backwash flow of 15 gpm/sq. ft.
 - c. The washwater collectors must be 24 inches above the top of the resin in the ion exchange softener vessel.
 - d. Backwash operation shall maintain a backward rate of 6-8 gpm/sq. ft. of bed area.
 - 2. Underdrain System
 - a. The underdrain shall be of the header-lateral design. It shall be amply designed to ensure uniformity of flow in both the backwash and treatment modes of operation. The underdrain shall be of PVC pipe construction and shall be structurally supported. The underdrain systems shall incorporate a header pipe with laterals. The laterals shall be provided with openings to accept the underdrain diffuser nozzles. The header lateral underdrain shall be constructed of PVC with all joints solvent welded. No threaded joints will be allowed.
 - b. The header-lateral underdrain piping shall be factory installed by the equipment manufacturer. Installation of header-lateral piping in the field by the installing contractor is unacceptable. Concrete fill shall be installed in the field by the contractor up to the bottom of the underdrain diffuser nozzle connections. Care shall be taken so as not to introduce foreign material into the underdrain piping during the installation process. The laterals will be plugged until the installation process has been complete

after which the plugs shall be removed and the underdrain diffuser nozzles shall be installed by the contractor.

- c. The underdrain diffuser nozzles shall be non-metallic underdrain nozzles with orifice control area of the underdrain diffuser nozzle equal to 0.3% of the total cross sectional area measured at the surface of the media. The underdrain area is critical to the success of the treatment system and particular attention will be paid to diffuser nozzle design, layout and function. Diffuser nozzles using pressed or crimped sheet metal shall not be acceptable due to poor tack weld strength, distribution and "dead spot" characteristics. Toggle-bolted designs are not permitted due to their inherent loosening potential.

C. Vessel Miscellaneous Components

1. Each ion exchange vessel shall be equipped with one 24" manway, rated for the working pressure of the vessel. The manway shall be placed on the top head for access into the vessel for purposes of resin loading and observation.
2. 1/2" diameter, full couplings shall be provided as described in the Equipment Schedule for sample taps.
3. Structural steel legs shall be provided for support of the vessels.
4. Contractor shall furnish anchor bolts as shown on the Plans.
5. Pipe nozzles shall be of the size as shown on the Equipment Schedule and shall consist of Sch. 40 steel pipe, projecting and terminating in a flange 6" from the outside face of the sideshell. Flanges shall be standard ANSI pattern, welded on split centers and shall be true and plumb.
6. A 2" air release half coupling shall be provided in the top head center. Gauge taps shall be furnished in the influent and effluent nozzle connections (1/2" NPT tap with plug).
7. A 2" drain with ball valve and plug shall be provided in the lower piping.

2.3 SUPPORT GRAVELS

- A. The support gravel shall consist of hard rounded stones with an average specific gravity of not less than 2.5. It shall not contain more than 2% of weight of pieces in which the length is three times the width. The gravel shall be free of shale, mica, clay, sand, dirt and organic impurities.
- B. The support gravels shall be placed in the tank as shown on the Equipment Schedule.
- C. The bottom layer of the screened support gravel shall be placed by hand to avoid damage to the diffuser assemblies. Each layer shall be placed and leveled before the addition of the next layer is started. A gravel-less underdrain shall not be acceptable.
- D. The resin shall be placed on top of the support gravel and meet the requirements as shown on the attached Equipment Schedule.
- E. The support gravels shall be procured from a manufacturer that complies with AWWA B-100 standards. Installation of the support gravel shall be in accordance with AWWA B-100 procedures. Installation of support gravels and resin shall be under the direct supervision of an employee of the equipment manufacturer experienced in this procedure.

2.4 ION EXCHANGE RESIN

- A. A high capacity polystyrene cation exchange resin shall be furnished for each ion exchange vessel as indicated in the Equipment Schedule. The resin shall have a minimum rated exchange capacity of 20,000 grains of hardness as CaCO_3 per cubic foot when regenerated with six pounds of salt per cubic foot of resin. Approved manufacturers are Thermax, Purolite, and Dow.
- B. The resin shall be placed in the ion exchange vessels above the support gravel beds. Placement of the ion exchange resin shall be under the direct supervision of a qualified employee of the ion exchange equipment manufacturer.

2.5 REGENERANT DISTRIBUTOR

- A. Distributor
 - 1. The distribution system shall be a header-lateral design located at an elevation of approximately 6" above the resin bed. Brine injection through the inlet distributor shall not be acceptable due to mal-distribution at such low flow rates.
 - 2. Materials. The system construction shall be Sch. 80 PVC pipe and fittings. Laterals shall be shop fabricated from Sch. 80 PVC, minimum 3/4" diameter, and solvent welded in place by the installing contractor. Each lateral shall be fitted with an end cap and a specially machined Sch. 80 male adapter for solvent welding into the distribution header. Laterals shall be evenly spaced at not more than 12" lateral to lateral spacing along the entire length of the header, each side. Laterals shall be supported at not greater than 2' intervals using steel angles. Supports shall be adjustable in two directions.
 - 3. Lateral Design. Each lateral shall be secured using a double wrap at each support with polypropylene ties. Specially sized brine metering control orifices shall be placed at 6" intervals along each lateral. Each orifice shall be installed at a 45o angle, alternating from the vertical axis of the installed brine laterals.

2.6 FACE PIPING

- A. All piping and fittings shall be Class 53 cement mortar lined and asphaltic coated ductile iron. Flanges shall be of ANSI construction and bolt pattern.
- B. Ion exchange facepiping shall be provided by the ion exchange manufacturer to the limits shown on the plans.

2.7 VALVES

- A. Filter function valves shall be electrically actuated and shall be provided by the filter equipment manufacturer. Valve size shall be as specified on the attached Equipment Schedule.
- B. All filter function valves shall be wafer style butterfly valves, and shall have a one piece through-stem direct drive requiring no disc screws or pins to connect stem to disc, to ASTM A126 Class B, polyester coated, for mounting between two bolted flanges without the need for gaskets. Resilient seats shall be tongue and groove design with primary hub seal and secondary seal, to prevent line media from contacting stem or body, and a molded O-ring suitable for weldneck and slip-on flanges. Valves shall have bi-directional pressure ratings of 175 psi through 12" and 150 psi from 14" through 20" sizes and tested to 110% of full rating. Disc construction shall be

aluminum bronze ASTM B148-954 or ductile iron ASTM A536 Gr. 65-45-12 with Nylon 11 coating. Valve shaft shall be one piece stainless steel, supported on non-corrosive, heavy duty acetal bushing, and be mechanically retained in body neck, with no part of stem or body exposed to line media. Seat shall be EPDM. Valves supplied shall be Bray Series 30 or engineer approved equal.

- C. Where specified on plans, an electric motor operator shall be supplied on butterfly valves. Motor operators shall be quarter turn type and have a cast aluminum NEMA 4 water tight housing, auxiliary open and closed limit switches 24vdc for PLC feedback, open and closed torque switches, end of travel mechanical stops, declutching handwheel manual override, self-locking worm gears, position indicator, and anti-condensation heater. Operators shall use 120VAC single phase power. Valves used for modulating service shall include a 4-20 mA input modulating card. Electric motor operators shall be Bray Series 70 or engineer pre-approved equal.
- D. Where manual actuators are specified in the Equipment Schedule they shall be handwheel type gear with cast iron housing and handwheel and position indicator.
- E. Electrically actuated valves shall be powered by the filter control panel.

2.8 INSTRUMENTATION

- 1. The Contractor shall furnish and install a Tonka Water aluminum loss of head gauge panel completely factory fabricated from 3/16" brushed aluminum plate having a textured finish, with minimum dimensions of 18" x 22".
- 2. The gauge panel shall have the following 4-1/2" flush-mounted gauges:
 - a. Inlet header (0-100 psi)
 - b. Effluent header (0-100 psi)
- 3. Each panel shall be equipped with the following components:
 - a. Phenolic nameplates identifying gauges and sample taps.
 - b. Two flush mounted sample taps for influent and effluent locations.
 - c. Manufacturer nameplate, aluminum construction.
- 4. Manufacturer shall furnish mounting hardware (brackets, U-bolts, nuts, washers, etc.) for affixing to facepiping. Installation of panel shall be by Contractor.

2.9 AUTOMATIC REGENERATION CONTROLS

A. General

- 1. The ion exchange system manufacturer shall furnish an automatic control system consisting of a PLC-based control panel with OIT necessary hardware, components, timers, operator interface terminal, enclosure, relays, switches, alarms, I/O, and other items necessary for a complete operational system. The automatic regeneration control system shall be essentially as described below.

B. Hardware

- 1. PLC. The automatic regeneration control panel shall be PLC-based using Allen-Bradley Series PLC's with Allen-Bradley I/O modules and communication hardware compatible with Data Highway network interface to remote plant SCADA. Manufacturer to provide 10% spare I/O capacity including digital and analog I/O.

2. Components. All HOA switches, lights, and indication shall be NEMA 4 rated, Allen-Bradley or equal. Nameplates shall be black Phenolic with white lettering indicating all functions, displays, indication, etc.
3. Operator interface terminal (OIT) shall be Series 1000 PanelView Plus OIT color touch screen by Allen-Bradley or engineer approved equal.
4. The OIT shall be panel mounted and shall indicate the following, via a series of custom designed screens:
 - a. Each ion exchange vessel status (batch set point and batch remaining, flow rate, etc.)
 - b. Service or regeneration sequence/step
 - c. Totalized ion exchange vessel treated flow
 - d. Alarms/alarm acknowledges
 - e. Status of exterior signals from SCADA as specified
 - f. Other functions, indication and information as required for a complete operating system
5. Panel shall include one 15 minute UPS (uninterruptible power supply), UL rated, and shall be furnished to automatically trickle charge. Adequately sized NiCad batteries shall be included to insure PLC and OIT function and indication for an uninterrupted power outage of 15 minutes duration. The UPS will not include power to filter function valves.
6. Panel shall include the breakers necessary to power the electrically actuated filter function valves as specified herein. Wiring between the panel and the individual valve actuators is by the installing contractor. Breakers shall be prior to the UPS; the UPS will not include power to filter function valves.
7. Enclosure. UL/NEMA 12 rated, wall mount enclosure, containing space for separate back panel mounting of PLC, power supply, I/O racks, wiring terminal blocks properly labeled and numbered, uninterruptible back-up power supply, fuses, switches, communication modem, etc., all as required for a complete operating system. Enclosure shall be UL rated and bear the UL stamp prior to shipment.
8. Timers. Countdown timers shall be located on a timer screen on the OIT in the ion exchange control panel. Timers will be provided to indicate the following:
 - a. Backwash
 - b. Brining
 - c. Slow Rinse
 - d. Fast Rinse

C. Functional Control Description

1. General. During automatic operation the PLC shall control the individual ion exchange functions and shall indicate and communicate individual ion exchange vessel status to the OIT and remote SCADA system as required.
2. Normal operation consists of opening ion exchange vessel influent and effluent valves, which are their normal positions. Each vessel effluent will include a flow meter, which will transmit a signal to the PLC control that will be used for the flow totalization batch control and display of rate of flow. The OIT will include a batch control screen for each vessel, which will allow the operator to set the batch volume in gallons. The meter signal will be used to show a count-up volume in gallons for each vessel. Once the batch counter has reached the batch set point the vessel will be placed into regeneration by the PLC.
3. Once regeneration has been initiated the regeneration will automatically sequence as programmed. Only one ion exchange vessel may be regenerated at a time. If a second ion exchange vessel should require regeneration while another unit is in regeneration, it will remain in service until the first ion exchange vessel regeneration has been completed.
4. The regeneration sequence shall be as follows:

Step	Set-point
1. Backwash	OIT timer screen, adjustable timer
2. Brine	Brine batch meter control with adjustable watch dog timer
3. Slow Rinse	OIT timer screen, adjustable timer
4. Fast Rinse	OIT timer screen, adjustable timer

5. The Backwash, Slow Rinse, and Fast Rinse steps will be based on operator-adjustable set-points on the OIT. The Brine step will be based on a batch set-point. The brine meter will send a signal to the PLC control that will be used for the batch and reset control. The OIT will include a batch control screen for the brine meter. The batch control screen will allow the operator to set the batch volume in gallons. The meter signal shall be used to calculate a count up volume in gallons for the brine feed system. Once the batch counter has reached the batch set point the brine pumps will be shut down and the slow rinse step of the regeneration will be initiated.
 6. Upon completion of the ion exchange vessel regeneration, the regenerated vessel will be put back into service and the batch control shall be reset for the next regeneration brine cycle.
- D. Power Failure. If power to the PLC is lost, the uninterruptible power supply shall engage and shall continue automatic operation of the control panel (all function and indication) for a minimum of 15 minutes. If after 15 minutes power has not been restored to the ion exchange control panel, then all valves shall fail to “service” condition, meaning that all ion exchange vessels shall be placed into normal service mode.
- E. Alarms. The following minimum alarms shall be indicated on the alarm OIT screen: regeneration hold; regeneration abort; and other relevant alarm conditions affecting ion exchange operation.
- F. Communication Modem. The control panel shall contain capability for use of a communication modem allowing remote access to its PLC and OIT to effect program changes remotely from the Tonka Water factory.
1. Remote Access Capability. The system control panel shall contain capability for remote screen mirroring, through Ethernet, of the system control panel PLC and OIT to monitor and operate the system, using customer supplied internet access/VPN.
 2. Supply wireless capable tablet with VNC viewer for remote access via VPN.
 3. Remote Programming Capability. The system control panel shall contain router and VPN gateway that includes capability for remote programming, through Ethernet, of the system control panel PLC, and OIT to troubleshoot and make changes to the system, using customer supplied internet access/VPN.
- G. Shop Testing Prior to Shipment. Prior to shipment, the ion exchange control panel shall be fully tested with all alarms, indication and I/O fully simulated at the factory prior to shipment. All screens shall be tested along with all alarm functions and other control parameters, verified by factory certification as to inspector and date inspected. Testing shall be subject to verified witnessing by the engineer if required.
- H. Manual Override – Ability to manually override all automatic control shall be provided.

2.10 ION EXCHANGE EFFLUENT WATER METERS

- A. A flanged in-line bi-directional magnetic flow meter shall be used to measure flows in lower piping. The meter shall be fabricated from carbon steel and internally lined with polyurethane or Ebonite hard rubber. The meter housing shall be rated for a pressure of 200 psi or higher. The meter shall include one (1) stainless steel ground ring, shipped loose for installation on one side of the meter. Full face gaskets shall be installed between grounding ring and the flanged ends of the meter. The meter shall be furnished with a remote mount converter housed in a NEMA 4 enclosure with readout display. The meter shall be fitted with an integral transmitter capable of producing pulse and analog output signals. Acceptable manufacturers are Rosemount, Siemens, or equal.

2.11 BRINE METER

- A. A positive displacement nutating disc type brine meter shall be provided for installation in the brine line for measuring gallons of brine pumped and controlling operation of the brine pumps. The meter shall be of bronze or thermoplastic construction with thermoplastic internals. The meter housing shall be rated for an operating pressure of 150 psi. The meter shall be fitted with an electronic transmitter capable of producing a pulse output.

2.12 BRINE SYSTEM COMPONENTS

- A. Brine Pump Skid System
 - 1. One brine with accessories shall be supplied for the application of brine during ion exchange regeneration.
 - 2. The brine pump skid shall be of adequate capacity to meet the brining requirements of ion exchange regeneration.

NOTE: Interconnecting piping, service valves, 2" pressure reducing valve and backflow preventer to be supplied by installing contractor

2.13 RAW BLENDING SYSTEM

- A. The ion exchange treatment system shall incorporate a raw water blending system. A controlled amount of raw water shall be blended with the treated water effluent, so as to maintain a finished water quality as specified in the Equipment Schedule.
- B. Blend Valve. A butterfly valve with modulating actuator shall be used to properly control the amount of water bypassing the ion exchange system. The system PLC shall, based on flow percentages, send a signal to modulate the blend valve as necessary to maintain the desired concentration in the finished water.
- C. Blend Meter. A flanged in-line magnetic flow meter shall be used to measure system bypass flow rate. The meter shall be fabricated from carbon steel and internally lined with polyurethane or Ebonite hard rubber. The meter housing shall be rated for a pressure of 200 psi or higher. The meter shall include two (2) stainless steel ground rings, shipped loose for installation on each side of the meter. Full face gaskets shall be installed between grounding rings and the flanged ends of the meter. The meter shall be furnished with a local mount converter housed in a NEMA 4

enclosure with local readout display. The meter shall be fitted with an integral transmitter capable of producing pulse and analog output signals. Acceptable manufacturers are Rosemount, Siemens, or equal.

- D. A manual shutoff valve shall be installed on each end of the blend line to permit complete isolation of the blend line components as shown on the plans.

2.14 PAINTING

- A. The interior of the vessels shall be sandblasted per SSPC-SP10 and coated as follows:
1. Stripe Coating: hand-apply one coat Tnemec Series 21-WH16 off white to all welds and hard to reach areas using high quality natural or synthetic bristle brush, to a dry film thickness of 3-5 mils.
 2. Prime Coating: Tnemec Series 21-WH16 off white primer to a dry mil thickness of 4-6 mils before any rust can form.
 3. Finish Coating: Tnemec Series 21-WH16 off white to a dry mil thickness of 4-6 mils for a total dry film thickness of 8-12 mils.
 4. Exterior – Shop sandblasted per SSPC-SP6 and coated as follows:
 - a. Stripe Coating: Hand-apply one coat Tnemec Series 21-WH16 off white to all welds and hard to reach areas using high quality natural or synthetic bristle brush, to a dry film thickness of 3-5 mils.
 5. Prime Coating: Tnemec Series 21-WH16 off white primer to a dry mil thickness of 4-6 mils before any rust can form.
 6. Finish Coating: NOT included. Provided and applied by contractor after vessel is installed.
- B. Surface preparation:
1. Interior - Sandblast to near white blast cleaning (SSPC-SP10).
 2. Exterior - Sandblast to commercial blast cleaning (SSPC-SP6).
- C. Coating:
1. Interior
 - a. Stripe coating: hand-apply one coat Tnemec Series N140-15BL tank white to all welds and hard to reach areas using high quality natural or synthetic bristle brush, to a dry film thickness of 3-5 mils.
 - b. Prime coating: Tnemec Series N140-1255 Beige primer to a dry mil thickness of 3-5 mils before any rust can form.
 - c. Finish coating: Tnemec Series N140-15BL tank white to a dry mil thickness of 4-6 mils for a total dry film thickness of 7-11 mils.
 2. Exterior
 - a. Stripe coating: hand-apply one coat Tnemec Series N140-15BL tank white to all welds and hard to reach areas using high quality natural or synthetic bristle brush, to a dry film thickness of 3-5 mils.
 - b. Prime coating: Tnemec Series N140-1255 Beige primer to a dry mil thickness of 3-5 mils before any rust can form.
 - c. Finish coating: The exterior finish coat shall be applied by installing contractor with compatible system.

- D. The total paint system shall be the product of and be applied in accordance with the recommendations of one manufacturer. Alternate paint systems must be pre-approved by engineer. Contractor shall purchase an adequate amount of touch-up paint, if required.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Delivery and Storage
 - 1. Upon delivery of the equipment to the jobsite, the contractor shall take inventory of the shipment and immediately report to the equipment manufacturer any discrepancies between the equipment manufacturer's packing lists and shipping documents.
 - 2. The contractor shall be responsible for off-loading and protection of all equipment against damage and during on-site storage and installation. All media must be stored on pallets in a manner that protects it from UV, radiation and weather. Damaged equipment and materials will be replaced by the contractor at the contractor's expense.
- B. Manufacturer's Instructions. Installation shall be as shown on the plans and in accordance with the manufacturer's recommendations, installation instructions and assembly drawings. Manufacturer's installation instructions and assembly drawings shall be submitted and approved by the engineer prior to shipment of equipment. Installation of the ion exchange system shall be in strict accordance with the details shown on the drawings and in complete conformance to manufacturer's instructions and procedures.

3.2 FACTORY SERVICES AND START-UP

- A. Installation Supervision. The contractor shall coordinate with the ion exchange equipment manufacturer to provide factory supervision (as outlined on the Equipment Schedule) or direction during critical phases of installation. Critical phases will include setting of equipment, installation of internals, installation of controls, wiring instrumentation and other components critical to the successful operation of the system.
- B. Media Installation. Installation of support gravels and ion exchange resin shall be under the direct supervision of an employee of the ion exchange manufacturer experienced in this procedure, in accordance with the Equipment Schedule.
- C. System Start-Up and Training
 - 1. The contractor will verify in writing that the project is ready for manufacturer field services. Copies of written verification shall be given to the manufacturer, engineer and owner prior to scheduling field services.
 - 2. The contractor shall provide the services of a factory representative during start-up of the ion exchange equipment. The contractor shall provide the number of days on site for start-up supervision as outlined in the Equipment Schedule. At a minimum, the ion exchange manufacturer's technician shall perform the following start-up functions:
 - a. Inspect the final installation to assure proper installation, connection and wiring of all equipment of the manufacturer's supply.
 - b. Start-up of the equipment in the presence of the Contractor and Owner's operating personnel.

- c. Training of Owner's operating personnel in proper operation and maintenance procedures, start-up/shutdown procedures, response to emergency conditions, and troubleshooting. The responsibility of the Contractor and the factory service representative with regard to start-up shall be fulfilled when the start-up is complete, the equipment is functioning properly, operating personnel have been trained and the equipment has been accepted by the Owner.

3.3 WARRANTY

A. Effluent Performance Warranty

1. During start-up, the ion exchange manufacturer's representative shall perform raw water and treated water effluent field tests to confirm performance of the equipment.
2. The equipment shall be warranted for a period of one year from the date of placing it on-line. The treated water effluent during this period of time shall be as detailed in the Equipment Schedule.
3. Sampling for conformance shall be taken during the middle of a run. All adjustments necessary to comply with this guarantee shall be made at the Contractor's expense.

EQUIPMENT SCHEDULE

2.1 MATERIALS AND EQUIPMENT

Plant Flow Rate:	2100 gpm
Raw Water Hardness:	300 mg/L
Raw Water Combined Radium:	11 pCi/L
Design Blended Effluent:	100 mg/L
Design Loading Rate:	4.5 gpm/sq. ft.

2.11, 2.12, 2.14 METERS

Flowmeter Function	Type	Qty	Size (in.)
TWE Batch Flowmeters	Mag Meter	4	6
Brine Flowmeter	Disc Meter	1	2
Blended Finished Water Flowmeter	Mag Meter	1	16
Bypass Blend Flowmeter	Mag Meter	1	8

2.2.A VESSEL CONSTRUCTION

Number of Vessels:	4
Vessel Diameter:	10 ft.
Design Working Pressure:	150 psi
Hydrostatic Test Pressure:	195 psi
Surface Area per Vessel:	78.5 sq. ft.

2.2 VESSEL MISC. COMPONENTS

1/2" Sample Taps (per vessel):

Influent/Effluent: Qty (1): 1 on each vessel effluent piping, accessible to operator

Nozzle Sizing:

Influent	6"
Effluent	6"
Brine:	3"

Coupling Sizing:

Drain	2"
Air Release	2"

2.4.A ION EXCHANGE RESIN

Resin Bed Depth:	4.25 ft.

2.7 VALVES

Function	Size (in.)	Quantity	Actuator
Raw Water Influent (RWI):	6	4	Electric
Outlet (TWE):	6	4	Electric
Backwash Effluent(BWE):	6	4	Electric
Backwash Influent (BWI):	6	4	Electric
Fast Rinse Outlet (FRE):	4	4	Electric
Brine/Slow Rinse In (BRI):	3	4	Electric
Brine Dilution:	3	1	Manual-Handwheel

Hard water blend (modulating):	8	1	Electric
Isolation of blend:	8	1	Manual-Lever
Throttling of blend:	8	1	Manual-Handwheel
Common Brine Influent (CBI):	2	1	Electric
Slow Rinse Influent (SRI):	2	1	Solenoid
Air Release (ARV):	1	4	N/A

2.14.A Vessel effluent hardness 100 mg/L ± 10%

3.2 FACTORY SERVICES & START-UP

Equipment Installation Supervision:	<u>1</u>	days
Media Installation Supervision:	<u>2</u>	days
Start-up & Operator Instruction:	<u>6</u>	days
Minimum number of trips required:	<u>4</u>	

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SECTION 43 3268 – FLUORIDATION CHEMICAL FEED EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes the following:
 - 1. Equipment for the addition of a 23-25% hydrofluorosilicic acid (fluoride) solution to the facility's treated water.

1.2 PERFORMANCE REQUIREMENTS

- A. Deliver fluoride solution up to minimum of five (5) gallons/day in 24 hours of continuous operation at rated capacity, in order to add approximately 0.25 mg/l Fl to the water supply, which has a natural background concentration of 0.5 to 0.7 mg/l.

1.3 QUALITY ASSURANCE

- A. Codes and Regulation
 - 1. NSF/ANSI Standard 61 and NSF/ANSI Standard 327.
 - 2. NSF/ANSU Standard 60.

PART 2 PRODUCTS

2.1 DOSING PUMP

- A. Manufacturers:
 - 1. Substitutions: As approved by the Engineer.
- B. Provide such tubing as required for fluoride application.
- C. Power requirements: 120-volt, single phase, 60 Hz

2.2 TANK

- A. Manufacturers:
 - 1. Tamco 5598 200 gal. Poly tank with fill and vent fittings with 20 gal day tank and elevated stand for bulk tank.
 - 2. Assmann ICCT-200 bulk tank with ASSMANN IMT-20 day tank and Assmann elevated stand for bulk tank.
 - 3. Substitutions: As approved by the Engineer.
- B. Provide such tubing, valving, and venting as required for fluoride application.

2.3 INJECTION

- A. Manufacturers:

1. Saf-T-Flo EB-130-B-C-4-0 injection assembly.

2. Substitutions: As approved by Engineer.

B. Provide with required hose.

2.4 SCALES

A. Manufacturers:

1. One (1) Force Flow 30-DR-20LP tank scale with SRG2-1 Solo G2 indicator.

2. Substitutions: As approved by Engineer.

B. Power requirements: 120-volt, single phase, 60 Hz.

2.5 SPILL CONTAINMENT

A. Manufacturers:

1. One (1) Ultratech Ultra-Spill Pallet P4 Plus.

2. Substitutions: As approved by the Engineer.

2.6 SPARE PARTS

A. Critical spare parts shall be furnished and made readily available on site before initial startup.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify layout and orientation of equipment, accessories and piping connections.

3.2 INSTALLATION

A. Install equipment and accessories as indicated on Drawings and in accordance with manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

A. Preliminary Leakage Testing: With system under pressure, observe each joint and connection for leaks.

B. Performance Testing: Test each piece of equipment under design conditions for two to four hours to demonstrate proper functioning and automatic regulation of system; test alarms and signal generation; exercise equipment control and manual override where applicable; demonstrate equipment safety features.

- C. Equipment Acceptance: Adjust, repair, modify or replace components failing to perform as specified and rerun tests; make final adjustments to equipment under direction of manufacturer's representative.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Furnish services of manufacturer's representative experienced in installation of products supplied under this specification for not less than two days at project site for installation inspection and field testing, and instructing Owner's personnel in maintenance of equipment.
- B. Furnish Installation Certificate from equipment manufacturer's representative attesting equipment has been properly installed and is ready for startup and testing.

END OF SECTION

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SECTION 43 3269 – PHOSPHATE CHEMICAL FEED EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes the following:
 - 1. Equipment for the addition of a blended phosphate solution to the facility's treated water.

1.2 PERFORMANCE REQUIREMENTS

- A. Deliver phosphate solution up to minimum of ten (10) gallons/day in 24 hours of continuous operation at rated capacity, in order to add approximately 1.0 mg/l PO₄ to the water supply.

PART 2 PRODUCTS

2.1 DOSING PUMP

- A. Manufacturers:
 - 1. Substitutions: As approved by the Engineer.
- B. Provide such tubing as required for phosphate application.
- C. Power requirements: 120-volt, single phase, 60 Hz

2.2 TANK

- A. Manufacturers:
 - 1. Assmann ICT-300 bulk tank with Assmann IMT-20 day tank and Assmann elevated stand for bulk tank.
 - 2. Substitutions: As approved by the Engineer.
- B. Provide such tubing, valving, and venting as required for phosphate application.

2.3 INJECTION

- A. Manufacturers:
 - 1. Saf-T-Flo EB-130-B-C-4-0 injection assembly.
 - 2. Substitutions: As approved by Engineer.
- B. Provide with required hose.

2.4 SCALES

- A. Manufacturers:
 - 1. One (1) Force Flow 30-DR-20LP tank scale with SRG2-1 Solo G2 indicator.
 - 2. Substitutions: As approved by Engineer.
- B. Power requirements: 120-volt, single phase, 60 Hz.

2.5 SPILL CONTAINMENT

- A. MANUFACTURERS:
 - 1. One (1) Ultratech Ultra-Spill Pallet P4 Plus.
 - 2. Substitutions: As approved by Engineer.

2.6 SPARE PARTS

- A. Critical spare parts shall be furnished and made readily available on-site before initial startup.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify layout and orientation of equipment, accessories and piping connections.

3.2 INSTALLATION

- A. Install equipment and accessories as indicated on Drawings and in accordance with manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

- A. Preliminary Leakage Testing: With system under pressure, observe each joint and connection for leaks.
- B. Performance Testing: Test each piece of equipment under design conditions for two to four hours to demonstrate proper functioning and automatic regulation of system; test alarms and signal generation; exercise equipment control and manual override where applicable; demonstrate equipment safety features.
- C. Equipment Acceptance: Adjust, repair, modify or replace components failing to perform as specified and rerun tests; make final adjustments to equipment under direction of manufacturer's representative.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Furnish services of manufacturer's representative experienced in installation of products supplied under this specification for not less than two days at project site for installation

inspection and field testing, and instructing Owner's personnel in maintenance of equipment.

- B. Furnish Installation Certificate from equipment manufacturer's representative attesting equipment has been properly installed and is ready for startup and testing.

END OF SECTION

Chamlin & Associates, Inc.
4152 Progress Boulevard Peru, IL 61354
(815) 223-3344
(815) 223-3348 (Fax)

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SECTION 43 3276 – CHLORINATION EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes the following:
 - 1. Equipment for the addition of a 12.5% sodium hypochlorite solution to the facility's treated water.

1.2 PERFORMANCE REQUIREMENTS

- A. Deliver sodium hypochlorite solution up to minimum of eighty (80) gallons/day in 24 hours of continuous operation at rated capacity.

PART 2 PRODUCTS

2.1 DOSING PUMP

- A. Manufacturers:
 - 1. Blue-White A3 Flexflo Peristaltic Metering Pump with 4-20 mA control cable, installation kit, and anti-siphon valve.
 - 2. Substitutions: As approved by the Engineer.
- B. Provide such tubing as required for chlorine application.
- C. Power requirements: 120-volt, single phase, 60 Hz

2.2 TANK

- A. Manufacturers:
 - 1. Assmann ICT-2000 bulk tank with Assmann IMT-80 day tank and Assmann elevated stand for bulk tank.
 - 2. Substitutions: As approved by the Engineer.
- B. Provide such tubing, valving, and venting as required for chlorine application.

2.3 INJECTION

- A. Manufacturers:
 - 1. Saf-T-Flo EB-130-B-C-4-0 injection assembly.
 - 2. Substitutions: As approved by Engineer.
- B. Provide with required hose.

2.4 SCALES

- A. Manufacturers:
 - 1. One (1) Force Flow 36-DR-LP tank scale with SRG2-1 Solo G2 indicator.
 - 2. Substitutions: As approved by Engineer.
- B. Power requirements: 120-volt, single phase, 60 Hz.

2.5 SPILL CONTAINMENT

- A. Manufacturers:
 - 1. One (1) Ultratech Ultra-Spill Pallet P4 Plus.
 - 2. Substitutions: As approved by the Engineer.

2.6 SPARE PARTS

- A. Critical spare parts shall be furnished and made readily available on site before initial startup.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify layout and orientation of equipment, accessories and piping connections.

3.2 INSTALLATION

- A. Install equipment and accessories as indicated on Drawings and in accordance with manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

- A. Preliminary Leakage Testing: With system under pressure, observe each joint and connection for leaks.
- B. Performance Testing: Test each piece of equipment under design conditions for two to four hours to demonstrate proper functioning and automatic regulation of system; test alarms and signal generation; exercise equipment control and manual override where applicable; demonstrate equipment safety features.
- C. Equipment Acceptance: Adjust, repair, modify or replace components failing to perform as specified and rerun tests; make final adjustments to equipment under direction of manufacturer's representative.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Furnish services of manufacturer's representative experienced in installation of products supplied under this specification for not less than two days at project site for installation

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(815) 223-3348 (Fax)

inspection and field testing, and instructing Owner's personnel in maintenance of equipment.

- B. Furnish Installation Certificate from equipment manufacturer's representative attesting equipment has been properly installed and is ready for startup and testing.

END OF SECTION

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4152 Progress Boulevard Peru, IL 61354
(815) 223-3344
(815) 223-3348 (Fax)

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