

CONTRACT DOCUMENTS & SPECIFICATIONS

FOR

BANGS LAKE OUTFALL IMPROVEMENTS

PREPARED FOR THE

VILLAGE OF WAUCONDA

PREPARED BY

**HMG ENGINEERS
975 CAMPUS DRIVE
MUNDELEIN, IL 60060**

ISSUED FOR BIDDING

NOVEMBER 5, 2024

HMG PROJECT NO. 8537



Corporate Office • 9360 Holy Cross Lane • Breese, IL 62230

ST. LOUIS METRO EAST • SUBURBAN CHICAGO • CENTRAL ILLINOIS • SOUTHERN ILLINOIS

www.hmgengineers.com

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SECTION 00 11 13
ADVERTISEMENT FOR BIDS

The **Village of Wauconda** (Owner) is requesting Bids for the construction of the following Project:

Bangs Lake Outfall Improvements
HMG No. 8537

Sealed Bids for the construction of the Project will be received at the Village Hall located at 101 N Main Street, Wauconda, IL 60084, until **December 4, 2024 at 11:00 AM** local time. At that time the Bids received will be publicly opened and read.

The Project includes the following Work:

The proposed project consists of 3,980 lineal feet of stream improvements which include a new lake outfall structure, automated weir gate & SCADA control, new storm sewer & box culverts, large block retaining wall, utility relocates, sheet pile retaining wall, tree/vegetation removal, and site wide restoration efforts.

Bidders must secure their information as to the condition of the site and all local conditions affecting the work prior to submitting their proposals.

Bidders are notified that the price bid must include everything as described in the specifications and shown on the drawings. No extra of any kind will be allowed unless ordered in writing by the Owner.

[PREVAILING WAGE ACT] The Construction Contract for this project is subject to "An Act regulating wages of laborers, mechanics and other workers employed in any public works by the State, County, City or any public body or any political subdivision or by anyone under contract for public works", approved June 26, 1941, as amended, being Section 820 ILCS 130/1-12 Illinois Compiled Statutes, commonly referred to as The Prevailing Wage Act. The Construction Contract for this project is also subject to the Employment of Illinois Workers on Public Works Act (30 ILCS 570). The Construction Contract for this project is also subject to the Illinois Works Jobs Program Act, 30 ILCS 559/Art. 20 Illinois Works Apprenticeship Initiative.

Any bid submittal shall be accompanied by a certified, check, cash or bid bond, or an acceptable form of Proposal Guaranty in an amount equal to 5% of the Proposal amount.

Any contract awarded under this Invitation for Bids will require performance and payment bonds in the amount of 100% of the contract price.

The contract will be awarded to the lowest responsive, responsible bidder.

Plans, Specifications and Contract Documents must be obtained from the following locations:

HMG Engineers, Inc.
975 Campus Drive
Mundelein, IL 60060
(ksheldon@hmgengineers.com)

All questions shall be directed to **Derek Anderson** at HMG Engineers, Inc. at **(847) 362-5959** or danderson@hmgengineers.com.

A non-mandatory pre-bid conference for the Project will be held on **November 20, 2024** at **1:00 PM** starting at Phil's Beach (328 N Main Street, Wauconda, IL 60084) and proceeding down the tributary to the project termination. Attendance at the pre-bid conference is encouraged but not required.

The OWNER may make such investigations as he 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.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

Owner: **Village of Wauconda**
By: **Virginia Radcliffe**
Title: **Village Clerk**

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

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ARTICLE 1—DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website, and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.04 Bidder may register as a plan holder and obtain complete sets of Bidding Documents, in the number and format stated in the Advertisement or invitation to bid, from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.
- 2.05 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Bidding Documents Website or Issuing Office. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.
- 2.06 *Electronic Documents*
- A.** When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.
1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
- B.** Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work:
- A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state or other contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 A non-mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference; however, attendance at this conference is not required to submit a Bid.
- 4.02 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

- 5.01 *Site and Other Areas*
- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.
- 5.02 *Existing Site Conditions*
- A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*
 - 1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner 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.

- c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
 3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.
- B. *Underground Facilities:*** Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

- A.** In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:
1. **N/A**
- Owner will make copies of these other Site-related documents available to any Bidder on request.
- B.** Owner has not verified the contents of these other Site-related documents, and Bidder may not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.
- C.** The other Site-related documents are not part of the Contract Documents.
- D.** Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.
- E.** No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

- A.** Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- B.** A Site visit is scheduled following the pre-bid conference. Maps to the Site will be available at the pre-Bid conference.
- C.** A Site visit is scheduled for November 20, 2024, at 1:00 pm. Please meet at 333 N Main Street, Wauconda, IL 60084; This is the Phil's Beach parking lot. Maps to the Site will be made available upon request.
- D.** Bidders visiting the Site are required to arrange their own transportation to the Site.
- E.** All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: **Joe Coulter (847) 526-9610**. Bidder must conduct the required Site visit during normal working hours.

- F. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- G. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.
- H. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- I. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.06 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

- A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.
- B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:
 - A. **Derek Anderson, P.E.; (847) 362-5959; danderson@hmgengineers.com**

- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of **five** percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.
- 9.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as

supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 11.02 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work within five days after Bid opening:
- A. Tree Clearing**
 - B. Utility & Grading**
 - C. Sheet Piling**
 - D. Guardrail**
 - E. Concrete Work**
 - F. Paving**
 - G. Landscape Restoration**
 - H. Maintenance of Restoration**
 - I. Designated Erosion Control Inspector (DECI)**
- 11.03 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 11.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
- A.** All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
 - B.** If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words “No Bid” or “Not Applicable.”

- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- 12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder's name and official address.
- 12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
- 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

- 13.01 *Unit Price*
- A.** Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B.** The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity", which Owner or its representative has set forth in the Bid Form, for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C.** Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

ARTICLE 14—SUBMITTAL OF BID

- 14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.
- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement.
- 14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of

- the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
 - B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner will announce to all bidders a "Base Bid plus alternates" budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.
 - C. For determination of the apparent low Bidder(s) when sectional bids are submitted, Bids will be compared on the basis of the aggregate of the Bids for separate sections and the Bids for combined sections that result in the lowest total amount for all of the Work.
 - D. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
 - E. For the determination of the apparent low Bidder when cost-plus-fee bids are submitted, Bids will be compared on the basis of the Guaranteed Maximum Price set forth by Bidder on the Bid Form.
- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 18.07 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19—BONDS AND INSURANCE

- 19.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with

printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—SALES AND USE TAXES

21.01 Owner is exempt from **Illinois** state sales and use taxes on materials and equipment to be incorporated in the Work. (Exemption No. **[number]**). Said taxes must not be included in the Bid. Refer to Paragraph SC-7.10 of the Supplementary Conditions for additional information.

ARTICLE 22—CONTRACTS TO BE ASSIGNED

END OF INSTRUCTIONS TO BIDDERS

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SECTION 00 41 43**BID FORM (UNIT PRICE)**

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

ARTICLE 1—OWNER AND BIDDER

- 1.01 This Bid is submitted to: **Village of Wauconda, 101 N. Main Street, Wauconda, IL 60084**
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security in the form of Bid Bond or Cashier's Check (Section 00 43 13);
 - B. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
 - C. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - D. Required Bidder Qualification Statement with supporting data (Section 00 45 13)

ARTICLE 3—BASIS OF BID—UNIT PRICE BID

- 3.01 *Unit Price Bids*
- A. Bidder will perform the following Work at the indicated unit prices:

BASE BID

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
1	Storm Sewers, Rubber Gasket, Class A, Type 1, 12"	LF	137	\$	\$
2	Storm Sewers, Rubber Gasket, Class A, Type 2, 12"	LF	98	\$	\$
3	Storm Sewers, Rubber Gasket, Class A, Type 2, 18"	LF	9	\$	\$
4	Storm Sewers, Rubber Gasket, Class A, Type 1, 27"	LF	14	\$	\$
5	Storm Sewers, Rubber Gasket, Class A, Type 2, 30"	LF	14	\$	\$
6	Storm Sewers, Rubber Gasket, Class A, Type 1, 36"	LF	37	\$	\$
7	Storm Sewers, Class A, Type 1, 29"x45" Elliptical RCP	LF	200	\$	\$

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Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
8	Storm Sewers, Class A, Type 1, 34"x53" Elliptical RCP	LF	140	\$	\$
9	Precast Concrete Box Culverts, 5' x 5'	LF	68	\$	\$
10	Precast Concrete Box Culverts, 12' x 3'	LF	56	\$	\$
11	Storm Inlet, Type A, 2' Diameter, Type 1 Frame and Grate	Each	4	\$	\$
12	Storm Inlet, Type A, 2' Diameter, Type 8 Grate	Each	2	\$	\$
13	Storm Inlet, Type A, 2' Diameter, Type 11 Frame and Grate	Each	3	\$	\$
14	Storm Manhole, Type A, 5' Diameter, Type 3 Frame and Grate	Each	1	\$	\$
15	Storm Manhole, Type A, 5' Diameter, Type 11 Frame and Grate	Each	1	\$	\$
16	Storm Manhole, Type A, 4' Diameter, Type 1 Frame and Grate	Each	1	\$	\$
17	Storm Manhole, Type A, 7' Diameter, Type 11 Frame and Grate	Each	1	\$	\$
18	Catch Basin, Type A, 4' Diameter, Type 37 Frame and Grate	Each	1	\$	\$
19	Inlets to be Adjusted	Each	1	\$	\$
20	Concrete Box Culvert End Section, 5' x 5'	Each	1	\$	\$
21	Precast Concrete Box Culvert End Section, 12' x 3'	Each	2	\$	\$
22	Modifications to Wingwall at Larkdale Row	LS	1	\$	\$
23	Modifications to Headwall at Osage Street	LS	1	\$	\$
24	Bangs Lake Intake Structure 1	LS	1	\$	\$
25	Bangs Lake Intake Structure 2	LS	1	\$	\$
26	Scada and Electrical Improvements at Intake Structure 1	LS	1	\$	\$
27	Precast Flared End Section Removed, Salvaged and Reinstalled	Each	2	\$	\$
28	Precast Flared End Section, 12"	Each	1	\$	\$
29	Precast Flared End Section, 34"x53"	Each	1	\$	\$
30	Remove and Replace 15" RCP Storm Sewer at Gravity Wall (1 stick)	LF	8	\$	\$
31	6" Ductile Iron Pipe at Gravity Wall with Check Valve	LS	1	\$	\$
32	Undercut/Stabilization Stone	CY	50	\$	\$
33	Trench Backfill	CY	375	\$	\$

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Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
34	CLSM Trench Backfill	CY	5	\$	\$
35	CLSM Abandonment of Culverts at Main Street	CY	70	\$	\$
36	Porous Granular Backfill	CY	40	\$	\$
37	Select Backfill	CY	50	\$	\$
38	Sidewalk Removal	SF	2,400	\$	\$
39	Concrete Sidewalk, 5"	SF	2,400	\$	\$
40	Aggregate Path, 8' Wide	SY	980	\$	\$
41	Concrete Curb and Gutter Removal	LF	342	\$	\$
42	Combination Concrete Curb and Gutter, B6.24	LF	200	\$	\$
43	Combination Concrete Curb and Gutter, B6.12	LF	142	\$	\$
44	Milling of Existing Roadway, 3"	SY	360	\$	\$
45	Roadway Pavement Removal	SY	456	\$	\$
46	HMA Leveling Binder, N50, Mix D, 1"	TONS	35	\$	\$
47	HMA Surface Course, N50, Mix D, 2"	SY	816	\$	\$
48	HMA Binder Course, IL-19.0, N50, 3"	SY	286	\$	\$
49	Class D Base Patches, Type IV, 6"	SY	170	\$	\$
50	Water Main in Steel Casing, 12"	LF	20	\$	\$
51	Ductile Iron Water Main, 6"	LF	35	\$	\$
52	Water Main Removal, 6"	LF	50	\$	\$
53	Insertion Valve, 6"	Each	1	\$	\$
54	Water Service Installation for 321 Main Street	LS	1	\$	\$
55	Abandonment of Service Tap for 321 Main Street	LS	1	\$	\$
56	Bypass Pumping of Sanitary Sewers	LS	1	\$	\$
57	Sanitary Sewer Removal, 12"	LF	65	\$	\$
58	Sanitary Sewer Removal, 15" Clay	LF	36	\$	\$
59	Ductile Iron Class 52 Sanitary Sewer, 12"	LF	46	\$	\$
60	Ductile Iron Class 52 Sanitary Sewer, 15"	LF	36	\$	\$

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Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
61	Sanitary Sewer in Steel Casing, 20"	LF	20	\$	\$
62	Sanitary Drop Manhole, 4' Diameter	Each	1	\$	\$
63	Sanitary Manhole Modifications	Each	1	\$	\$
64	Sanitary Manhole Adjustment Including External Chimney Seal	Each	2	\$	\$
65	Ornamental Fence, 6'	LF	50	\$	\$
66	Ornamental Fence Mounted to Block Wall, 4'	LF	340	\$	\$
67	Ornamental Fence Mounted to Block Wall, 2'	LF	96	\$	\$
68	Block Retaining Wall With Capstone	SF	3,497	\$	\$
69	Flood Control Wall With Capstone	SF	523	\$	\$
70	Steel Sheet Piling Retaining Wall with Cap	LF	225.50	\$	\$
71	Stream Grading and Shaping	LF	1,260	\$	\$
72	Earth Excavation at Stream	CY	145	\$	\$
73	Earth Excavation at Rip Rap Stabilization	CY	212	\$	\$
74	Earth Excavation at Aggregate Path	CY	220	\$	\$
75	Earth Excavation for Site Grading	CY	75	\$	\$
76	Biotechnical Riprap Stabilization	LF	181	\$	\$
77	Biotechnical Riprap Stabilization with Grading	LF	547	\$	\$
78	Rock Riffle	Each	6	\$	\$
79	Initial Channel Backfill, Riprap (RR4)	LF	297	\$	\$
80	Secondary Channel Backfill, Native Bed Material	LS	1	\$	\$
81	Structural Streambank Stabilization	SY	275	\$	\$
82	Filter Fabric at Riprap	SY	275	\$	\$
83	Filter Fabric at Aggregate Path	SY	980	\$	\$
84	Filter Fabric at Sheet Pile Wall	SY	130	\$	\$
85	Steel Plate Beam Guardrail, Type A, 6' Steel Posts	LF	317	\$	\$
86	Traffic Barrier Terminal, Type 1 (Special) Tangent	Each	3	\$	\$

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Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
87	Traffic Barrier Terminal, Type 2	Each	3	\$	\$
88	Storm Sewer Removal, 12" RCP	LF	69	\$	\$
89	Storm Sewer Removal, 15" RCP	LF	8	\$	\$
90	Storm Sewer Removal, 18" RCP	LF	5	\$	\$
91	Storm Sewer Removal, 27" RCP	LF	8	\$	\$
92	Storm Sewer Removal, 30" RCP	LF	34	\$	\$
93	Storm Sewer Removal, 36" CPP	LF	55	\$	\$
94	Storm Sewer Removal, 29"x45" Elliptical RCP	LF	202	\$	\$
95	Storm Sewer Removal, 34"x49" Arch CMP	LF	111	\$	\$
96	Storm Sewer Removal, 64"x43" Arch CMP	LF	124	\$	\$
97	Remove Inlet, 2' Diameter	Each	4	\$	\$
98	Remove Manhole, 4' Diameter	Each	1	\$	\$
99	Remove Manhole, 5' Diameter	Each	1	\$	\$
100	Remove 18" Flared End Section and Toe Block	Each	1	\$	\$
101	Remove 27" Flared End Section and Toe Block	Each	1	\$	\$
102	Remove Frame and Grate	Each	2	\$	\$
103	Remove Concrete End Section	Each	1	\$	\$
104	Tree Removal (6 to 15 Units Diameter)	Unit	480	\$	\$
105	Tree Removal (Over 15 Units Diameter)	Unit	264	\$	\$
106	Clearing, Acres (Less than 6 Units Diameter)	Acre	1.25	\$	\$
107	Beaver Dam Removal and Disposal	Each	2	\$	\$
108	Remove Split Rail Fence	LF	191	\$	\$
109	Remove Chain Link Fence	LF	82	\$	\$
110	Remove Ornamental Fence	LF	98	\$	\$
111	Remove Guardrail	LF	468	\$	\$
112	Remove Concrete Spillway at Culvert Outfall	SF	415	\$	\$

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Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
113	Remove Timber Retaining Wall	LS	1	\$	\$
114	Remove Outlet Control Structure at Phil's Beach	LS	1	\$	\$
115	Remove Concrete Headwall, Wingwalls and Junction Chamber at Main Street	Each	2	\$	\$
116	Removal of Wooden Bridge and Supports at Kuester Manor	LS	1	\$	\$
117	Temporary Construction Fencing	LF	1,150	\$	\$
118	Temporary Relocation of Raft and Trailer at Phil's Beach	LS	1	\$	\$
119	Special Waste Disposal	CY	50	\$	\$
120	Hazardous Waste Disposal	CY	50	\$	\$
121	Seeding, IDOT Class 1	SY	8,100	\$	\$
122	Seeding, IDOT Class 4A	SY	2,850	\$	\$
123	Seeding, IDOT Class 4B	SY	400	\$	\$
124	Interseeding, IDOT Class 4A	SY	1,325	\$	\$
125	Sodding	SY	1,250	\$	\$
126	Mulch	SY	520	\$	\$
127	Sand	CY	35	\$	\$
128	Thermoplastic Pavement Marking - Line, 4"	LF	400	\$	\$
129	Erosion Control Blanket	SY	11,150	\$	\$
130	Topsoil Furnish and Place, Variable Depth	SY	11,150	\$	\$
131	Site Grading and Shaping	LS	1	\$	\$
132	Soil Erosion and Sedimentation Control	LS	1	\$	\$
133	Dust and Mud Control	LS	1	\$	\$
134	Dewatering	LS	1	\$	\$
135	Traffic and Pedestrian Control	LS	1	\$	\$
136	Mobilization	LS	1	\$	\$
137	Pre-Construction Video Documentation	LS	1	\$	\$
138	Project Maintenance and Monitoring (Bangs Lake to Larkdale Row)	Year	3	\$	\$

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Total of All Unit Price Bid Items – Base Bid Only	\$
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BID ADDITIVE ALTERNATE A

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
A1	Storm Sewers, Rubber Gasket, Class A, Type 2, 12"	LF	3	\$	\$
A2	Storm Sewers, Rubber Gasket, Class A, Type 2, 18"	LF	18	\$	\$
A3	Storm Sewers, Rubber Gasket, Class A, Type 2, 48"	LF	236	\$	\$
A4	Storm Manhole, Type A, 8' Diameter, Type 1 Frame and Grate	Each	2	\$	\$
A5	Storm Manhole, Type A, 9' Diameter, Type 1 Frame and Grate	Each	1	\$	\$
A6	Trench Backfill	CY	365	\$	\$
A7	Manhole to be Reconstructed at Slocum Lake Road	Each	1	\$	\$
A8	Manhole to be Reconstructed at WWTP	Each	1	\$	\$
A9	CLSM Abandonment of Storm Sewer at Public Works Building	CY	56	\$	\$
A10	Sidewalk Removal	SF	100	\$	\$
A11	Concrete Sidewalk, 5"	SF	100	\$	\$
A12	Concrete Curb and Gutter Removal	LF	159	\$	\$
A13	Combination Concrete Curb and Gutter, B6.12	LF	159	\$	\$
A14	Roadway Pavement Removal	SY	344	\$	\$
A15	HMA Surface Course, N50, Mix D, 2"	SY	344	\$	\$
A16	HMA Binder Course, IL-19.0, N50, 3"	SY	344	\$	\$
A17	Storm Sewer Removal, 42"	LF	11	\$	\$
A18	Storm Sewer Removal, 60"	LF	27	\$	\$
Total of All Unit Price Bid Items – Additive Alternate A Only					\$

BID ADDITIVE ALTERNATE B

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
B1	Tree Removal (Larkdale Row to IL Route 176)	Acre	1	\$	\$
B2	Project Maintenance and Monitoring (Larkdale Row to IL Route 176)	Year	3	\$	\$
Total of All Unit Price Bid Items – Additive Alternate B Only					\$

BIDDING SUMMARY TABLE

Base Bid Total Only	\$
Bid Additive Alternate A Total Only	\$
Bid Additive Alternate B Total Only	\$

B. Bidder acknowledges that:

1. each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and
2. estimated quantities are not guaranteed and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.
3. the Owner will award all work to be performed under this contract to one contractor. The Owner reserves the right to award any combination of Base Bids and Additive Alternates as deemed to be in the Owner’s best interests. The Owner reserves the right to reject any or all bids.

ARTICLE 4—TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda: [Add rows as needed. Bidder is to complete table.]

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder’s Representations*

- A. In submitting this Bid, Bidder represents the following:
 1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
 2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder’s (Contractor’s) safety precautions and programs.
 7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
 8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
 9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 6.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.
5. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.
6. By submission of the bid, each bidder certifies, and in this case of a joint bid each party thereto certifies as to his own organization that in connection with the bid:
 - a. The prices in the bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
 - b. Unless otherwise required by law, the prices which have been quoted in the bid have not knowingly been disclosed by the bidder, prior to opening, directly or indirectly to any other bidder or to any competitor; and
 - c. No attempt has been made or will be made by the bidder to induce any other person or firm to submit or not submit a bid for the purpose of restricting competition.
7. Each person signing the bid shall certify that:

- a. He is the person in the bidder's organization responsible within that organization for the decision as to the prices being bid and that he has not participated, and will not participate in any action contrary to (6)(a) through (6)(c) above: or
- b. He is not the person in the bidder's organization responsible within that organization for the decision as to the prices being bid but that he has been authorized to act as agent for the persons responsible for such decision in certifying that such persons have not participated and will not participate, in any action contrary to (6)(a) through (6)(c) above, and as their agent shall so certify, and shall also certify that he has not participated, and will not participate, in any action contrary to (6)(a) through (6)(c) above.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____
(individual's signature)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Date: _____
(typed or printed)

Address for giving notices:

Bidder's Contact:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Phone: _____

Email: _____

Address: _____

Bidder's Contractor License No.: (if applicable) _____

SECTION 00 43 13

BID SECURITY FORM (BID BOND)

<p>Bidder Name: [Full formal name of Bidder] Address (<i>principal place of business</i>): [Address of Bidder's principal place of business]</p>	<p>Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]</p>
<p>Owner Name: Village of Wauconda Address (<i>principal place of business</i>): 101 N Main Street Wauconda, IL 60084</p>	<p>Bid Project (<i>name and location</i>): Bangs Lake Outfall Improvements Bid Due Date: [Enter date bid is due]</p>
<p>Bond Penal Sum: Date of Bond:</p>	
<p>Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Bidder	Surety
By: _____ <i>(Full formal name of Bidder)</i> _____ <i>(Signature)</i>	By: _____ <i>(Full formal name of Surety) (corporate seal)</i> _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i></p>	

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
 - 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2. All Bids are rejected by Owner, or
 - 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

**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.

Signature _____

Date _____

Corporate Seal (where appropriate)

SECTION 00 45 13

BIDDER'S QUALIFICATIONS

The following qualifications must be met in order to be deemed a Responsible Bidder. Bidder's inability to meet said qualifications, or failure to substantiate said qualifications, will result in the Bidder being disqualified.

Bidder must have a minimum of 15 years of experience as a general contractor constructing municipal water and wastewater treatment facilities, and shall have successfully completed a minimum of five (5) water/wastewater treatment facilities of a minimum of \$5 million in construction cost. Attach a list of completed projects with the following information:

- a. Name of Project with location information.
 - b. Name of Owner with contact information.
 - c. Name of Engineer with contact information.
 - d. Project Description.
 - e. Awarded Bid Amount.
 - f. Final Contract Amount.
 - g. Project duration, from Notice to Proceed to Certificate of Substantial Completion.
 - h. Classification and value of work self-performed.
2. Bidder must have the physical and financial capacity to complete the project, and shall provide the following:
 - a. Attach a list of work currently under contract, amount of each contract, % complete, contract completion date, and Owner and Engineer contact information.
 - b. Attach a statement of bonding capacity from Bidder's surety company.
 - c. Attach an audited statement of financial position.
 - d. Attach a list of construction equipment owned.
 - e. Attach personnel resumes.
 3. Bidder must attach a statement of project-related litigation history.
 4. Bidder must provide documentation on the most recent three (3) years Experience Modification Rating (EMR). The average EMR over the last three years shall be less than or equal to 0.85.
 5. Bidder must self perform a minimum of 50% of the work. Attach a statement of work to be self-performed.

I, _____, do hereby certify that I am _____ of

Name

Title/Position

_____ and have authority to execute this certification on

Bidder

behalf of the firm. I certify that all the information provided for this Bidder Qualification Statement is true and accurate as of the date below.

Bidder

By: _____

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

Month

Year

Notary Public

Commission Expires

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SECTION 00 51 00

NOTICE OF AWARD

Date of Issuance: _____
 Owner: Village of Wauconda Owner's Project No.: _____
 Engineer: HMG Engineers, Inc. Engineer's Project No.: 8537
 Project: Bangs Lake Outfall Improvements
 Contract Amount: _____
 Bidder: _____
 Bidder's Address: _____

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

[Describe Work, alternates, or sections of Work awarded]

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

[Number of copies sent] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically.

Drawings will be delivered separately from the other Contract Documents.

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

1. Deliver to Owner **[number of copies sent]** counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): **[Describe other conditions that require Successful Bidder's compliance]**

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

Within 10 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: Village of Wauconda
 By (signature): _____
 Name (printed): _____
 Title: _____

Copy: Engineer

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SECTION 00 52 13

AGREEMENT FORM – STIPULATED PRICE

This Agreement is by and between **the Village of Wauconda**] (“Owner”) and **[name of contracting entity]** (“Contractor”).

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows: **The proposed project consists of 3,980 lineal feet of stream improvements which include a new lake outfall structure, automated weir gate & SCADA control, new storm sewer & box culverts, large block retaining wall, utility relocates, sheet pile retaining wall, tree/vegetation removal, and site wide restoration efforts.**

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows: **The proposed project consists of 3,980 lineal feet of stream improvements which include a new lake outfall structure, automated weir gate & SCADA control, new storm sewer & box culverts, large block retaining wall, utility relocates, sheet pile retaining wall, tree/vegetation removal, and site wide restoration efforts.**

ARTICLE 3—ENGINEER

3.01 The Owner has retained HMG Engineers, Inc. (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by **[insert “Engineer” if an entity has been identified as such in Paragraph 3.01, and that same entity prepared the design; or indicate by name the entity other than Engineer that prepared the design].**

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

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

4.02 *Contract Times: Dates*

A. The Work will be substantially complete on or before **November 22, 2025**, and completed and ready for final payment (except maintenance) in accordance with Paragraph 15.06 of the General Conditions on or before **June 15, 2026**.

4.03 *Milestones*

A. Parts of the Work must be substantially completed on or before the following Milestone(s):
1. **Milestone 1** – Completion of all tree removal by March 31, 2025.

2. **Milestone 2** – Completion of all work at Wauconda Park District’s Phil’s Beach by May 24, 2025. Should material issues become a problem, work will not be permitted until after September 2, 2025.
3. **Milestone 3** – Completion of all work on the Wauconda School District Middle School property starting after June 2, 2025 and before August 2, 2025. Except Tree clearing must be completed by March 31, 2025 as noted in Milestone 1.

4.05 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
 1. *Substantial Completion*: Contractor shall pay Owner **\$1,250** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work*: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner **\$1,750** for each day that expires after such time until the Work is completed and ready for final payment.
 3. *Milestones*: Contractor shall pay Owner **\$4,000** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved, or until the time specified for Substantial Completion is reached, at which time the rate indicated in Paragraph 4.05.A.1 will apply, rather than the Milestone rate.
 4. Liquidated damages for failing to timely attain Milestones, Substantial Completion, and final completion are not additive, and will not be imposed concurrently.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner’s sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

4.06 *Special Damages*

- A. Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor’s failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.
- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.
- C. The special damages imposed in this paragraph are supplemental to any liquidated damages for delayed completion established in this Agreement.

ARTICLE 5—CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:
- A. For all Work, at the prices stated in Contractor's Bid, attached hereto as an exhibit.

ARTICLE 6—PAYMENT PROCEDURES**6.01 *Submittal and Processing of Payments***

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

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 1st day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in 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 elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

- a. 90 percent of the value of the Work completed (with the balance being retainage).

- 1) If 50 percent or more of the Work has been completed, as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and

- b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less Five percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

- A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

6.05 *Interest*

- A. All amounts not paid when due will bear interest at the rate of 5 percent per annum.

ARTICLE 7—CONTRACT DOCUMENTS7.01 *Contents*

- A. The Contract Documents consist of all of the following:
1. This Agreement.
 2. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 3. General Conditions.
 4. Supplementary Conditions.
 5. Specifications as listed in the table of contents of the project manual (copy of list attached).
 6. Drawings (not attached but incorporated by reference) consisting of **42** sheets with each sheet bearing the following general title: **BANGS LAKE OUTFALL IMPROVEMENTS**.
 7. Drawings listed on the attached sheet index.
 8. Addenda (numbers **[number]** to **[number]**, inclusive).
 9. Exhibits to this Agreement (enumerated as follows):
 - a. **[list exhibits]**
 10. Permits
 - a. **[list permits]**
 11. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS8.01 *Contractor's Representations*

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

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

This Agreement will be effective on **[indicate date on which Contract becomes effective]** (which is the Effective Date of the Contract).

Owner:

Contractor:

(typed or printed name of organization)

(typed or printed name of organization)

By: _____
(individual's signature)

By: _____
(individual's signature)

Date: _____
(date signed)

Date: _____
(date signed)

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence

Attest: _____
(individual's signature)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address for giving notices:

Address for giving notices:

Designated Representative:

Designated Representative:

Name: _____
(typed or printed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Address:

Phone: _____

Phone: _____

Email: _____

Email: _____

(If [Type of Entity] is a corporation, attach evidence of authority to sign. If [Type of Entity] is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this

License No.: _____
(where applicable)

State: _____

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SECTION 00 55 00

NOTICE TO PROCEED

Owner: Village of Wauconda Owner's Project No.: _____
 Engineer: HMG Engineers, Inc. Engineer's Project No.: 8537
 Contractor: _____ Contractor's Project No.: _____
 Project: Bangs Lake Outfall Improvements
 Effective Date of Contract: _____

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

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

In accordance with the Agreement: **[Select one of the following two alternatives, insert dates or number of days, and delete the other alternative.]**

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

[or]

The number of days to achieve Substantial Completion is **[number of days, from Agreement]** from the date stated above for the commencement of the Contract Times, resulting in a date for Substantial Completion of **[date, calculated from commencement date above]**; and the number of days to achieve readiness for final payment is **[number of days, from Agreement]** from the commencement date of the Contract Times, resulting in a date for readiness for final payment of **[date, calculated from commencement date above]**.

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

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

Owner: Village of Wauconda
 By (signature): _____
 Name (printed): _____
 Title: _____
 Date Issued: _____

Copy: Engineer

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SECTION 00 61 13.13

PERFORMANCE BOND FORM

<p>Contractor Name: [Full formal name of Contractor] Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]</p>	<p>Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]</p>
<p>Owner Name: Village of Wauconda Mailing address (<i>principal place of business</i>): 101 N Main Street Wauconda, IL 60084</p>	<p>Contract Description (<i>name and location</i>): Bangs Lake Outfall Improvements Contract Price: [Amount from Contract] Effective Date of Contract: [Date from Contract]</p>
<p>Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 16</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

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1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 3.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
 - 5.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
 - 5.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 - 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice

from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
14. Definitions
 - 14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

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- 14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
16. Modifications to this Bond are as follows: **[Describe modification or enter “None”]**

SECTION 00 61 13.16

PAYMENT BOND FORM

<p>Contractor Name: [Full formal name of Contractor] Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]</p>	<p>Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]</p>
<p>Owner Name: Village of Wauconda Mailing address (<i>principal place of business</i>): 101 N Main Street Wauconda, IL 60084</p>	<p>Contract Description (<i>name and location</i>): Bangs Lake Outfall Improvements Contract Price: [Amount from Contract] Effective Date of Contract: [Date from Contract]</p>
<p>Bond Bond Amount: [Amount] Date of Bond: [Date] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> Modifications to this Bond form: <input type="checkbox"/> None <input type="checkbox"/> See Paragraph 18</p>	
<p>Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.</p>	
Contractor as Principal	Surety
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<p><i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i></p>	

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1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond will arise after the following:
 - 5.1. Claimants who do not have a direct contract with the Contractor
 - 5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2. Pay or arrange for payment of any undisputed amounts.
 - 7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction

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performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

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

- 16.1.1. The name of the Claimant;
- 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
- 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
- 16.1.4. A brief description of the labor, materials, or equipment furnished;
- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
- 16.1.7. The total amount of previous payments received by the Claimant; and
- 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the

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

- 16.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
 - 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
 - 16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.
18. Modifications to this Bond are as follows: **[Describe modification or enter "None"]**

Contractor's Application for Payment

Owner: _____	Owner's Project No.: _____
Engineer: _____	Engineer's Project No.: _____
Contractor: _____	Contractor's Project No.: _____
Project: _____	
Contract: _____	

Application No.: _____ **Application Date:** _____

Application Period: From _____ to _____

1. Original Contract Price	\$	-
2. Net change by Change Orders	\$	-
3. Current Contract Price (Line 1 + Line 2)	\$	-
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)	\$	-
5. Retainage		
a. _____ X \$ _____ - Work Completed	\$	-
b. _____ X \$ _____ - Stored Materials	\$	-
c. Total Retainage (Line 5.a + Line 5.b)	\$	-
6. Amount eligible to date (Line 4 - Line 5.c)	\$	-
7. Less previous payments (Line 6 from prior application)		
8. Amount due this application	\$	-
9. Balance to finish, including retainage (Line 3 - Line 6)	\$	-

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____

Signature: _____ **Date:** _____

Recommended by Engineer	Approved by Owner
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____
Approved by Funding Agency	
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

SECTION 00 63 36

FIELD ORDER NO.: [Number of Field Order]

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

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference:

Specification Section(s):

Drawing(s) / Details (s):

Description:

[Description of the change to the Work]

Attachments:

[List documents supporting change]

Issued by Engineer

By: _____

Title: _____

Date: _____

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SECTION 00 63 49

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

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

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

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

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

Notes to User—Check one or both of the following

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

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

Contract Price:	\$	_____	[increase]	[decrease]	[not]	yet
			estimated].			
Contract Time:	days	_____	[increase]	[decrease]	[not]	yet
			estimated].			

Basis of estimated change in Contract Price:

Lump Sum Unit Price Cost of the Work Other

Recommended by Engineer

Authorized by Owner

By: _____
 Title: _____
 Date: _____

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SECTION 00 63 63

CHANGE ORDER NO.: [Number of Change Order]

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

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

Description:

[Description of the change]

Attachments:

[List documents related to the change]

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

Recommended by Engineer (if required)

Accepted by Contractor

By: _____
 Title: _____
 Date: _____

Authorized by Owner

Approved by Funding Agency (if applicable)

By: _____
 Title: _____
 Date: _____

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SECTION 00 65 16

CERTIFICATE OF SUBSTANTIAL COMPLETION FORM

Owner: _____ Owner's Project No.: _____
 Engineer: _____ Engineer's Project No.: _____
 Contractor: _____ Contractor's Project No.: _____
 Project: _____
 Contract Name: _____

This Preliminary Final Certificate of Substantial Completion applies to:

All Work The following specified portions of the Work:

[Describe the portion of the work for which Certificate of Substantial Completion is issued]

Date of Substantial Completion: **[Enter date, as determined by Engineer]**

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

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

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

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

Amendments to Owner's Responsibilities: None As follows:

[List amendments to Owner's Responsibilities]

Amendments to Contractor's Responsibilities: None As follows:

[List amendments to Contractor's Responsibilities]

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

[List attachments such as punch list; other documents]

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

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

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GENERAL CONDITIONS

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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, 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 printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 Before Starting Construction

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and
 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work 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 identify:
 - 1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
 - 2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
 - 3. Technical Data contained in such reports and drawings.
- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.
- C. *Reliance by Contractor on Technical Data:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b.
- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures

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

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

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, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;
 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 identify:

1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
3. Technical Data contained in such reports and drawings.

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

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures 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 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 or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

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

- contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
- 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, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.
- 10.04 *Engineer's Authority*
- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.
- 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. 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.

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- 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 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 DISPUTES17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this article:
1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
 2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS18.01 *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.

SECTION 00 73 00
SUPPLEMENTARY CONDITIONS

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SECTION 00 73 00**SUPPLEMENTARY CONDITIONS**

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, "Paragraph SC-4.05."

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

No Supplementary Conditions in this Article.

ARTICLE 2—PRELIMINARY MATTERS

SC-2.02 Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor **2** printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and **1** in electronic portable document format (PDF).

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC-3.01 Delete Paragraph 3.01.C in its entirety.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF WORK

No Supplementary Conditions in this Article.

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

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D:

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
Geotechnical Investigation	7/15/15	Existing Soil Borings Adjacent to Sheet Pile Retaining Wall

Report Title	Date of Report	Technical Data
Geotechnical Investigation	2/20/24	New Soil Boring Adjacent to Sheet Pile Retaining Wall New Soil Borings Adjacent to Larkdale ROW Culvert

- F. The following table lists the 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 specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
No Additional Drawings		

- G. Contractor may examine copies of reports and drawings identified in SC-5.03.E and SC-5.03.F that were not included with the Bidding Documents at **[location]** during regular business hours, or may request copies from Engineer.

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	Date of Report	Technical Data
None		

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
None		[Identify Technical Data]

ARTICLE 6—BONDS AND INSURANCE

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.A:

- Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C-610, Performance Bond (2010, 2013, or 2018 edition).
- Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C-615, Payment Bond (2010, 2013, or 2018 edition).

EJCDC® C-800, Supplementary Conditions of the Construction Contract.
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SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

- D. *Other Additional Insureds:* As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds (in addition to Owner and Engineer) the following:
 1. Wauconda Park District
 2. Board of Education of Wauconda Community Unit School District No.118
 3. Housing Authority of County of Lake, Illinois, an IL Municipal Corporation
 4. Wauconda National Bank and Trust Company, as Trustee of Trust Number 87-113
 5. Cheryl Buys, LLC
 6. Calliope Razes
 7. MDC Real Estate Management, LLC
 8. James Bart and Judith Bart
 9. Antonio Munoz and Maria Munoz
- E. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Employer's Liability	
Each accident	\$1,000,000.00
Each employee	\$1,000,000.00
Policy limit	\$1,000,000.00

- F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
 1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- G. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
 - a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 4. Underground, explosion, and collapse coverage.
 5. Personal injury coverage.
 6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- H. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
 4. Any exclusion of coverage relating to earth subsidence or movement.
 5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).
 6. Any limitation or exclusion based on the nature of Contractor's work.
 7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.
- I. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate	\$2,000,000.00
Products—Completed Operations Aggregate	\$1,000,000.00
Personal and Advertising Injury	\$1,000,000.00
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000.00

- J. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of

the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$1,000,000.00

- K. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer’s liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than:
Each Occurrence	\$1,000,000.00
General Aggregate	\$1,000,000.00

- L. *Contractor’s Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor’s operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor’s Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	\$1,000,000.00
General Aggregate	\$1,000,000.00

- M. *Contractor’s Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

Contractor’s Professional Liability	Policy limits of not less than:
Each Claim	\$1,000,000.00
Annual Aggregate	\$2,000,000.00

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

- F. *Builder’s Risk Requirements:* The builder’s risk insurance must:
1. be written on a builder’s risk “all risk” policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by

- enforcement of Laws and Regulations; and water damage (other than that caused by flood).
- a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.
 - b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.
2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).
 4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 5. extend to cover damage or loss to insured property while in transit.
 6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.
 7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.
 8. include performance/hot testing and start-up, if applicable.
 9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.
 10. include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:
 - a. Wauconda Park District, Board of Education of Wauconda Community Unit School District No.118, Housing Authority of County of Lake, Illinois, an IL Municipal Corporation, Wauconda National Bank and Trust Company, as Trustee of Trust Number 87-113, Cheryl Buys, LLC, Calliope Razes, MDC Real Estate Management, LLC, James Bart and Judith Bart, Antonio Munoz and Maria Munoz other persons or entities to be included on the builder's risk policy as named insureds. It is generally recommended to list the insured's full legal/contractual name, address, contact person, telephone, and e-mail address. Include only persons or entities that have property at the Site that is to be insured by the builder's risk insurance. If applicable, separately identify any mortgagee or lender required to be named as a loss payee.]

- G. *Coverage for Completion Delays:* The builder's risk policy will include, for the benefit of Owner, loss of revenue and soft cost coverage for losses arising from delays in completion that result from covered physical losses or damage. Such coverage will include, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, compensation for loss of net revenues, rental costs, and attorneys' fees and engineering or other consultants' fees, if not otherwise covered.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

- SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:
1. Regular working hours will be 7:00 AM – 5:00 PM.
 2. Owner's legal holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving (and day after), Christmas Day.
- SC-7.03 Amend the first and second sentences of Paragraph 7.03.C to state "...all Work at the Site must be performed during regular working hours, Monday through Saturday. Contractor will not perform Work on a Sunday, or any legal holiday."
- SC-7.03 Delete Paragraph 7.03.C in its entirety, and insert the following:
- C. In the absence of any Laws or Regulations to the contrary, Contractor may perform the Work on holidays, during any or all hours of the day, and on any or all days of the week, at Contractor's sole discretion.
- SC-7.03 Add the following new paragraph immediately after Paragraph 7.03.C:
- D. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.
- SC-7.09 Add a new paragraph immediately after Paragraph 7.09.A.:
- B. The requirements included in the permits listed below shall be adhered to by the Contractor:
1. Lake County SMC Permit - Pending
 2. NPDES Permit - Pending
 4. IDNR Permit – Pending
 5. USACE Permit – Pending
- SC-7.10 Add a new paragraph immediately after Paragraph 7.10.A:
- B. Owner is exempt from payment of sales and compensating use taxes of the State of Illinois and of cities and counties thereof on all materials to be incorporated into the Work.
1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
 2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.
- SC-7.11 Add the following new subparagraphs immediately after Paragraph 7.11.A:
1. The Employment of Illinois Workers on Public Works Act (30 ILCS 570) is in effect for this project.

ARTICLE 8—OTHER WORK AT THE SITE

No Supplementary Conditions in this Article.

ARTICLE 9—OWNER'S RESPONSIBILITIES

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

9.13 *Owner's Site Representative*

- A. Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner's Site Representative is not Engineer's consultant, agent, or employee.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
 1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
 3. *Liaison*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
 4. *Review of Work; Defective Work*
 - a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Observe whether any Work in place appears to be defective.
 - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
 5. *Inspections and Tests*
 - a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.

- b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
 6. *Payment Requests: Review Applications for Payment with Contractor.*
 7. *Completion*
 - a. Participate in Engineer's visits regarding Substantial Completion.
 - b. Assist in the preparation of a punch list of items to be completed or corrected.
 - c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work, and prepare a final punch list of items to be completed or corrected by Contractor.
 - d. Observe whether items on the final punch list have been completed or corrected.
- D. The RPR will not:
1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
 7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11—CHANGES TO THE CONTRACT

No Supplementary Conditions in this Article.

ARTICLE 12—CLAIMS

No Supplementary Conditions in this Article.

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

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. *Adjustments in Unit Price*
 1. 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 extended price of a particular item of Unit Price Work amounts to 25 percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

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- 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

No Supplementary Conditions in this Article.

ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

SC-15.01 Add the following new Paragraph 15.01.F:

- F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment.

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

No Supplementary Conditions in this Article.

ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01:

17.02 *Attorneys' Fees*

- A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

ARTICLE 18—MISCELLANEOUS

No Supplementary Conditions in this Article.

END OF SUPPLEMENTARY CONDITIONS

SECTION 00 73 43**WAGE RATE REQUIREMENTS**

THE STATE OF ILLINOIS REQUIRED WAGE RATE DETERMINATION FOLLOWS.

Not less than the higher of the "prevailing rate of wages" as found by the Illinois Department of Labor shall be paid to all laborers, workers and mechanics performing work under the Construction Contract. These prevailing rates of wages are included in the Contract Documents by addendum and/or reference.

If the Illinois Department of Labor prevailing rates of hourly wages to be paid are revised, the revised rate shall apply to this contract.

All payroll records shall be submitted to the Illinois Department of Labor.

The Contractor and each Subcontractor shall keep an accurate record showing the names and occupations of all laborers, workers and mechanics employed by them on the contract, and also showing the actual hourly wages paid to each of such persons. The Contractor and each Subcontractor shall preserve their weekly payroll records for a period of three years from the date of completion of the contract.

NOTE:

THESE WAGE RATE DECISIONS MUST BE CONFIRMED WITHIN 10 DAYS PRIOR TO AWARD OF THE CONTRACT. WAGE RATES UPDATES TO BE INCLUDED BY ADDENDA.

State of Illinois wage rates by county are available online at:

<https://www2.illinois.gov/idol/Laws-Rules/CONMED/Pages/current-prevailing-rates.aspx>

END OF SECTION

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SECTION 01 11 00
SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contract description.
- B. Work by Owner.
- C. Owner supplied products.
- D. Contractor's use of site and premises.
- E. Future work.
- F. Work sequence.
- G. Owner occupancy.
- H. Specification Conventions.

1.02 CONTRACT DESCRIPTION

- A. The proposed project consists of 3,980 lineal feet of stream improvements which include a new lake outfall structure, automated weir gate & SCADA control, new storm sewer & box culverts, large block retaining wall, utility relocates, sheet pile retaining wall, tree/vegetation removal, and site wide restoration efforts.
- B. Perform work of Contract under unit price contract with Owner in accordance with Conditions of Contract.
- C. Work of each separate Contract is identified in the following and on Drawings.

1. BANGS LAKE OUTFALL IMPROVEMENTS

1.03 OWNER SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples, to Contractor.
 - 2. Arrange and pay for delivery to site.
 - 3. On delivery, inspect products jointly with Contractor.
 - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:

1. Review Owner-reviewed Shop Drawings, Product Data, and Samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

1.04 CONTRACTOR'S USE OF SITE**A. Access to Site: Limited to:**

1. Right of Way and Easements as shown on the plans.

B. Construction Operations: Limited to Permanent and Temporary Easement areas noted on Drawings.**C. Time & Date Restrictions for Performing Work are as follows:**

1. Wauconda Park District Phil's Beach
 - a. Day after Labor Day through 1 week prior to Memorial Day weekend.
2. Wauconda Unit School District Wauconda Middle School
 - a. Tree Clearing ONLY during school year, with prior authorization, and construction traffic eliminated during school drop off and pickup times.
 - b. Remaining construction activities from June 2, 2025 through August 2, 2025.

D. Utility Outages and Shutdown:

1. Water main outage is planned to be avoided with the staging of the insertion valve. Contractor shall notify Village 48 hours in advance of insertion valve installation to have contingency plan in place.

1.05 WORK SEQUENCE**A. Construct work in phases/milestones to accommodate Property Owner's occupancy requirements during construction period, coordinate construction schedule and operations with Engineer:**

1. Phase/Milestone 1: Completion of all tree removal by March 31, 2025.
2. Phase/Milestone 2: Completion of all work at Wauconda Park District's Phil's Beach by May 24, 2025. Should material issues become a problem, work will not be permitted until after September 2, 2025.
3. Phase/Milestone 3: Completion of all work on the Wauconda School District Middle School property starting after June 2, 2025 and before August 2, 2025.

1.06 OWNER OCCUPANCY

- A. The Owner intends to occupy the Public Works Garage Building during the Project.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Schedule the work to accommodate Owner occupancy.

1.07 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 20 00**PRICE AND PAYMENT PROCEDURES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Applications for payment.
- B. Change procedures.
- C. Defect assessment.
- D. Unit prices.
- E. Alternates.

1.02 APPLICATIONS FOR PAYMENT

- A. Submit one copy of each application on EJCDC C-620.
- B. Content and Format: Utilize Bid Form Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit with transmittal letter as specified for Submittals in Section 01 33 00 - Submittal Procedures.
- F. Submit lien waivers.
- 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 attesting to off-site stored products.

1.03 CHANGE PROCEDURES

- A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the work.
- B. The Engineer will advise of minor changes in the work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions.
- C. The Engineer may issue a Change Order Request including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. Contractor will prepare and submit estimate within 5 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 effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on work by separate or other Contractors. Document requested substitutions in accordance with Section 01 60 00 - Product Requirements.
- E. Stipulated Sum/Price Change Order: Based on Change Order Request and Contractor's price quotation or Contractor's request for Change Order as approved by Engineer.
- F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute work under Work Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Change Order.
- G. Work Change Directive: Engineer may issue directive, 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.
- H. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
- I. 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.
- J. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.
- K. Change Order Forms: EJCDC C-941 Change Order.
- L. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- M. 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.

1.04 DEFECT ASSESSMENT

- A. Replace the work, or portions of the work, not conforming to specified requirements.
- B. If, in the opinion of the Engineer, it is not practical to remove and replace the work, the Engineer will direct appropriate remedy or adjust payment.

- C. The defective work may remain, but unit sum/price will be reduced at discretion of Engineer.
- D. Defective work will be partially repaired to instructions of Engineer, and unit sum/price will be reduced at discretion of Engineer.
- E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Engineer 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.

1.05 UNIT PRICES

- A. Authority: Measurement methods are delineated in individual specification sections.
- B. Measurement methods delineated in individual specification sections complement criteria of this section. In event of conflict, requirements of individual specification section govern.
- C. Take measurements and compute quantities. Engineer will verify measurements and quantities.
- D. Unit Quantities: Quantities and measurements indicated in Bid Form are for contract purposes only. Actual quantities provided shall determine payment.
 - 1. When actual work requires more or fewer quantities than those quantities indicated, provide required quantities at unit sum/prices contracted.
 - 2. When actual work requires 25 percent or greater change in quantity than those quantities indicated, Owner or Contractor may claim for Contract Price adjustment.
- E. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application or installation of item of the work; overhead and profit.
- F. Final payment for work governed by unit prices will be made on basis of actual measurements and quantities accepted by Engineer multiplied by unit sum/price for work incorporated in or made necessary by the work.
- G. Measurement of Quantities:

1. Weigh Scales: Inspected, tested and certified by applicable state Weights and Measures department within past year.
2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
3. Metering Devices: Inspected, tested and certified by applicable State department within past year.
4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
5. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
6. Measurement by Area: Measured by square dimension using mean length and width or radius.
7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the work.

H. Unit Price Schedule:

Specification Section	Item No.	Item Description	Unit
33 42 00	1-10	Storm Sewers and Precast Box Culverts	LF
33 42 00	11-21	Storm Structures and End Sections	EA
33 42 00	22-23	Storm Structure Modifications	LS
33 42 00	24-25	Bangs Lake Intake Structure 1 and 2	LS
26 00 01	26	Scada and Electrical Improvements at Intake Structure 1	LS
33 42 00	27-29	Precast Flared End Sections	EA
33 42 00	30	Remove and Replace 15" RCP Storm Sewer at Gravity Wall	LF
33 42 00	31	6" Ductile Iron Pipe at Gravity Wall with Check Valve	LS
31 23 33	32-33	Trench Backfill and Undercut/Stabilization Stone	CY
03 34 13	34-35	CLSM Backfill and Abandonment	CY
31 23 33	36-37	Select and Porous Granular Backfill	CY
32 01 21	38	Sidewalk Removal	SF
32 16 00	39	Concrete Sidewalk, 5"	SF
32 15 00	40	Aggregate Path, 8' Wide	SY
32 01 21	41	Concrete Curb and Gutter Removal	LF
32 16 00	42-43	Combination Concrete Curb & Gutter	LF
32 01 21	44-45	Pavement Removal and Milling	SY
32 12 16.13	46	HMA Leveling Binder, N50, Mix D, 1"	TONS

32 12 16.13	47-50	HMA Paving and Patching	SY
33 14 12	51-52	Water Main and Water Main in Casing	LF
33 14 12	53	Water Main Removal	LF
33 14 18	54-55	Water Service Installation and Abandonment	LS
33 01 30.01	56	Bypass Pumping of Sanitary Sewer	LS
33 31 11	57-58	Sanitary Sewer Removal	LF
33 31 11	59-61	Saniter Sewer and Sanitary Sewer in Casing	LF
33 05 62	62-64	Sanitary Manholes, Modifications and Adjustments	EA
32 31 20	65-67	Ornamental Fencing	LF
32 32 16	68-69	Block Retaining Wall and Flood Control Wall	SF
31 41 16.13	70	Steel Sheet Piling Retaining Wall with Cap	LF
31 22 19	71	Stream Grading and Shaping	LF
31 23 00	72-75	Earth Excavation	CY
31 37 00	76-77	Biotechnical Riprap Stabilization	LF
31 37 00	78	Rock Riffle	EA
31 23 33	79	Initial Channel Backfill, Riprap (RR4)	LF
31 23 33	80	Secondary Channel Backfill, Native Bed Material	LS
31 37 00	81	Structural Streambank Stabilization	SY
31 37 00	82-84	Filter Fabric	SY
31 41 16.13	85	Steel Plate Beam Guardrail, Type A, 6' Steel Posts	LF
31 41 16.13	86-87	Traffic Barrier Terminal, Type 1 and Type 2	EA
33 42 00	88-96	Storm Sewer Removal	LF
33 42 00	97-103	Storm Structure or End Section Removal	EA
31 10 00	104-105	Tree Removal (Units Diameter)	Unit
31 10 00	106	Clearing, Acres (Less than 6 Units Diameter)	Acre
31 10 00	107	Beaver Dam Removal and Disposal	EA
31 10 00	108-110	Remove Fencing	LF
31 41 16.13	111	Remove Guardrail	LF
31 10 00	112	Remove Concrete Spillway at Culvert Outfall	SF
31 10 00	113	Remove Timber Retaining Wall	LS
31 10 00	114	Remove Outlet Control Structure at Phil's Beach	LS
31 10 00	115	Remove Concrete Headwall, Wingwalls and Junction Chamber at Main Street	EA
31 10 00	116	Removal of Wooden Bridge and Supports at Kuester Manor	LS
01 50 00	117	Temporary Construction Fencing	LF
01 50 00	118	Temporary Relocation of Raft and Trailer at Phil's Beach	LS
31 23 00	119-120	Special and Hazardous Waste Disposal	CY
32 92 19	121-126	Seeding, Interseeding, Sodding and Mulch	SY
31 22 19	127	Sand	CY
32 17 23.13	128	Thermoplastic Pavement Marking - Line, 4"	LF
32 92 19	129	Erosion Control Blanket	SY
31 22 19	130	Topsoil Furnish and Place, Variable Depth	SY
31 22 19	131	Site Grading and Shaping	LS

01 57 13	132-133	Soil Erosion and Sedimentation and Dust and Mud Control	LS
31 23 19	134	Dewatering	LS
01 50 00	135-136	Traffic and Pedestrian Control and Mobilization	LS
01 30 00	137	Pre-Construction Video Documentation	LS
32 92 19	138	Project Maintenance and Monitoring (Bangs Lake to Larkdale Row)	Year
31 10 00	B1	Tree Removal (Larkdale Row to IL Route 176)	Acre

1.06 ADDITIVE 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.
- B. Coordinate related work and modify surrounding work.
- C. Schedule of Alternates:
 - 1. Additive Alternate A: [Public Works Storm Sewer Reroute]:
 - a. Alternate Item: Drawing number 36
 - 2. Additive Alternate B: [Tree Removal and Maintenance from Larkdale Row to IL Rte 176]:
 - a. Alternate Item: Drawing number 11(Partial), 12 and 13

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 30 00**ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Pre-installation meetings.
- G. Cutting and patching.
- H. Special procedures.

1.02 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. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of work of separate sections in preparation for Substantial Completion and for portions of work designated for Owner's occupancy.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03 FIELD ENGINEERING

- A. Employ Land Surveyor registered at Project location and acceptable to Engineer.
- B. Locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.
- C. Control datum for survey is that shown on Drawings.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit copy of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the work are in conformance with Contract Documents.
- G. Maintain complete and accurate log of control and survey work as work progresses.
- H. On completion of foundation walls and major site improvements, prepare certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.
- I. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- J. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- K. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

1.04 PRECONSTRUCTION MEETING

- A. Engineer will schedule meeting after receipt of executed Agreement, Bonds, and Certificate of Insurance.
- B. Attendance Required: Owner, Engineer and Contractor.
- C. Agenda:
 - 1. Distribution of Contract Documents.
 - 2. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
 - 3. Designation of personnel representing parties in Contract, and Engineer.
 - 4. Procedures and processing of field decisions, submittals and substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 5. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, and those affected by decisions made.

1.05 PRECONSTRUCTION VIDEO DOCUMENTATION

- A. Contractor shall provide a Preconstruction Video Documentation that includes:
 - 1. High resolution color and audio.
 - 2. Showing all areas to be affected by construction.
- B. The Preconstruction Video Documentation shall be submitted to the Owner before commencement of construction activity. No additional payment will be provided unless provided in the bid tab under a lump sum payment.

1.06 SITE MOBILIZATION MEETING

- A. Engineer will schedule meeting at Project site prior to Contractor occupancy.
- B. Attendance Required: Owner, Engineer, Special Consultants, Contractor, Contractor's Superintendent, and major Subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements and occupancy.
 - 3. Construction facilities and controls provided by Owner.
 - 4. Temporary utilities provided by Owner.
 - 5. Survey and layout.
 - 6. Security and housekeeping procedures.
 - 7. Schedules.
 - 8. Application for payment procedures.
 - 9. Procedures for testing.
 - 10. Procedures for maintaining record documents.
 - 11. Requirements for start-up of equipment.
 - 12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, and those affected by decisions made.

1.07 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum monthly intervals.

- B. Make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.
- D. 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 submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, and those affected by decisions made.

1.08 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.
- B. Require attendance of parties directly affecting, or affected by, work of specific section.
- C. Notify Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of installation, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, and those affected by decisions made.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements affecting:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete work, and to:
 - 1. Fit the several parts together, to integrate with other work.
 - 2. Uncover work to install or correct ill-timed work.
 - 3. Remove and replace defective and non-conforming work.
 - 4. Remove samples of installed work for testing.
 - 5. Provide openings in elements of work for penetrations of mechanical and electrical work.
- D. Execute work by methods to avoid damage to other work, and to provide proper surfaces to receive patching and finishing.
- E. Cut masonry and concrete materials using masonry saw or core drill.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material to full thickness of penetrated element.
- J. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.
- K. Identify hazardous substances or conditions exposed during the work to Engineer for decision or remedy.

3.02 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products for patching and extending work.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- H. Remove, cut, and patch work in manner to minimize damage and to permit restoring products and finishes to specified condition.
- I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to specified condition for each material, with neat transition to adjacent finishes.
- J. Where new work abuts or aligns with existing, provide smooth and even transition. Patch work to match existing adjacent work in texture and appearance.
- K. 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.
- L. Where change of plane of 1/4 inch or more occurs, submit recommendation for providing smooth transition to Engineer for review.
- M. Trim existing doors to clear new floor finish. Refinish trim to specified condition.
- N. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- O. Finish surfaces as specified in individual product sections.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Product data.
- E. Shop drawings.
- F. Samples.
- G. Design data.
- H. Test reports.
- I. Certificates.
- J. Manufacturer's instructions.
- K. Manufacturer's field reports.
- L. Erection drawings.

1.02 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer accepted form.
- B. Identify Project, Contractor, Subcontractor and Supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- C. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of the work and Contract Documents.
- D. Schedule submittals to expedite Project and deliver to Engineer at business address. Coordinate submission of related items.
- E. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.
- F. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed work.
- G. Allow space on submittals for Contractor and Engineer review stamps.
- H. When revised for resubmission, identify changes made since previous submission.

- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- J. Submittals not requested will not be recognized or processed.

1.03 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedules within 10 days after date of Owner-Contractor Agreement. After review, resubmit required revised data within ten days.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Distribute copies of reviewed schedules to project site file, Subcontractors, suppliers, and other concerned parties.
- D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- E. Submit computer generated horizontal bar chart with separate line for each major portion of work or operation, identifying first work day of each week.
- F. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
- G. Indicate estimated percentage of completion for each item of work at each submission.
- H. Submit separate schedule of submittal dates for shop drawings, product data, and samples, including Owner furnished products and products identified under Allowances, and dates reviewed submittals will be required from Engineer. Indicate decision dates for selection of finishes.
- I. Indicate delivery dates for Owner furnished products and products identified under Allowances.
- J. Revisions To Schedules:
 - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
 - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
 - 3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect.

1.04 PROPOSED PRODUCTS LIST

- A. Within 10 days after date of Owner-Contractor Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.05 PRODUCT DATA

- A. Product Data: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Submit number of copies Contractor requires, plus four 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 in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 – Execution and Closeout Requirements.

1.06 SHOP DRAWINGS

- A. Shop Drawings: Submit to Engineer for review for limited purpose of checking for 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 professional engineer responsible for designing components shown on shop drawings.
 - 1. Include signed and sealed calculations to support design.
 - 2. Submit 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 number of opaque reproductions Contractor requires, plus four copies Engineer will retain.
- E. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 – Execution and Closeout Requirements.

1.07 SAMPLES

- A. Samples: Submit to Engineer for review for limited purpose of checking for 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, or finish selection.

2. Submit samples of finishes from full range of manufacturers' standard colors, 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 which may be used in the work are indicated in individual specification sections.
 - G. Samples will not be used for testing purposes unless specifically stated in specification section.
 - H. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents purposes described in Section 01 70 00 – Execution and Closeout Requirements.
- 1.08 DESIGN DATA
- A. Submit for Engineer's knowledge as contract administrator or for Owner.
 - B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- 1.09 TEST REPORTS
- A. Submit for Engineer's knowledge as contract administrator or for Owner.
 - B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- 1.10 CERTIFICATES
- A. When specified in individual specification sections, 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.
- 1.11 MANUFACTURER'S INSTRUCTIONS
- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.
 - B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.12 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for Engineer's benefit as contract administrator or for Owner.
- B. Submit report in duplicate within 5 days of observation to Engineer for information.
- C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.13 ERECTION DRAWINGS

- A. Submit drawings for Engineer's benefit as contract administrator or for Owner.
- B. Submit for information for limited purpose of 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.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with 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 minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable work. Do not permit tolerances to accumulate.

- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.04 REFERENCES

- 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 on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

1.05 LABELING

- A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- 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.

1.06 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be comparison standard for remaining work.
- D. Where mock-up has been accepted by Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Engineer.

1.07 TESTING AND INSPECTION SERVICES

- A. Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing.

1. Prior to start of work, submit testing laboratory name, address, and telephone number, and names of full-time registered Engineer and responsible officer.
 2. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.
- B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Engineer.
1. Laboratory: Authorized to operate at Project location.
 2. Laboratory Staff: Maintain full-time registered Engineer on staff to review services.
 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Engineer or Owner.
- D. Reports will be submitted by independent firm to Engineer, Contractor, and authority having jurisdiction, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
1. Submit final report indicating correction of work previously reported as non-compliant.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
1. Notify Engineer and independent firm 48 hours prior to expected time for operations requiring services.
 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing and employment of testing agency or laboratory shall not relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.
- G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- H. 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 specified sampling and testing of products in accordance with specified standards.

4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 5. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of work or products.
 6. Perform additional tests required by Engineer.
 7. Attend preconstruction meetings and progress meetings.
- I. Agency Reports: After each test, promptly submit two copies of report to Engineer, Contractor, and authority having jurisdiction. When requested by Engineer, provide interpretation of test results. Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and specifications section.
 6. Location in Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.
- J. 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.
- 1.08 MANUFACTURERS' FIELD SERVICES
- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and as applicable, and to initiate instructions when necessary.
 - B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer.

- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00 - Submittal Procedures, Manufacturers' Field Reports article.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing site conditions and substrate surfaces 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.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

END OF SECTION

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SECTION 01 50 00**TEMPORARY FACILITIES AND CONTROLS**

PART 1 GENERAL

1.01 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Temporary Construction Fencing

1. Measurement: Temporary Construction Fencing will be measured for payment in feet in place.
2. Payment: This work will be paid for at the contract unit price per foot for Temporary Construction Fencing. Fencing shall be placed at the perimeter of the work as shown in the plans.

B. Temporary Relocation of Raft and Trailer at Phil's Beach

1. Measurement: Temporary Relocation of Raft and Trailer at Phil's Beach will not be measured for payment but paid at the contract lump sum price.
2. Payment: This work will be paid for at the contract lump sum price for Temporary Relocation of the raft and trailer at Phil's Beach. The work shall consist of coordination with the Wauconda Park District and Engineer to determine a suitable location to temporarily store the trailer. Upon completion of the work and prior to restoration, the trailer shall be relocated to the preconstruction location or as directed by the park district and/or engineer.

C. Traffic and Pedestrian Control

1. Measurement: In accordance with IDOT Standard Specifications, Section 701, shall not be measured for payment but paid at the contract lump sum price.
2. Payment: This work will be paid for at the contract lump sum price in accordance with IDOT Standard Specifications, Section 701. The lump sum price includes all labor, materials and equipment necessary to furnish, install, maintain, relocate and removal all traffic and pedestrian control devices required per MUTCD and as specified and shown in the contract documents.

D. Mobilization

1. Measurement: In accordance with IDOT Standard Specifications, Section 671.
2. Payment: This work will be paid at the lump sum price for mobilization in accordance with IDOT Standard Specifications, Section 671.

1.02 SECTION INCLUDES

A. Temporary Utilities:

1. Temporary electricity.
2. Temporary lighting for construction purposes.

3. Temporary heating.
 4. Temporary cooling.
 5. Temporary ventilation.
 6. Temporary sanitary facilities.
- B. Construction Facilities:
1. Vehicular access.
 2. Parking.
 3. Progress cleaning and waste removal.
 4. Traffic regulation.
- C. Temporary Controls:
1. Barriers.
 2. Enclosures and fencing.
 3. Water control.
 4. Dust control.
 5. Erosion and sediment control.
 6. Noise control.
 7. Pollution control.
- D. Removal of utilities, facilities, and controls.

1.03 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from utility source as needed for construction operation.
- B. Provide temporary electric feeder from electrical service. Do not disrupt Owner's use of service.
- C. Complement existing power service capacity and characteristics as required for construction operations.
- D. Provide power outlets, with branch wiring and distribution boxes located as required for construction operations. Provide flexible power cords as required for portable construction tools and equipment.
- E. Provide main service disconnect and over-current protection at convenient location, feeder switch at source distribution equipment and meter.

- F. Permanent convenience receptacles may be utilized during construction.
- G. Provide distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations to achieve minimum lighting level of 2 watt/sq ft.
- B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.
- C. Provide and maintain 0.25 watt/sq ft HID lighting to interior work areas after dark for security purposes.
- D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtailed, and lamps for specified lighting levels.
- E. Maintain lighting and provide routine repairs.
- F. Permanent building lighting may not be utilized during construction.

1.05 TEMPORARY HEATING

- A. Provide and pay for heating devices and heat as needed to maintain specified conditions for construction operations. Provide separate metering and reimburse Owner for cost of energy used.
- B. Prior to operation of 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.
- C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in product sections.

1.06 TEMPORARY COOLING

- A. Provide and pay for cooling devices and cooling as needed to maintain specified conditions for construction operations. Provide separate metering and reimburse Owner for cost of energy used.
- B. Prior to operation of 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.
- C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.07 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.08 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of project mobilization.

1.09 VEHICULAR ACCESS

- A. Construct temporary access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes.
- B. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- C. Extend and relocate vehicular access as work progress requires, provide detours as necessary for unimpeded traffic flow.
- D. Location approved by Engineer.
- E. Provide unimpeded access for emergency vehicles. Maintain 20 feet wide driveways with turning space between and around combustible materials.
- F. Provide and maintain access to fire hydrants and control valves free of obstructions.
- G. Provide means of removing mud from vehicle wheels before entering streets.
- H. Use designated existing on-site roads for construction traffic.

1.10 PARKING

- A. Provide temporary surface parking areas to accommodate construction personnel.
- B. Locate as approved by Engineer.
- C. When site space is not adequate, provide additional off-site parking.
- D. Use of designated existing on-site streets and driveways used for construction traffic is permitted. Tracked vehicles not allowed on paved areas.
- E. Use of designated areas of existing parking facilities used by construction personnel is permitted.
- F. Do not allow heavy vehicles or construction equipment in parking areas.
- G. Do not allow vehicle parking on existing pavement.
- H. Designate one parking space for Engineer.
- I. 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 permanent parking structures is permitted.

J. Maintenance:

1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

K. Removal, Repair:

1. Remove temporary materials and construction at Substantial Completion.
2. Remove underground work and compacted materials to depth of 2 feet; fill and grade site as specified.
3. Repair facilities damaged by use, to specified condition.

L. Mud from Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.

1.11 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, prior to enclosing spaces.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 TRAFFIC REGULATION

A. Signs, Signals, And Devices:

1. Post Mounted and Wall Mounted Traffic Control and Informational Signs: As approved by authority having jurisdiction.
2. Traffic Control Signals: As approved by local jurisdictions.
3. Traffic Cones and Drums, Flares and Lights: As approved by authority having jurisdiction.
4. Flagperson Equipment: As required by authority having jurisdiction.

B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

- C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- D. Haul Routes:
 - 1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
 - 2. Confine construction traffic to designated haul routes.
 - 3. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
- E. 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. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.
 - 3. Relocate as work progresses, to maintain effective traffic control.
- F. Removal:
 - 1. Remove equipment and devices when no longer required.
 - 2. Repair damage caused by installation.
 - 3. Remove post settings to depth of 2 feet.

1.13 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.
- B. Provide barricades and covered walkways required by authorities having jurisdiction for public rights-of-way.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.14 ENCLOSURES AND FENCING

- A. Construction: Contractor's option.
- B. Provide 6 feet high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.15 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.16 DUST CONTROL

- A. Execute work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.17 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.18 NOISE CONTROL

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

1.19 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.

1.20 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to 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.

END OF SECTION

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SECTION 01 57 13**TEMPORARY EROSION AND SEDIMENT CONTROL****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. This item of work shall consist of constructing temporary erosion control systems as shown on the plans and/or specifications herein for the duration of the contract to control erosion and sediment damage to pavements, adjacent properties and water resources through the use of ditch checks, basins, inlet sedimentation control, silt filter fences, temporary seeding and other erosion control devices or methods as is acceptable.
- B. As part of the lump sum bid or unit price if unit prices for erosion control are provided for, the Contractor shall be required to comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) Storm Water Permit for construction site activities.
- C. The Contractor's Certification Statement is made a part of this Contract. The Contractor shall sign and date the certification sheet and submit it with the Agreement. Certification sheet is at the end of the Storm Water Pollution Prevention Plan attached to this specification.
- D. Information on the above-referenced permits requirements may be obtained from:

Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand Avenue East
Springfield, Illinois 62702
- E. Temporary erosion control shall be in-place prior to commencement of work in any area.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Soil Erosion and Sedimentation Control
 - 1. Measurement: This Work will not be measured for payment but paid at the lump sum contract price.
 - 2. Payment: This work will be paid for at the contract lump sum price for all necessary soil erosion and sedimentation control efforts for the project. This includes but not limited all erosion control devices such as silt fence, inlet protection, silt curtains, erosion control logs, dewatering bags, silt dikes and any other methods of erosion control as required by the engineer, Lake County SMC, the contractor's DECI, IDNR or US Army Corps of Engineers.

The contractor shall assign a Designated Erosion Control Inspector (DECI) hired or employed by the contractor to perform ongoing inspection of compliance and maintenance of the approved soil erosion and sediment control plan for the project. The DECI shall follow the requirements of the Watershed Development Ordinance developed by Lake County Stormwater Management Commission (SMC). The contractor or DECI shall also submit a stormwater prevention plan for review and approval for the project as outlined within this specification section.

B. Dust and Mud Control

1. Measurement: This Work will not be measured for payment but paid at the lump sum contract price.
2. Payment: This work will be paid for at the contract lump sum price for all necessary dust and mud control associated with the project. This includes stabilized construction access to the site, dust control, removal of dirt and debris from the roadways using equipment and street sweeping to remove debris from roadways and gutter lines. The contractor will be responsible for sweeping and general site maintenance at the request of the engineer and DECI.

1.03 REFERENCE STANDARDS

- C. Illinois Department of Transportation - Standard Specification for Road and Bridge Construction current edition including Supplemental Specifications and Recurring Special Provisions. Except references to Methods of Measurement and Basis of Payment, as revised herein.
- D. U. S. Environmental Protection Agency Phase I and II Regulation for Construction Sites.
- E. Illinois Environmental Protection Agency - General Permit to Discharge Storm Water - Construction Site Activities.
- F. NPDES Storm Water Pollution Prevention Plan.
- G. Illinois Environmental Protection Agency - Illinois Urban Manual.

1.04 WATER POLLUTION CONTROL MANAGEMENT

- A. Contractor is required to submit the Name, Address and Telephone number(s) of the person(s) responsible for water pollution control during construction. The person(s) is the Water Pollution Control Manager(s) (WPCM).
- B. The WPCM shall be available at all times throughout the duration of the project.
- C. Duties of the Contractor's WPCM include but are not limited to:
 1. Ensuring full compliance with the Storm Water Pollution Prevention Plan (SWPPP) and the NPDES Storm Water Permit.
 2. Implementing all elements of the SWPPP and Special Provisions, including but not limited to:
 - a. Implementation of prompt and effective erosion and sediment control measures.
 - b. Implementing all Non-storm water management, and materials and waste management activities such as monitoring discharges (dewatering, diversion devices), general site clean-up, vehicle and equipment cleaning, fueling and maintenance, spill control, and ensuring that no materials other than storm water are discharges in quantities which will have an adverse effect on receiving waters or storm water drain systems.

3. Pre-storm inspections, post-storm inspections, storm event inspections, routine inspection as required by the permit, and ensuring elimination of all unauthorized discharges.
4. The Contractor's WPCM shall be assigned authority by the Contractor to mobilize crews in order to make immediate repairs to the control measures.
5. Coordinate with the Engineer to assure all of the necessary corrections/ repairs are made immediately, and that the project complies with the SWPPP, the Permit and approved plans at all times.

PART 2 PRODUCTS

2.01 BALE STAKES

- A. Bale stakes shall be four feet minimum in length each and be either of sound wood 1" minimum for one dimension, metal according to IDOT Article 1006.28 (d), or painted metal posts.

2.02 FENCE STAKES

- A. Fence stakes, except for silt filter fence, shall be 8 feet minimum in length metal stakes according to IDOT Standard Specifications Article 1006.28 (d) or painted metal posts.

2.03 HAY OR STRAW BALES

- A. Bales shall be either hay or straw compacted and adequately bound to an approximate size of 12 x 18 x 36 inches.

2.04 FENCE

- A. Fence shall be a minimum of 4 feet in height and may be either snow fence, flexible wooden slat fence, woven wire, or similar material approved by the Engineer.

2.05 AGGREGATE

- A. Aggregate shall include any locally available coarse aggregate, stone, broken brick, broken concrete, or riprap meeting the approval of the Engineer. The gradation required will vary depending on flow velocity.

2.06 SILT FILTER FENCE

- A. Geotextile fabric for silt fence shall consist of woven or nonwoven filaments of polypropylene, polyester or polyethylene. Nonwoven fabric may be needle punched heat-bonded, resin-bonded or combination thereof. The filaments in the Silt Filter Fence Fabric must be dimensionally stable (i.e., to each other), resistant to delamination, and must be free from any chemical treatment or coating that might significantly reduce porosity and permeability. Both fabrics shall be resistant to ultraviolet radiation. If stored on the jobsite prior to its use, it shall be protected from exposure to direct sunlight. The fabrics shall comply with the following physical properties:

Properties	Dimension	Reference
Width, m (ft.)	1 (3.5) min.	
Weight [g/m ² (oz./sq. yd.)]	135 (4.0) min.	ASTM D 3776
Grab Tensile Strength, N (lbs.)	900 (200) min. ^{1/}	ASTM D 4632
Grab Elongation @ Break (%)	15 min. ^{1/}	ADTM D 4632

Properties	Dimension	Reference
Burst Strength, kPa (psi)	1725 (250) min. ^{2/}	ASTM D 3786
Equivalent Opening Size	600 um (30) min. (nonwoven) ^{2/}	COE CW-02215
(EOS) Sieve No.	300 um (50) min. (woven) ^{2/}	

^{1/} The fabric shall be tested wet in both warp and fill directions in accordance with ASTM D1682, Grab Test, G using a 100 mm (4 inch) by 200 mm (8 inch) sample, 75 mm (3 inch) gage length, 300 mm (12 inch) per minute in a CRE testing machine. The average of 5 tests in each direction shall meet the minimum value given above.

^{2/} Manufacturer's certification that the fabric meets the minimum value.

2.07 TEMPORARY MULCH MATERIAL

- A. Mulch for temporary seeding and planting shall be non-toxic to vegetation and to the germination of seed and shall be approved by the Engineer. Straw shall be stalks of wheat, rye, oats or other approved straw, and shall be air dried.
- B. Hydraulic Mulch and Chemical Mulch Binder shall meet the requirements of IDOT Standard Specification Article 1081.06 (a).

2.08 TEMPORARY SEED

- A. Seeds shall consist of Oats from March 1st to July 31st and Winter Wheat from August 1st to November 15th. Light disking of hard or caked soil as directed by the Engineer.
- B. Seed shall be delivered to the job site in unopened, labeled bags. A certification from the supplier stating the weight and contents of the bag shall be printed on or attached to each bag along with a certification stating that the seed meets the requirements of IDOT Article 1081.04 (c).
- C. Areas where construction activity temporarily ceases for more than twenty-one days shall be stabilized with a temporary seed and mulch within fourteen days of the last disturbance. Once construction activity ceases permanently in an area, that area shall be stabilized with permanent seed and mulch as per the specifications.

2.09 URETHANE FOAM/GEOTEXTILE

- A. Urethane foam/geotextile ditch checks shall be triangular shaped having a minimum height of 8 to 10 inches in the center with equal sides and a 16 to 20 inch base. The triangular shaped inner material shall be a low density urethane foam. The outer cover shall be a woven geotextile fabric placed around the inner material and allowed to extend beyond both sides of the triangle 2 to 3 feet. Standard lengths of each dike shall be 7 feet. The fabrics shall comply with the following physical properties:

Properties	Dimension	Reference
Grab Tensile Strength, N (lbs.)	450 (100) min. ^{1/}	ASTM D 4632
Grab Elongation @ Break (%)	15 min. ^{1/}	ADTM D 4632
Burst Strength, kPa (psi)	1380 (200) min. ^{2/}	ASTM D 751
Weight g/sq m (oz./sq. yd.)	135 (4.0) min.	ADTM D 3776
Equivalent Opening Size	600 um (30) min. (nonwoven) ^{2/}	
(EOS) Sieve No.	300 um (50) min. (woven) ^{2/}	COE CS-02215

^{1/} For woven fabric, test results shall be referenced to orientation with warp or weave, whichever the case may be. Both woven and nonwoven fabric shall be tested wet.

^{2/} Manufacturer's certification that the fabric meets the minimum value.

The urethane foam shall have the following properties:

Properties	Dimension	Reference
Density, kg/cu m (lbs./cu. ft.)	16.0±1.6 (1.0±0.1) min.	ASTM D 3574
Filler Content (%) by weight	0%	ADTM D 297
Tensile Strength, kPa (psi)	70 (10) min.	ASTM D 3574
Elongation (%)	125 min.	ASTM D 3574
Tear Resistance N/mm (lb./in.)	0.22 (1.25)	ASTM D 3574

^{1/} Manufacturer's certification that the fabric meets the minimum value.

2.10 ROLLED EXCELSIOR

A. Rolled excelsior shall meet the manufacturer's specifications.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall conduct his construction operations in accordance with the latest revision of the Illinois Environmental Protection Agency publication Illinois Urban Manual.
- B. Erosion control must be considered by the Contractor prior to exposing any erodible material. Erosion protection for Contractor furnished borrow pits, equipment storage sites, plant sites and haul roads shall be provided by the Contractor.
- C. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical.

- D. Slopes that erode easily shall be temporarily seeded as the work progresses with a cereal grain of wheat, rye or oats obtained from a local supplier or seed store. The cereal grains may be planted by a hand seeder or other acceptable method and covered by a drag or harrow to provide a quick cover crop. Inspection of the cereal grain seed will not be required. The intent of using cereal grains as temporary erosion control is to permit the Contractor to quickly seed potential areas as the need arises with on-site personnel and equipment.

3.02 TEMPORARY EROSION CONTROL

- A. The installation and maintenance of silt fence or bales shall be in accordance with the permit, or as directed by the Engineer.

3.03 TEMPORARY DITCH CHECKS

- A. Temporary Ditch Checks shall be constructed by placing silt fence and bales at intervals of not greater than 200 feet along ditch lines, or as directed by the Engineer.

3.04 SILT FENCE

- A. The installation and maintenance of silt fence shall be in accordance with the permit, or as directed by the Engineer.
- B. The Contractor shall maintain the alignment and condition of the silt fence, as necessary, throughout its use on the project. Upon completion and/or as directed, the Contractor shall remove the silt fence from the project.

3.05 STRAW BALE BARRIER

- A. The installation and control of straw bale barriers shall be in accordance with the permit, or as directed by the Engineer.

3.06 INLET AND PIPE PROTECTION

- A. This system consists of placement of protection surrounding inlets, pipe inlets or outfalls, and in similar locations as required to intercept water borne silt and sediment and prevent it from entering the drainage system or exiting the construction area. The protection shall be constructed according to the manufacturers' specifications where appropriate.

3.07 DUST CONTROL

- A. The Contractor shall employ construction methods and means that will keep flying dust to the minimum as directed by the Engineer. The Contractor shall provide for the laying of water on the project, and on roads, streets, aprons and other areas immediately adjacent to the project limits, wherever traffic, or buildings that are occupied or in use, are affected by such dust caused by hauling or other operations.

3.08 EXTENT OF EROSION CONTROL

- A. The Contractor shall limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and provide immediate temporary pollution control measures. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical.

3.09 MAINTENANCE AND REMOVAL OF TEMPORARY EROSION CONTROL SYSTEM

- A. When the Engineer is notified or determines an erosion and/or sediment control deficiency exists, the Engineer will direct the Contractor in writing to correct the deficiency. The Contractor shall then correct the deficiency within 24 hours. The deficiency may be the lack of any repair, maintenance, or implementation of erosion and/or sediment control devices included in the Contract, or any failure to comply with the conditions of the National Pollutant Discharge Elimination System (NPDES) Storm Water Permit for Construction Site Activities. If the Contractor fails to correct the deficiency(s) within 24 hours of receipt of notification, a daily monetary deduction may be imposed for each calendar day the deficiency exists. The time period will begin with the initial written notification to the Contractor and end with the Engineer's acceptance of the corrected work. The per calendar day deduction will be either \$1,000.00 or 0.05 percent of the awarded contract value, whichever is greater. If the Contractor fails to respond, the Owner may correct the deficiency(s) and deduct the cost from monies due or which may become due the Contractor. This corrective action shall in no way relieve the Contractor of the contractual requirements or responsibilities. This deduction is in addition to liquidated damages if they also apply.
- B. When accumulated sediment reaches one third of the height of the silt fence, the sediment shall be removed and the area shall be monitored and maintained until stabilized.
- C. Silt fence shall be inspected for tears, security of fabric to posts, and posts embedment in the ground.
- D. Sediment traps and ditch checks shall be cleaned when the sediment reaches the maximum allowable sediment level of 1/3 its height, or as directed of the Engineer.

3.10 REMOVAL OF EROSION CONTROL

- A. The Contractor shall remove temporary erosion control structures at the end of the project or when ordered to do so by the Engineer. The costs associated with the removals shall be incidental to this item. In the event that temporary erosion and pollution control measures are ordered by the Engineer due to the Contractor's negligence or carelessness, the work shall be performed by the Contractor at his expense.

3.11 SPILL PREVENTION

- A. Material Management Practices - Special care shall be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.
- B. Good Housekeeping - The following good housekeeping practices shall be followed onsite during the construction project:
 - 1. Effort to store only enough products required to do the job.
 - 2. Materials stored in a neat, orderly manner in their appropriate containers.
 - 3. Products kept in original containers with original manufacturer's labels.
 - 4. Materials not mixed with one another unless allowed by the manufacturer.
 - 5. All of a product shall be used up before disposing of the container.
 - 6. Manufacturer's recommendations for proper use and disposal shall be followed.

- C. Hazardous Products - These practices are used to reduce the risks associated with hazardous materials:
1. Products shall be kept in original containers unless they are not resealable.
 2. Original labels and Material Safety Data Sheets (MSDS) shall be retained.
 3. If surplus product must be disposed of, manufacturers or local and state recommended methods for proper disposal shall be followed.
- D. Product Specific Practices - The following practices shall be followed onsite:
1. Petroleum Products - All onsite vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers which are clearly labeled. Construction equipment shall be stored and fueled only at designated locations. All necessary measures shall be taken to contain any fuel or pollution run-off in compliance with EPA water quality regulations. Leaking equipment or supplies shall be immediately repaired or removed from the site.
 2. Fertilizers - All fertilizers used shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked into the soil to limit exposure to storm water runoff. Storage shall be in a covered area. The contents of any partially used bags of fertilizer shall be transferred to a sealable plastic bin to avoid spills.
 3. Paints - All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be dumped on the ground or discharged to the storm sewer system, but shall be properly disposed of according to manufacturer's instructions or applicable state or local regulations.
 4. Concrete Trucks - Concrete trucks shall not be allowed to wash out or discharge surplus concrete or drum wash water onsite unless in an accepted holding basin.

STORM WATER PREVENTION PLAN

GENERAL

This plan has been prepared to comply with the provisions of the General NPDES Permit Number ILR10 issued by the Illinois Environmental Protection Agency for storm water discharges from construction site activities.

The following plan was established and included in these plans to direct the Contractor in the placement of temporary erosion control systems and to provide a storm water pollution prevention plan for compliance under NPDES. The Contractor shall abide by all requirements within this plan as part of the contract.

The purpose of this plan is to prevent/minimize siltation within the construction zone and to eliminate sediments from entering and leaving the construction zone by utilizing proper temporary erosion control systems and providing ground cover within a reasonable time.

Certain items shall be placed as shown in this plan. Other items shall be placed as directed by the Engineer based on situations resulting from type of activities, time of year, and weather conditions.

The Contractor shall place permanent erosion control and seeding within a reasonable amount of time; therefore, reducing areas open to the possibility of erosion. The Engineer will determine if temporary erosion control systems shown in the plan can be deleted, size of proposed ditch checks, proper methods of installation, and if additional temporary erosion controls shall be added which are not included in this plan. The Contractor shall perform all work as directed by the Engineer.

SITE DESCRIPTION

Description of Construction Activity:

1. The proposed project consists of the Bangs Lake Outfall Improvements Project. This consists of a new lake outfall structure, storm sewer, retaining wall, site grading, tree/brush clearing and site restoration.

Intended Sequence of Major Construction Activities:

1. Mobilization and construction staking.
2. Install silt fences and temporary erosion control measures.
3. Access road construction (location specific).
4. Demolition.
5. Storm sewer installation
6. Main Street box culvert relocation
7. Block Retaining Wall Installation and outfall relocation
8. Channel grading
9. Storm Sewer replacement under Osage Street.
10. Tree clearing, channel regrading and sanitary sewer adjustments

11. Large Block Retaining Wall at Slocum Lake Road
12. Storm Sewer relocation at Public Works Building (Additive Alternate)
13. Sheet Pile Retaining Wall along Slocum Lake Road
14. Channel grading
15. Bank stabilization between US Rte 12 & Larkdale ROW
16. Culvert replacement in Larkdale ROW
17. Tree clearing and channel reestablishment from Larkdale ROW to IL Rte. 176
18. Restoration

Area of Construction Site:

1. The project will entail disturbing approximately 4.5 acres along the Bangs Lake Outfall.

Drainage Tributaries Receiving Water from this Construction Site:

1. The storm water leaving the site flows to an unnamed tributary to Bangs Lake Outfall, to Slocum Lake and ultimately the Fox River Watershed. The project is located within a flood plain.
2. Silt laden discharges from dewatering operations in the creek will be contained and clear water decanted back into the creek. The captured silt will be transported to a predetermined permanent site be either seeded or incorporated into existing soils in an agricultural application.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

1. The storm water pollution prevention plan reflects Illinois Environmental Protection Agency and Illinois Soil and Water Conservation District's requirements for storm water management and erosion and sediment control. There are no other applicable local requirements for sediment and erosion site plans (or permits), or storm water management site plans (or permits).

CONTROLS - EROSION CONTROLS AND SEDIMENT CONTROLS

Stabilization Practices

1. Temporary Stabilization
 - a. Areas of existing vegetation (woods and grasslands) outside the proposed construction slope limits shall be identified for preserving and shall be protected from construction or other activities which would be detrimental to their maintenance and development.
 - b. Dead, diseased, or unsuitable vegetation within the site shall be removed as directed by the Engineer, along with required tree removal.

- c. As soon as reasonable access is available to all locations where water drains away from the project, sediment basins, temporary ditch checks, and/or erosion control fence shall be installed as called out in this plan and as directed by the Engineer.
 - d. Bare and sparsely vegetated ground in highly erodible areas as determined by the Engineer shall be temporarily seeded where no construction activities are expected within seven days.
 - e. Top soil stockpiles, earth stockpiles and disturbed portions of the site where construction activity temporarily ceases for at least twenty-one days shall be temporarily seeded no later than fourteen days from the last construction activity in that area as stated in the special provision "Temporary Erosion Control Seeding".
 - f. Temporary erosion control items shall be removed as directed by the Engineer after the item is no longer needed or it is no longer functioning.
2. Permanent Stabilization
- a. Excavated areas, embankments and all other disturbed portions of the site where construction activity permanently ceases shall be stabilized with permanent seed no later than fourteen days after the last construction activity. This work shall be done in accordance with the project specifications.
 - b. All seeded areas shall be inspected at least one time each seven days and within 24 hours after a rainfall of 0.5" or greater.
 - c. The project shall be inspected by the Engineer on a bi-weekly basis to determine that erosion control efforts are in place and effective and if other control work is necessary.

Structural Practices

1. Perimeter barriers, ditch checks, inlet/pipe protection and/or sediment basins shall be constructed at all locations as indicated in the plans and at any additional location as directed by the Engineer.
2. Temporary riprap ditch checks will be allowed to remain in place where approved by the Engineer.
3. Sediment collected during construction by the various temporary erosion control systems shall be disposed of on a regular basis as directed by the Engineer.

Storm Water Management

1. Storm water management will be provided by drainage ditches, swales, storm sewers, and catch basins for the site. The areas will be graded to drain and have permanent seeding.

OTHER CONTROLS

Waste Disposal

1. Waste Materials - All waste materials will be collected and stored in containers with lids and will be disposed of by a licensed solid waste company. The containers will meet all state and local solid waste management regulations. All trash and construction debris from

the site will be deposited in the containers. The containers will be emptied and the trash hauled offsite on an as-needed basis or as directed by the Engineer. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal and a notice stating these practices will be posted in the Contractor's office trailer.

2. Hazardous Waste - All hazardous waste materials shall be disposed of in the manner specified by state or local regulations or by the Manufacturer's Material Safety Data Sheet (MSDS). Site personnel will be instructed regarding the correct procedure for hazardous waste disposal.
3. Sanitary Waste - All sanitary waste will be collected from any portable units a minimum of once per week by a licensed Sanitary Waste Management Contractor, as required by local regulations.

Offsite Vehicle Tracking

1. If deemed necessary, a vehicle wash off area with yard hydrants will be provided to help reduce vehicle tracking of sediments. The paved airport entrance road will be swept daily to remove any excess mud, dirt or rock tracked from the site. The Contractor shall provide all measures required by IDOT for accessing public roads by construction vehicles.

TIMING OF CONTROLS/MEASURES

1. As indicated in the sequence of major activities, the silt fencing and other temporary erosion controls will be constructed prior to clearing or grading of any other portions of the site. Areas where construction activity temporarily ceases for more than twenty-one days will be stabilized with a temporary seed and mulch within fourteen days of the last disturbance. Once construction activity ceases permanently in an area, that area will be stabilized with permanent seed and mulch as per the specifications. All accumulated sediment will be removed and the area will be monitored and maintained until stabilized.

MAINTENANCE/INSPECTION PROCEDURES

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls:

1. All control measures shall be inspected by the Engineer on a bi-weekly basis and following any storm event of 0.5" or greater.
2. All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of the report.
3. Built-up sediment will be removed from silt fence when it has reached one-quarter the height of the fence.
4. Silt fence will be inspected for depth of sediment, tears, if fabric is securely attached to posts, and if posts are firmly embedded in the ground.
5. Sediment traps and ditch checks will be inspected for depth of sediment and secured placement. Built-up sediment will be removed when it reaches the maximum allowable sediment level or at the direction of the Engineer.
6. All ditches will be inspected and any breaches promptly repaired.

7. Temporary and permanent seeding will be inspected for bare spots, washouts, rills, cuts and healthy growth.
8. The Contractor shall have two individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report. The Engineer shall verify all inspections, maintenance and repair activities.
9. A maintenance inspection report in accordance with Part IV. D. 4. b. of the general permit shall be made and kept on file by the Contractor as part of the plan for at least three years after the date of inspection. The report shall be signed in accordance with Part VI. G. of the general permit.
10. If any violation of the provisions of this plan is identified during the conduct of the construction work covered by this plan, the Engineer shall complete and file an "Incident of Noncompliance (ION)" report for the identified violation. The Engineer shall use forms provided by the Illinois Environmental Protection Agency and shall include specific information on the noncompliance, actions which were taken to prevent any further causes of noncompliance, and a statement detailing any environmental impact which may have resulted from the noncompliance.

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construction:

1. Vehicle fluids.
2. Concrete, form release agents and curing compounds.
3. Limestone gravel.
4. Paints and solvents.
5. Bituminous paving materials.
6. Mortar mix.
7. Detergents.
8. Landscaping materials.
9. Petroleum based products.
10. Cleaning solvents.
11. Wood.
12. General litter.

SPILL PREVENTION

Material Management Practices - The following will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff:

1. Good Housekeeping - The following good housekeeping practices will be followed onsite during the construction project:

- a. Effort to store only enough product required to do the job.
 - b. Materials stored in a neat, orderly manner in their appropriate containers.
 - c. Products kept in original containers with original manufacturer's labels.
 - d. Materials not mixed with one another unless recommended by the manufacturer.
 - e. All of a product will be used up before disposing of the container.
 - f. Manufacturer's recommendations for proper use and disposal will be followed.
2. Hazardous Products - These practices are used to reduce the risks associated with hazardous materials:
- a. Products will be kept in original containers unless they are not re-sealable.
 - b. Original labels and Material Safety Data Sheets (MSDS) will be retained.
 - c. If surplus product must be disposed of, manufacturers or local and state recommended methods for proper disposal will be followed.

Product Specific Practice - The following practices will be followed onsite:

1. Petroleum Products - All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Construction equipment shall be stored and fueled only at designated locations. All necessary measures shall be taken to contain any fuel or pollution run-off in compliance with EPA water quality regulations. Leaking equipment or supplies shall be immediately repaired or removed from the site.
2. Fertilizers - All fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water runoff. Storage will be in a covered area. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
3. Concrete Trucks - Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water onsite unless in an approved holding basin.

CONTRACTOR CERTIFICATION STATEMENT

This certification statement is part of the Storm Water Pollution Prevention Plan for the project described below in accordance with General NPDES Permit No. ILR10, issued by the Illinois Environmental Protection Agency on July 31,2023, following this section.

The plan was prepared to comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) Storm Water Permit for construction site activities.

The plan was established and included in the plans to direct the Contractor in the placement of temporary erosion control systems and to provide a storm water pollution prevention plan for compliance on NPDES. The Contractor will abide by all requirements within the plan as part of the contract.

Project:

Location:

County:

PART 4 I certify under penalty of law that I understand the terms of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Contractor's Signature

Date

Title

Name of Firm

Street Address

City, State, Zip Code

Phone Number

END OF SECTION

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SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.
- F. Equipment electrical characteristics and components.

1.02 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

1.03 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with 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 by methods to prevent soiling, disfigurement, or damage.

1.04 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide 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 by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.05 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting 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 in accordance with the following article.

1.06 PRODUCT SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.
- B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that 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 coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

F. Substitution Submittal Procedure:

1. Submit three copies of request for Substitution 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.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01 70 00
EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 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.

1.02 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to Engineer required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. Owner will occupy portions of building as specified in Section 01 11 00 - Summary of Work.

1.03 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

- C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- D. Clean and replace filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.04 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Engineer 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 33 00 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

1.05 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 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, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at designated 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.

1.06 TESTING, ADJUSTING AND BALANCING

- A. Employ services of independent firm to perform testing, adjusting, and balancing.
- B. Reports will be submitted by independent firm to Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

1.07 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. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

1.08 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling 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 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.

1.09 OPERATION AND MAINTENANCE DATA

- A. Submit all Operation and Maintenance Data electronically as well as bound in 8-1/2 x 11 inch (A4) text pages, three D side ring 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 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 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. Originals of warranties and bonds.

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 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 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 trouble shooting; 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 40 00 - 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 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 32 00**GEOTECHNICAL INVESTIGATION**

The following soil boring data is presented for the bidder's information. It should not be considered as all indicative. The bidder is advised to perform any investigations he deems necessary to prepare his bid. To arrange to perform investigatory "digs" the bidder should contact Derek A. Anderson of HMG Engineers, Inc. at danderson@hmgengineers.com, the project's Engineer.

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SECTION 03 11 00
CONCRETE FORMING

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 03 15 00 - Concrete Accessories
- B. Section 03 20 00 - Concrete Reinforcing
- C. Section 03 31 00 - Structural Concrete

1.02 QUALITY ASSURANCE

- A. Construct and erect concrete formwork in accordance with ACI 347.

1.03 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Reinforced Concrete
- B. ACI 347 - Recommend Practice for Concrete Formwork
- C. PS 1 - Construction and Industrial Plywood

1.04 DELIVERY, STORAGE AND HANDLING

- A. Delivers, handle and store formwork material to prevent warping or damage detrimental to strength of materials or to surfaces to be formed.
- B. Ensure formwork surfaces in contact with concrete are not contaminated by foreign matter.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIALS

- A. Exposed Concrete Surfaces: Plywood conforming to PS 1, minimum veneer grade B-B, tight fitting, and adequately stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.
- B. Unexposed Concrete Surfaces: Plywood, lumber, tight fitting, adequately stiffened to support weight of concrete without deflection detrimental to structural tolerances.
- C. Nails, Spikes, Lag Bolts, Through Bolts, and Anchorage's: Sized as required, of sufficient strength and character to maintain formwork in place while pouring concrete.

2.02 PREFABRICATED FORMS

- A. Steel Type: Matched, tight fitting and adequately stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.

- B. Fiberglass Fabric Reinforced Plastic Forms: Matched, tight fitting and stiffened to support weight of concrete without deflection detrimental to structural tolerance and appearance of finished concrete surfaces.

2.03 ACCESSORIES

- A. Form Ties: Water sealing snap-in removable type of fixed length, free of devices that will leave holes larger than 1 1/4 inch in concrete surface. Embedded portion of tie after removal of end shall terminate not less than 1 inch from the formed face of the concrete.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete or impair bonding or color characteristics of coating intended for use on concrete.
- C. Filets for Chamfered Corners: Rigid foam plastic, wood, or metal of maximum possible lengths.
- D. Flashing Reglets: 24 gauge galvanized steel, release tape sealed reglet, bent tab anchors, securable to forms, profile to prevent water from entering behind reglet.
- E. Formed Construction Joints: Galvanized steel, tongue and groove type knock-out holes to receive dowels, ribbed steel spikes with tongue to fit top screed edge.

PART 3 EXECUTION

3.01 WORKMANSHIP

- A. Verify lines, levels and site dimensions for compliance with design drawings before erecting formwork.
- B. Assemble formwork to permit easy dismantling and stripping, ensuring concrete is not damaged during form removal.
- C. Align joints, make watertight to prevent leakage of mortar.
- D. Provide 3/4" chamfer strips on external corners of beams, expansion joints, columns and walls.
- E. Form chases, slots, openings, drips and recesses as detailed, or required.
- F. Obtain review of Engineer before framing opening in structural joints, beams, or columns which are not detailed on drawings.
- G. Provide bracing to ensure stability of formwork. Strengthen forms subject to construction loads.
- H. Check and adjust formwork both horizontally and vertically, during placing of concrete.
- I. Arrange forms to allow stripping without removal of prime shores where required to remain in place.

3.02 INSERTS, EMBEDDED COMPONENTS AND OPENINGS

- A. Provide form openings where required for pipe, conduit, sleeves and other work embedded in or passing through concrete.

- B. Accurately locate and set items to be cast directly into concrete.
- C. Provide temporary ports or openings to facilitate cleaning and inspection. Locate openings at bottom of forms so that flushing water will drain out.
- D. Close temporary ports or openings with tight fitting panels flush with the inside face of forms, neatly fitted so that joints will not be apparent in exposed concrete surfaces.

3.03 TOLERANCES

- A. Design, erect and secure forms to following tolerances:
 - 1. Variation from plumb:
 - a. In the lines and surfaces of columns, piers, walls, and in arises:
 - 1) In any 10 ft. of length: 1/4 in.
 - 2) Maximum for the entire length up to 100 ft.: 1 in.
 - b. For exposed corner columns, control-joint grooves, and other conspicuous lines:
 - 1) In any 20 ft. of length: 1/4 in.
 - 2) Maximum for the entire length up to 100 ft.: 1/2 in.
 - 2. Variation from the level or from the grades specified in the contract documents:
 - a. In slab soffits, ceilings, beam soffits and in arises, measured before removal of supporting shores:
 - 1) In any 10 ft. of length: 1/4 in.
 - 2) In any bay or in any 20 ft. length: 3/8 in.
 - 3) Maximum for the entire length: 3/4 in.
 - 4) Special construction may require more stringent values as recommended by equipment manufacturer.
 - b. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
 - 1) In any bay or in 20 ft. length: 1/4 in.
 - 2) Maximum for the entire length: 1/2 in.
 - 3. Variation of the linear building lines from established positions in plan and related position of columns, walls, and partitions.
 - a. In any bay: 1/2 in.
 - b. In any 20 ft. of length: 1/2 in.

- c. Maximum for the entire length: 1 in.
4. Variation in the sizes and location of sleeves, floor openings, and wall openings: plus or minus 1/4 in.
5. Variation in cross-sectional dimensions of columns and beams in the thickness of slabs and walls:
 - a. Minus: 1/4 in.
 - b. Plus: 1/2 in.
6. Footings for masonry:
 - a. Alignment in 10 ft.: 1/4 in.
 - b. Maximum for entire length: 1/2 in.
 - c. Level in 10 ft.: 1/4 in.
 - d. Maximum for entire length: 1/2 in.
 - 1) Other footings - variations in dimensions in plan:
 - a) Minus: 1/2 in.
 - b) Plus: 2 in.
 - 2) Misplacement of eccentricity:
 - a) 2 percent of the footing width in the direction of misplacement but not more than 2 in.
 - 3) Thickness:
 - a) Decrease in specified thickness: 5 percent
 - b) Increase in specified thickness: No limit.
7. Variation in steps.
 - a. In a flight of stairs:
 - 1) Raise: Plus or minus 1/8 in.
 - 2) Tread: Plus or minus 1/4 in.
 - b. In consecutive steps:
 - 1) Raise: Plus or minus 1/16 in.
 - 2) Tread: Plus or minus 1/8 in.

3.04 CLEARING

- A. Clean forms as erection proceeds, to remove foreign matter.
- B. Remove cuttings, shavings and debris from within forms.
- C. Flush completed forms with water to remove remaining foreign matter.
- D. Ensure that water and debris drain to exterior through cleanout ports.

3.05 FORM REMOVAL

- A. Do not remove forms, shores and bracing until concrete has gained sufficient strength to carry its own weight, construction loads and design loads.
- B. Verify strength of concrete by compressive test results.
- C. Remove formwork progressively in accordance with code requirements.
- D. Do not impose shock loads or imbalance loads on structure.
- E. Reshore structural members where required due to construction conditions.

END OF SECTION

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SECTION 03 15 00
CONCRETE ACCESSORIES

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 03 11 00 - Concrete Forming
- B. Section 03 31 00 - Structural Concrete
- C. Section 03 35 00 – Concrete Finishing

1.02 REFERENCES

- A. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
- B. ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

1.03 SUBMITTALS

- A. Manufacturer's printed installation instructions.
- B. Provide 6 inch long sample of expansion/contraction joint.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Formed Construction Joints: As specified in Section 03 11 00.
 - 1. Joint Filler: Asphalt impregnated fiberboard; of size detailed; ASTM D175. To be used at all interior locations, exterior walkways and concrete drives.
 - 2. Joint Filler: Regranulated cork particles impregnated and bound with asphalt resins; ASTM D1752 Type II; resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness. To be used between adjacent substructures.
- B. Waterstops: Greenstreak Model 702, 705, 724 or approved equal. Use preformed joints where possible.
- C. Dovetail Anchor Slots: 24 gauge galvanized steel, foam filled, release tape sealed slot, bent tab anchors, securable to forms.

PART 3 EXECUTION

3.01 INSTALLATION AND WORKMANSHIP

- A. Locate and form expansion and contraction joints.
- B. Install joint fillers and sealants in accordance with manufacture's printed instructions. Use primers of type recommended by joint filler/sealant manufacturer.
- C. Install waterstops continuous without displacing reinforcement. Heat seal joints. Install waterstops on all joints below grade.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 03 31 00 - Structural Concrete

1.02 QUALITY ASSURANCE

- A. Perform concrete reinforcing work in accordance with CRSI 63 and 65 and ACI 315 unless specified otherwise in this section.
- B. All development and splices of reinforcing steel shall be in accordance with ACI 318. All splices shall be Class B unless otherwise noted.

1.03 SOURCE QUALITY CONTROL

- A. Submit 7 certified copies of mill test report of supplied concrete reinforcing, indicating physical and chemical analysis.

1.04 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Reinforced Concrete
- B. CRSI 63 - Recommended Practice for Placing Reinforcing Bars
- C. CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature
- D. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement
- E. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement
- F. AWS D12.1 - Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction
- G. ACI 315 - Manual of Standard Practice
- H. ACI 350 - Concrete Sanitary Engineering Structures

1.05 SHOP DRAWINGS

- A. Submit shop drawings in accordance with Section 01 33 00.
- B. Indicate bar sizes, lengths, spacings, locations, and quantities of reinforcing steel, and wire fabric, bending and cutting schedules, and supporting and spacing devices.

PART 2 PRODUCTS

2.01 REINFORCING

- A. Reinforcing Steel: Grade 60 deformed billet steel bars, ASTM A615; plain finish, unless noted otherwise on plans.
- B. Welded Steel Wire Fabric: Plain type, ASTM A185; plain finish.

2.02 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type, or patented system accepted by Engineer.
- B. Chairs, Bolsters, Bar Supports and Spacers: Sized and shaped for strength and support of reinforcing during construction conditions.
- C. Special Chairs, Bolsters, Bar Supports and Spacers (where adjacent to exposed concrete surfaces): Stainless steel type; sized and shaped as required.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 315.
- B. Locate reinforcing splices, not indicated on drawings, at points of minimum stress. Location of splices: Review by Engineer.
- C. Where indicated, weld reinforcing bars in accordance with AWS D12.1.
- D. Fabricate reinforcing steel to the following tolerances:
 - 1. Sheared Length: Plus or minus 1 inch.
 - 2. Depth of Truss Bar: Plus 0, minus 1/2 inch.
 - 3. Overall Dimension of Stirrup, Ties and Spirals: Plus or minus 1/2 inch.
 - 4. All Other Bends: Plus or minus 1 inch.
- E. All rebar in cast in place wetwells and their slabs, in basin draw off structures and any water containing structure shall be epoxy coated in conformance with ASTM D3963.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place reinforcing supported and secured against displacement. Do not deviate from true alignment.
- B. Before placing concrete, ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings which would reduce bond to concrete.
- C. Place reinforcing steel to the following tolerances:
 - 1. Concrete cover to formed surfaces of slabs: Plus or minus 1/8 inch.

2. Concrete cover to formed surfaces of walls and beams: Plus or minus 1/4 inch.
3. Concrete cover to all other surfaces: Plus or minus 1/4 inch.

END OF SECTION

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SECTION 03 31 00
STRUCTURAL CONCRETE

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 03 11 00 - Concrete Forming
- B. Section 03 20 00 - Concrete Reinforcing
- C. Section 03 15 00 - Concrete Accessories
- D. Section 03 35 00 - Concrete Finishing

1.02 QUALITY ASSURANCE

- A. Perform cast-in-place concrete work in accordance with ACI 318, unless specified otherwise in this section.

1.03 TESTING AGENCY

- A. Inspection and testing will be performed by a firm appointed and paid for in accordance with Section 01 40 00.
- B. Submit proposed mix design for each class of concrete to inspection and testing firm for review prior to commencement of work.
- C. Test of cement and aggregates shall be performed to ensure conformance with specification requirements. Manufacturer's certification that cement materials meet specification requirements and results of manufacturer's own material tests will be acceptable in lieu of tests by inspection and testing firm. Aggregate testing shall be performed by independent inspection and testing firm, for compliance with ASTM C33, including limits for deleterious substances, grading and physical property requirements.
- D. Field quality control tests are specified in Part 3 of this section.

1.04 REFERENCE STANDARDS

- A. ACI 301 - Specification for Structural Concrete
- B. ACI 304 - Guide for Measuring, Mixing, Transporting and Placing Concrete
- C. ACI 305 - Hot Weather Concreting
- D. ACI 306 - Cold Weather Concreting
- E. ACI 318 - Building Code Requirements for Structural Concrete
- F. ASTM C33 - Concrete Aggregates
- G. ASTM C94 - Ready-Mixed Concrete

- H. ASTM C150 - Portland Cement
- I. ASTM C171 - Sheet Materials for Curing Concrete
- J. ASTM C260 - Air-Entraining Admixtures for Concrete
- K. ASTM C309 - Liquid Membrane Forming Compounds for Curing Concrete
- L. ASTM C494 - Chemical Admixtures for Concrete

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: Portland Cement, ASTM C150, Type II.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.

2.02 ADMIXTURES

- A. Air-Entrainment: ASTM C260.
- B. Chemical:
 - 1. ASTM C494, Type A - water reducing.
 - 2. ASTM C494, Type B - retarding.
 - 3. ASTM C494, Type C - accelerating.
 - 4. ASTM C494, Type D - water reducing and retarding.
 - 5. ASTM C494, Type E - water reducing and accelerating.

2.03 CURING MATERIALS

- A. Curing Compound: Resin based type. ASTM C309, Type 1 - clear or translucent for interior concrete and Type 2 - white pigmented for exterior concrete, Class B.
- B. Polyethylene Film: 4 mil thick, opaque ASTM C171.

2.04 ACCESSORIES

- A. Bonding Agent: Two-component modified epoxy resin.

2.05 CONCRETE MIXES

- A. Mix concrete in accordance with ASTM C94.
- B. Provide concrete of the following strength:

1. Compressive strength (28 day): 4,500 psi.
 2. Entrained Air Content: As indicated in ACI 301, Table 4.2.2.7.b.1, exposure category as directed by the Engineer.
 3. Cement Content: Minimum 564 pounds per cubic yard.
 - a. Maximum Flyash content 20% by weight.
 4. Water Cement Ratio: Maximum 0.42.
 5. Slump: 1 inch minimum, 3 inch maximum for footings and substructure walls; 4 inch maximum for slabs, beams, reinforced walls and columns. Loss of slump in pumping shall not exceed 1 1/2 inch.
- C. Select proportions for normal weight concrete in accordance with ACI 301, Section 4.2.3.
- D. Use water reducing admixtures only when accepted by Engineer.
- E. Use accelerating admixtures only in cold weather and only when accepted by Engineer. If accepted, use of admixture will not relax cold weather placement requirements. Calcium chloride shall not be used.
- F. Use retarding admixtures only in hot weather and only when accepted by Engineer.
- G. Use air-entrained concrete for all concrete exposed to the exterior.

PART 3 EXECUTION

3.01 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304.
- B. Notify Engineer minimum 24 hours prior to commencement of concreting operations.
- C. Ensure anchors, seats, plates and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete. Rectify same and proceed with work.
- D. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, embedded parts, and formed expansion and contraction joints are not disturbed during concrete placement.
- F. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.
- G. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- H. Pour floor slabs in checkerboard or saw cut pattern indicated on drawings. Saw cut control joints within 24 hours after finishing. Use 3/16 inch thick blade, cutting 1/4 into depth of slab thickness.

- I. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels, and pack solidly with non-shrink grout.
- J. Honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- K. Concrete temperature shall be 90 degrees F maximum out of truck.
- L. Conform to ACI 305 when concreting during hot weather.
- M. Conform to ACI 306 when concreting during cold weather.
- N. Maintain concrete cover around reinforcing in accordance with ACI 318 or as otherwise indicated on drawings.
- O. Install vapor barrier under interior slabs on grade. Lap joints minimum, 6 inches and seal. Do not disturb or damage vapor barrier while placing concrete reinforcing. If damage does occur, repair areas before placing concrete. Use vapor barrier materials, lapped over damaged areas minimum 6 inches in all directions and sealed.
- P. Separate slabs-on-grade from vertical surfaces where shown with 1/2 inch thick joint filler. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Refer to Section 03 15 00 for joint filler requirements.

3.02 CURING AND PROTECTION

- A. Beginning immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures, and mechanical injury. Maintain concrete with minimal water loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- B. Apply curing compound in 2 coats, with second coat at right angles to first; or spread polyethylene film over slab areas, lapping edges and sides a minimum of 12 inches, maintain in place with pressure sensitive tape and plywood for 7 days.

3.03 FIELD TESTS

- A. Three concrete test cylinders shall be taken for every 100 or less cubic yards of each class of concrete placed. Test cylinders at ages recommended by Engineer.
- B. One additional test cylinder shall be taken during cold weather concreting, and cured on job site under same conditions as concrete it represents.
- C. One slump test and one air test shall be taken for each set of test cylinders taken.
- D. Follow sampling and testing procedures referenced in ASTM C94.

END OF SECTION

SECTION 03 34 13**CONTROLLED LOW-STRENGTH MATERIAL (CLSM)**

PART 1 GENERAL

1.01 DESCRIPTION

- A. This work shall consist of furnishing, transporting, and placing Controlled Low Strength Material (CLSM) as backfill in trenches or at other locations shown on the plans or as directed by the Engineer.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. CLSM Trench Backfill

1. Measurement: In accordance with IDOT Standard Specifications, Section 593.
2. Payment: This work will be paid for at the contract unit price per cubic yards in accordance with IDOT Standard Specifications, Section 593.

B. CLSM Abandonment of Culverts at Main Street

1. Measurement: In accordance with IDOT Standard Specifications, Section 593.
2. Payment: This work will be paid for at the contract unit price per cubic yards in accordance with IDOT Standard Specifications, Section 593. CLSM shall be placed to limits of existing culverts remaining and fill all voids or annular spaces under the roadway. CLSM shall be contained within the roadway and sidewalk limits, additional material used for abandonment outside of these surfaces will not be included for payment. CLSM shall be placed to one foot below finished roadway and sidewalk surfaces.

C. CLSM Abandonment of Storm Sewer at Public Works Building

1. Measurement: In accordance with IDOT Standard Specifications, Section 593.
2. Payment: This work will be paid for at the contract unit price per cubic yards in accordance with IDOT Standard Specifications, Section 593. CLSM (or grout) shall be placed to limits of existing piping and fill all voids or annular spaces under the roadway or building. The unit price shall include all materials, equipment and labor required to backfill the storm sewers and structures as detailed in the plans.

PART 2 PRODUCTS

2.01 MATERIALS

- A. This work shall consist of a mixture of portland cement, fly ash, fine aggregate, and water proportioned to provide a backfill material that is self-compacting and capable of being excavated with hand tools if necessary, at a later date.

- B. When abandoning existing piping, work shall include supplying and pumping low strength grout (Elastizell PS 120 or approved equal) into the abandoned piping. Installation methods shall be per the manufacturer's recommendations for the type of pipe.
- C. All materials shall meet the following requirements contained in the Illinois Department of Transportation (IDOT) Standard Specifications:
 - 1. Portland Cement, Type I - Section 1001
 - 2. Water (Potable) - Section 1002
 - 3. Fine Aggregate for CLSM - Section 1003.06
 - 4. Fly Ash - Section 1010.02

2.02 PROPORTIONING

- A. Materials for CLSM shall be proportioned as follows:
 - 1. Portland Cement: 50 lb
 - 2. Fly Ash - Class C or F: 125 lb
 - 3. Fine Aggregate (saturated surface dry): 2,900 lb
 - 4. Water: 50-65 gallons
- B. These quantities will yield approximately one cubic yard of CLSM of the proper consistency. The flowability shall be observed by the Engineer and the water content adjusted within the specified limits to produce desired results. The CLSM shall be ready-mixed as specified in the Standard Specifications. Sufficient mixing capacity shall be provided to permit the CLSM to be placed without interruption. The mixer drum shall be completely emptied prior to the initial batch of CLSM to ensure that no additional cement fines are incorporated into the mix.

PART 3 EXECUTION

3.01 PLACEMENT

- A. The CLSM shall be discharged directly from the truck or pumped into the space to be filled, or by other methods approved by the Engineer. When backfilling pipe, CLSM shall be distributed evenly to preclude any movement of the pipe. Placement will be required in stages to prevent uplift of the pipe. The first stage placement shall stop at one-fourth the height of the pipe. After consolidation of the first lift, as determined by the Engineer, the second stage placement shall stop at mid-height of the pipe. After consolidation of the second lift, the remainder of the trench shall be filled in one operation.

3.02 LIMITATION OF OPERATIONS

- A. CLSM shall not be placed on frozen ground. Mixing and placing may begin only if the air temperature is at least 35°F and rising. At time of placement, CLSM shall have a temperature of at least 40°F.

END OF SECTION

SECTION 03 35 00
CONCRETE FINISHING

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 03 11 00 - Concrete Forming
- B. Section 03 31 00 - Structural Concrete

1.02 REFERENCE STANDARDS

- A. ACI 302 - Recommended Practice for Concrete Floor and Slab Construction
- B. ACI 340 - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete

1.03 DELIVERY OF MATERIALS

- A. Furnish concrete hardener, sealer and slip resistant coating, in manufacturer's packaging complete with application instructions.

PART 2 PRODUCTS

2.01 CEMENT GROUT

- A. Cement: As specified in Section 03 31 00.
- B. Sand: As specified herein and in Section 03 31 00.

2.02 COATING, HARDENERS AND SEALERS

- A. Non-Metallic Hardener: Premixed emery type; dry shake in color selected by Engineer from manufacturer's standard range.
- B. Slip Resistant Coating: Graded aluminum oxide shake. Color selected by Engineer from manufacturer's standard range.
- C. Sealer: ASTM C309, Type 1, Class A, transparent.

PART 3 EXECUTION

3.01 FINISHING HORIZONTAL SURFACES

- A. Finish concrete surfaces in accordance with ACI 302 and ACI 304.
- B. Uniformly spread, screed and consolidate concrete. Do not use grate tampers or mesh rollers. Do not spread concrete by vibration.

- C. In areas with floor drains, maintain floor level at walls and pitch surfaces uniformly to drains as indicated on drawings.
- D. Scratch Finish: After the concrete has been placed and leveled to the specified tolerance, roughen surface with stiff brushes, brooms, or rakes before final set.
- E. Float Finish: Do not work concrete until ready for floating. During or after the first floating, check surface against allowable tolerances. Cut down high spots and fill low spots to produce a surface within specified tolerances. Immediately after leveling, refloat to a uniform, sandy texture.
- F. Trowel Finish: Float-finish concrete as specified above. Trowel to produce a smooth surface relatively free of defects; trowel marks may still be visible after this operation. Perform additional and final troweling to produce a finished surface that is free of trowel marks, uniform in texture and appearance, and within the specified tolerances. Grind smooth surface defects which would show through applied floor covering system.
- G. Nonslip Broom Finish: Immediately after the concrete has been float finished as specified above, slightly roughen the surface by drawing a broom transversely across the surface.
- H. Nonslip Finish: Immediately after the concrete has been float finished as specified above, evenly apply the slip resistant coating material to the surface in accordance with the manufacturer's recommendations. The total application rate shall be 25 pounds per 100 square feet. The nonslip surface shall be completed with a trowel finish as specified above.
- I. Hardened Finish: Immediately after the concrete has been float finished as specified above, evenly apply concrete hardener to surface in accordance with the manufacturer's recommendations. The total application rate shall be 25 pounds per 100 square feet. The hardened surface shall be completed with a trowel finish as specified above.

3.02 FINISHED HORIZONTAL SURFACE TOLERANCES

- A. Scratch Finish: True planes within 1/4 inch in 5 feet as determined by a 5 foot straightedge placed anywhere on the slab in any direction.
- B. Float Finish: True planes within 1/4 inch in 10 feet as determined by a 10 foot straightedge placed anywhere on the slab in any direction.
- C. Trowel Finish: True planes within 1/8 inch in 10 feet as determined by a 10 foot straightedge placed anywhere on the slab in any direction.

3.03 SCHEDULE OF HORIZONTAL SURFACE FINISHES

- A. Scratch Finish: Apply to concrete surfaces that are to receive concrete floor topping.
- B. Float Finish: Apply to concrete surfaces that are to receive membrane roofing or insulation.
- C. Trowel Finish: Apply to concrete surfaces that are exposed to view at completion of project, covered with resilient flooring, painted, or to receive thin set ceramic tile.
- D. Nonslip Broom Finish: Apply to exterior concrete platforms, steps and walks.
- E. Nonslip Finish: Apply to interior concrete steps.

- F. Hardened Finish: Apply to all interior floor slabs not receiving other finish.

3.04 FINISHING FORMED SURFACES

- A. Defective Concrete: Remove all honeycombed and other defective concrete down to sound concrete. If clipping is required, the edges shall be perpendicular to the formed surface. The defective areas shall be patched as specified below.
- B. Patching Defective Concrete: Prepare a bonding grout using a mix of one part cement to one part fine sand passing a No. 30 sieve. Prepare one part cement to two part sand patching mixture. Substitute white Portland Cement for a portion of the gray cement on exposed concrete surfaces to match color of adjacent concrete. Dampen area to be patched with water; brush bonding grout into the surface; apply patching mortar; strike off to a uniform plane; final finish; and cure.
- C. Rough Form Finish: Patch tie holes and defects as specified above. Fins and projections exceeding 1/4 inch shall be rubbed down or shipped off.
- D. Smooth Form Finish: Patch tie holes and defects as specified above. Remove all fins and projections.
- E. Smooth Rubbed Finish: Apply to newly harden concrete no later than the day following form removal. Patch tie holes and defects as specified above. Remove all fins and projections. Wet concrete surface and rub with carborundum brick or other abrasive until uniform color and texture are produced. Cure finish surface. No cement grout shall be used.

3.05 SCHEDULE OF FORMED SURFACE FINISHES

- A. Rough Form Finish: Apply to surfaces that are not exposed to view at completion of project.
- B. Smooth Form Finish: Apply to surfaces of tanks, channels and other liquid-containing structures exposed to view at completion of project. Use only select form material as specified in Section 03 11 00.
- C. Smooth Rubbed Finish: Apply to interior and exterior building concrete surface irregularities that are exposed to view at completion of project.

END OF SECTION

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SECTION 03 39 00
CONCRETE CURING

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 03 31 00 - Structural Concrete

1.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products in accordance with O1504 of CDB's Standard Documents for Construction.
- B. Deliver materials in manufacturer's packaging including application instructions.

PART 2 PRODUCTS

2.01 COMPOUNDS

- A. Sealer: ASTM C-309 type; 1, Class A, transparent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.

3.02 FLOOR FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 301.
- B. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/4 inch per foot.

3.03 FLOOR SURFACE TREATMENT

- A. Apply sealer in accordance with manufacturer's instructions on all floor surfaces.

END OF SECTION

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 01 11 00 – Summary of Work
- B. Section 01 33 00 – Submittal Procedures
- C. Section 01 60 00 – Product Requirements
- D. Section 09 91 00 – Painting

1.02 REFERENCE STANDARDS

- A. ASTM A36 – Standard Specification for Carbon Structural Steel
- B. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
- C. ASTM A325 – Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated
- D. ASTM A502 – Standard Specification for Rivets, Steel, Structural
- E. AWS D1.1 – Structural Welding – Steel

1.03 SUBMITTALS

- A. Comply with Section 01 33 00 – Submittal Procedures.
- B. Safety Data Sheets.
- C. Welder's Certification.

PART 2 PRODUCTS

2.01 GENERAL

- A. Items are as listed in schedule at end of this section.

2.02 MATERIALS

- A. Steel: ASTM A36; galvanized.
- B. Bolts, Nuts and Washers: High strength type recommended for structural steel joints.
 - 1. ASTM A307; galvanized.
 - 2. ASTM F594; stainless steel.

- C. Welding Materials: Applicable AWS D1.1, type required for materials being welded.

2.03 FABRICATION

- A. Verify dimensions on site prior to shop fabrication.
- B. Fabricate items with joints nearly fitted and properly secured.
- C. Fit and shop assemble in largest practical sections, for delivery to site.
- D. Grind exposed welds smooth and flush with adjacent finished surfaces.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts unobtrusively located consistent with design of structure, except where specifically noted otherwise.
- F. Make exposed joints flush butt type hair line joints where mechanically fastened.
- G. Supply components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same materials and finish as metal fabrication, unless otherwise specified in schedule herein.
- H. Thoroughly clean surfaces of rust, scale, grease, and foreign matter prior to galvanizing.
- I. Galvanize items as scheduled. Provide minimum 2.0 oz./sq. ft. galvanized coating.
- J. Make provision for erection stresses by temporary bracing. Keep work in alignment.
- K. Replace items damaged in course of installation.
- L. Perform field welding in accordance with AWS D1.1.
- M. After installation, touch-up field welds and scratched and damaged galvanized surfaces. Use primer specified in Section 09 91 00.
- N. Supply to appropriate sections, items requiring to be cast into concrete, or embedded in masonry, complete with necessary setting templates.

PART 3 EXECUTION

3.01 SCHEDULE OF ITEMS

- A. Bar Screen at Main Street Culvert on Phil's Beach frontage.

END OF SECTION

SECTION 05 53 00**METAL GRATINGS****PART 1 GENERAL****1.01 RELATED SECTIONS**

- A. Section 05 50 00 - Metal Fabrications
- B. Section 09 91 00 - Painting

1.02 REFERENCES

- A. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
- B. ASTM B308 - Aluminum-Alloy Standard Structural Shapes, Rolled or Extruded

1.03 DESIGN DATA

- A. Installed grating shall withstand a uniform live load of one hundred (100) pounds per square foot plus a concentrated load of 300 lbs. with a maximum deflection of 0.25 inches.

1.04 SHOP DRAWINGS AND PRODUCT DATA

- A. Submit shop drawings in accordance with Section 01 33 00.
- B. Indicate component details, materials, finishes, connecting, and joining methods, and the relationship to adjoining work.
- C. Submit manufacturer's instructions for installation and connecting methods.

PART 2 PRODUCTS**2.01 MATERIALS - ALUMINUM GRATING**

- A. Bars and Spacers: ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes; Alloy 6063-T6.
- B. Seat Angles: ASTM B308 - Aluminum Alloy Standard Structural Shapes, Rolled or Extruded; Alloy 6061-T6.

2.02 ALUMINUM GRATING SYSTEM

- A. Grating shall be made of straight extruded bearing bars laced together by interlocking cross-bridges or spacers, securely fastened to the bearing bars symmetrically about the neutral axis. If bearing bar is punched to receive transverse spacers, there shall be no unfilled openings in the bearing bar. The spacer members shall be such as to provide a maximum clear opening between extruded main bearing bars of 1".
- B. Grating shall have open area of at least 60%.
- C. Grating walking surfaces shall have non-skid finish. Surface shall be as follows:

1. Type: Anti-slip, aluminum surface.
 2. Surface Texture: Grade 2, medium.
 3. Surface: Anti-slip aluminum surface consisting of aluminum oxide particles 8 to 10 microns uniformly distributed horizontally and vertically within a random hatch matrix.
 4. Bond Strength, Surface to Substrate, ASTM C 633: Minimum of 2,000 psi.
 5. Coefficient of Friction, Anti-Slip Surface: Minimum of 0.6.
 6. UL Listed: Slip-resistant.
 7. Manufacturer: W.S. Molnar Company's "Slip-Not" or equal.
- D. The lacing or spacer members shall be placed on not over 7" centers longitudinally. The ends of each grating shall be finished with spacer members.
- E. The spacer members and main bars shall be neatly fastened so as to form a grating which will be rigid and not subject to sag in any position.
- F. All openings for pipe or other fixtures which require cutting of more than three (3) main bearing bars shall be finished in the same manner as the ends of the panels.
- G. No grating of the welded type will be acceptable nor will grating be accepted which is made by welding or otherwise fastening narrow (12" wide or less) panels together to form a larger panel.
- H. Grating shall be removable and fabricated in a manner such that no removable section will weigh more than seventy-five (75) pounds when assembled and in place.

2.03 FABRICATION

- A. Verify dimensions on site prior to shop fabrication.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All grating shall bear on seat angles. Grating seat angles shall have suitable concrete anchors welded to back at a maximum of 3 feet centers and a minimum of 2 anchors per side. Surfaces in contact with concrete shall receive coat of zinc chromate primer prior to installation. Where changes in channel direction, openings for gates, ends of grating runs, etc., prohibit adequate support for grating, additional cross angles shall be furnished to provide a seating surface for the grating on all four sides.
- B. All grating shall be fastened to supports by suitable removable fasteners. Fastener clips shall be aluminum and necessary bolts, nuts and washers shall be 316 stainless steel.

END OF SECTION

SECTION 05 56 00**METAL CASTINGS**

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 33 05 62 - Precast Concrete Manholes & Utility Structures

1.02 REFERENCE STANDARDS

- A. ASTM A48 - Gray Iron Castings

1.03 SUBMITTALS

- A. Make submittals in accordance with Section 01 33 00.
- B. Submit shop drawings for manhole frames and covers, inlet frames and grates, manhole steps, valve boxes and covers, trench drain grates, cover lifts, and floor drain grates.

PART 2 PRODUCTS

2.01 CASTINGS

- A. Manhole frames and covers:
 - 1. ASTM A48, Class 308 cast iron with horizontal and vertical mating surfaces machined.
 - 2. Frames and covers shall be heavy duty and capable of sustaining wheel loads of 16,000 pounds.
 - 3. Frames shall be provided with two anchor boltholes for attachment to manhole section.
 - 4. Solid coverlids shall be provided with one concealed pickhole and shall be of the self-sealing type with a one-eighth (1/8) inch rubber gasket all around the lip where the cover rests.
 - 5. Frame and lid shall be as identified on the final engineering plans.
 - 6. All workmanship and materials shall be of the highest quality. The manhole cover shall be the product of a manufacturer actively engaged in research, development, and manufacturing of watertight manhole rings and covers.
- B. Manhole & utility vault steps: ASTM A48, Class 308 cast iron equal to Neenah R-1980E; or reinforced polypropylene meeting the requirements outlined in ASTM 2146-68 under Type II, Grade 49109. Steel used as internal reinforcement shall be a deformed 3/8 inch diameter reinforcing rod, grade 60 conforming to all of the requirements of ASTM A-615. Step shall be Model #PS-I as manufactured by M.A. Industries, Incorporated, Peachtree City, Georgia or equal. Load and pullout ratings shall meet OSHA requirements.

- C. Drain grates to be as identified on the final engineering plans.
- D. Adjustable cast iron valve box and lid.
 - 1. Three-piece cast iron valve box, screw type, 5 1/4 inch shaft.
 - 2. Cast iron lid with the word "WATER" stamped in bold letters.
 - 3. Provide extensions as necessary to achieve flush installation.
 - 4. Provide valve box stabilizer.
 - 5. Tyler Union Model 6860 (3 piece screw type), or equal.

2.02 MISCELLANEOUS PRODUCTS

- A. Cover lifts: One cover lift suitable for raising manhole covers with concealed Pick holes shall be provided.
- B. Valve box stabilizer by Valve Box Stabilizer Inc., or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Set castings accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from the established lines and levels. Follow manufacturer's installation instructions.
- B. Castings placed on concrete surfaces shall be set in full coat tar sealant or bituminous mastic beds having a thickness of at least one-quarter (1/4) inch.
- C. Two widths of joint sealant tape shall be used across stepped joints.

END OF SECTION

SECTION 09 91 00**PAINTING****PART 1 GENERAL****1.01 SUMMARY**

- A. This specification covers preparation of surfaces and completion of painting all exterior and interior surfaces as required by the drawings and/or as specified herein.

1.02 RELATED SECTIONS

- A. Section 01 11 00 – Summary of Work
- B. Section 01 20 00 – Price and Payment Procedures
- C. Section 01 33 00 – Submittal Procedures
- D. Section 01 40 00 – Quality Requirements
- E. Section 01 50 00 – Temporary Facilities and Controls
- F. Section 01 60 00 – Product Requirements

1.03 REFERENCE STANDARDS

- A. ANSI/NSF 61 – Drinking Water System Components - Health Effects
- B. ASTM D 16 – Standard Terminology for Paint, Related Coatings, Materials and Applications
- C. SSPC-PA 2 – Determining Compliance to Required DFT
- D. SSPC-SP 1 – Solvent Cleaning
- E. SSPC-SP 2 – Hand Tool Cleaning
- F. SSPC-SP 3 – Power Tool Cleaning
- G. SSPC-SP 5/NACE No. 1 – White Metal Blast Cleaning
- H. SSPC-SP 6/NACE No. 3 – Commercial Blast Cleaning
- I. SSPC-SP 7/NACE No. 4 – Brush-Off Blast Cleaning
- J. SSPC-SP 10/NACE No. 2 – Near-White Metal Blast Cleaning
- K. SSPC-SP 11 – Bare Metal Power Tool Cleaning
- L. SSPC-SP 13/NACE No. 6 – Surface Prep of Concrete
- M. SSPC-VIS-1 – Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

1.04 DEFINITIONS

- A. Definitions of Painting Terms: ASTM D16, unless otherwise specified.
- B. Dry Film Thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000 inch).

1.05 SUBMITTALS

- A. Comply with Section 01 33 00 – Submittal Procedures.
- B. Contractor's purchase order for the specified materials.
- C. Material Safety Data Sheets (MSDS) shall be provided with all materials and shall be sent out to the customer when an order is placed. Additional copies of the MSDS shall be available upon request.
- D. Product Data: Submit manufacturer's product data for each coating, including generic description, complete technical data, surface preparation, and application instructions.
- E. Color Samples: Submit manufacturer's color samples showing full range of standard colors.
- F. Manufacturer's Quality Assurance: Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.
- G. Applicator's Quality Assurance: Submit list of a minimum of 5 completed projects of similar size and complexity to this work. Include for each project:
 - 1. Project name and location.
 - 2. Name of Owner.
 - 3. Name of Contractor.
 - 4. Name of Engineer.
 - 5. Name of coating manufacturer.
 - 6. Approximate area of coatings applied.
 - 7. Date of completion.
- H. Warranty: As specified herein.

1.06 SAMPLES

- A. Prepare 4-inch x 4-inch samples of all finishes when requested by Engineer. When possible, apply finishes on identical type materials to which they will be applied on job.
- B. Identify each sample as to finish, formula, color name and number, and sheen name and gloss units.
- C. Colors to be selected by Engineer prior to commencement of work.

1.07 MAINTENANCE MATERIALS

- A. Leave on premises, where directed by Engineer, not less than one gallon of each color used.
- B. Containers to be tightly sealed and clearly labeled for identification.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, color designation, and instructions for mixing and/or reducing.
- B. Provide adequate storage facilities. Store paint materials at minimum ambient temperature of 45 degrees F in well ventilated area.
- C. Take precautionary measure to prevent fire hazards and spontaneous combustion.

1.09 ENVIRONMENTAL CONDITIONS

- A. All coatings shall be applied during good painting weather. Air and surface temperatures shall be within limits set forth by the manufacturer for the coatings being applied and work areas shall be reasonably free of air-born dust at the time of application and while coating is drying.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture contents of surfaces are below following minimums:
 - 1. Masonry, concrete, and concrete block: 12 percent
 - 2. Interior located wood: 15 percent
- C. Ensure humidity, surface temperatures and the surrounding air temperature are within paint manufacturer's recommendations.
- D. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures for 24 hours before, during, and 48 hours after application of finishes, or longer if required for curing of coating.
- E. Provide minimum 15-foot candles of lighting on surfaces to be finished.

1.10 PROTECTION

- A. Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.
- B. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.
- C. Place cotton waste, cloths, and material which may constitute a fire hazard in closed metal containers and remove daily from site.
- D. Remove electrical plates, surface hardware, fittings, and fastenings prior to painting operations. These items are to be carefully stored, cleaned, and replaced on completion

of work in each area. Do not use solvent to clean hardware that may remove permanent finish.

PART 2 PRODUCTS

2.01 QUALITY OF PAINT

- A. Materials specified are those that have been evaluated for the specified service. Products of the Tnemec Company are listed to provide a standard of quality. Equivalent material of other manufacturers may be substituted on written approval of the Owner only. Any requests for substitution shall include manufacture's literature for each product listing the name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified test data showing results to equal the performance criteria of the products listed herein. In addition, a list of ten projects shall be submitted in which each product has been used and rendered satisfactory service.
- B. Coatings used inside potable water containing vessels shall be NSF registered for potable water immersion service.

PART 3 EXECUTION

3.01 PROTECTION

- A. Concrete: Remove contamination. Verify no harmful form coatings remain on surface. Do not apply coatings until concrete has cured at least 28 days and moisture content is within acceptable range.
- B. Metal: Grind smooth all rough edges, welds, and sharp corners. Prepare surface as indicated in Schedule. Surface profile shall be as recommended by coating's manufacturer. Apply primer same day surface is prepared.
- C. Follow all additional preparatory steps recommended by coatings manufacturer.

3.02 APPLICATION

- A. Apply coatings as recommended by manufacturer. Numbers in schedule indicate minimum and maximum dry film thickness in mils.
- B. Apply additional coats when required to obtain uniform color and appearance.
- C. Cure coatings as recommended by manufacturer.
- D. Cut in edge sharp and neat.
- E. Gap between flanges of iron pipe shall be caulked closed.
- F. Paint interior surfaces of ducts, convectors, and heating cabinets that are visible through grilles and louvers with one coat flat black paint, to limit of sight line. Paint dampers exposed immediately behind louvers and grilles to match face panels.
- G. Finish coats shall be uniform in color and sheen without streaks, runs, sags or misses. On metal surfaces there shall be no holidays.

- H. Finish paint pipe and pipe supports where they meet and where supports touch concrete or other surfaces.
- I. Finish paint all field drilled holes in steel.

3.03 CLEANING

- A. As work proceeds and upon completion, promptly remove paint where spilled, splashed or splattered.
- B. During progress of work keep premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.
- C. Upon completion of work leave premises neat and clean.

3.04 SURFACES NOT COATED

- A. Aluminum handrails and grating. Except isolation coatings shall be applied at concrete interfaces.
- B. Electrical conduit, except paint conduit to match wall or ceiling in rooms where walls or ceilings are painted.
- C. Insulated pipe. However, insulation shall be painted pipe color. Insulation paint shall be flexible and as recommended by the insulation manufacturer.
- D. Concrete and masonry, except where scheduled herein, see 5.01 A. and B.
- E. Shop prefinished items.
- F. PVC and other plastic pipe must be labeled.
- G. Stainless steel pipe must be labeled.
- H. Brass and bronze valves, fittings, and accessories.

PART 4 ACCEPTANCE OF WORK

4.01 ACCEPTANCE OF WORK

- A. Request acceptance of each coat by Engineer before applying the next coat.
- B. Correct work that is not acceptable and request reinspection by Engineer.

PART 5 PAINTING SCHEDULE

- A. Ferrous Metal, Exterior, Including Piping and Equipment, Normal Exposure
 - 1. System Type: Zinc-Rich Urethane/Epoxy/Polyurethane.
 - 2. Surface Preparation: SSPC-SP 6/NACE No. 3 – Commercial Blast Cleaning.

3. Primer Coat: Tnemec Series 91 H2O or 94 H2O Hydro-Zinc at 2.5 to 3.5 mils DFT.
4. Intermediate Coat: Tnemec Series N69 Hi-Build Epoxoline II at 2.0 to 3.0 mils DFT.
5. Finish Coat: Tnemec Series 1094 Endura-Shield at 2.0 to 5.0 mils DFT.
6. Total DFT: 6.5 to 11.5 mils.

PART 6 PAINT COLOR

6.01 PIPE AND PIPE COLOR SELECTION

- A. Bar Scree at Main Street – 35GR Black

END OF SECTION

SECTION 26 00 01**GENERAL ELECTRICAL REQUIREMENTS****PART 1 GENERAL****1.01 NOTICE**

- A. The General Conditions, Special Conditions and all other herein bound documents are part of these specifications and of the Contract. Submission of Proposal implies that the bidder is fully conversant with all requirements of all above-mentioned documents.

1.02 SUMMARY

- A. The work in this section consists of furnishing all material, accessories, equipment, tools, transportation services, labor and performing all operations required to completely execute the Electrical Work for this project, all as indicated on the drawings, approved shop drawings, and as herein specified, provide all Electrical Work in this section in place complete.
- B. Included in this section is all Electrical Work for underground cables, conduits, wiring and appurtenances relative to installation of the equipment as shown on the drawings and herein specified.

1.03 REFERENCES

- A. All equipment, apparatus, and systems shall be fabricated and installed in complete accordance with the following applicable regulations, standards and codes:
1. ASTM American Society of Testing Materials
 2. IEEE Institute of Electrical and Electronic Engineers
 3. NBFU National Bureau of Fire Underwriters
 4. NEC National Electric Code
 5. NEMA National Electric Manufacturers Association
 6. UL Underwriters Laboratories, Inc.
 7. IEPA Illinois Environmental Protection Agency
 8. OSHA Occupational Safety and Health Act
 9. State Department of Public Safety
 10. Local Utility Company
- B. Reference to Standards shall mean and intend the latest edition adopted, published and revised at the time of invitation to submit proposals.
- C. Give all required notices when inspections are required by State or Local authorities.

1.04 SYSTEM DESCRIPTION

- A. The electrical portion of this project shall involve providing and installing a service, lift station control panel, radar level indicator, float switches and connection to an existing generator and ATS for the Lift Station 5 Reconstruction for the Village of Wauconda.

1.05 SUBMITTALS

- A. Follow procedures as outlined in Section 01 33 00.
- B. Shop Drawings: Where required, submit for Engineer's acceptance, three (3) sets of complete shop drawings, including equipment brochures and data sheets, catalog sheets and all other pertinent data covering Electrical Work for this project.
- C. Materials List:
 - 1. Within 15 days after award of Contract, and before any electrical materials are delivered to the job site, submit to the Engineer a complete list of all materials and equipment proposed to be furnished and installed under this section.
 - 2. This shall in no way be construed as permitting substitution except as provided by these Specifications.

1.06 CLOSEOUT SUBMITTALS

- A. Follow procedures as outlined in Section 01 70 00.
- B. Record Drawings:
 - 1. During progress of the work, maintain an accurate record of the installation of the electrical system, locating each circuit precisely by dimension.
 - 2. Upon completion of the electrical installation, transfer all record data to blue line prints of the original drawings.

1.07 QUALITY ASSURANCE

- A. All work included in this contract shall comply with all Federal and State Laws, rules and regulations. The Contractor shall pay for and furnish to Engineer, all required certificates of inspection and approval as required.
- B. Obtain and pay for all permits required for the execution of the work under this contract, and arrange for all tests and inspections of the work required by the authorities having jurisdiction, and pay for all costs thereof. Deliver certificates of all such permits and inspections to the Engineer.

1.08 FIELD MEASUREMENTS

- A. It shall be the responsibility of the Contractor to examine the drawings and specifications and visit the site and become familiar with the conditions and limitations applying to the Electrical Work. By the act of having submitted a bid, the Contractor will be deemed to have made such an examination and to have made allowance, therefore, in his contract.
- B. The information given herein and on the drawings is as exact as could be secured, but its extreme accuracy is not guaranteed. The Contractor must, therefore, examine the

location carefully and verify all measurements, distances, levels, etc., before starting work. If any discrepancies occur between drawings and actual conditions, the Contractor shall notify the Engineer before starting the work.

1.09 COORDINATION

- A. The contractor shall coordinate construction and installation work with other construction trades in order to complete the specified work. If a condition arises that reveals a conflict between necessary construction and installation requirements, the onsite project representative shall be informed and if possible a field modification may be worked out. Prior to putting the modification into effect, the Engineer shall be informed of the situation so that it may be reviewed and accepted.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Protection: Use all means necessary to protect the work and materials of this Section before, during and after installation and to protect the work and materials of all other trades.
- B. Failure on the part of the Contractor to comply with the above to the entire satisfaction of the Engineer shall be sufficient cause for the rejection of the particular piece of apparatus in question.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The work in this section further consists of furnishing all materials, accessories, equipment, tools, transportation services, labor and performing all operations required to completely execute the Electrical work for this project. The equipment to be furnished shall consist of but not necessarily be limited to the following major items. The Contractor will be required to determine the actual quantities and items involved. The General Contractor is responsible for furnishing and installing a complete and working system. The General Contractor may elect to have the electrical subcontractor furnish and install the following items indicated below, only make connections as needed and/or install the other items indicated.
- B. At the Lift Station
 - 1. Furnish/Install the following:
 - a. NEMA 4X Junction Boxes
 - b. Control Panel, NEMA 4X
 - c. Radar Level Transducer and Float Switches
 - d. Lot conduit, wire, fittings, boxes and devices as required
 - Instructions to the operators as required

2. Provide connections to/install the following:
 - a. Service Meter
 - b. Main Disconnect Switch
 - c. SCADA System/ Controls Panel
 - d. Radar level transducer
 - e. Junction box and disconnect switches, NEMA 4X

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 26 05 19.03
WIRE AND CABLE (600V CLASS)

PART 1 GENERAL

1.01 RELATED WORK

- A. Division 26

1.02 QUALITY ASSURANCE

- A. All materials, sizes, and capacities shall conform to the requirements of the National Electric Code and prevailing state and local codes.
- B. All materials shall be UL labeled.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code (NEC).

1.04 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Materials to be submitted:
1. Manufacturer's standard published catalog sheets and descriptive bulletins for each type used.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Single Conductor Assembly:
1. Conductor Material: Soft drawn annealed copper. Wire sizes No. 8 AWG and larger shall be stranded. Wire sizes smaller than No. 10 AWG shall be solid conductor, except for control conductors, which shall be stranded.
 2. Insulation: 600 V class minimum, color-coded in accordance with NEC and an established color-coding scheme throughout the project, marked to give grade of insulation, size, and manufacturer's name.
 - a. Type: PVC thermoplastic insulation Type THWN-2, as manufactured by Anaconda, Okonite, or equivalent.
 - b. Type: VFD load side cabling.
 3. Insulation and Jackets: Listed by UL as type TC. XHHW insulation with a thermoplastic PVC overall jacket. Number of conductors as shown on drawings. Suitable for installation in plenum areas.

- B. VFD Load Side Multiple Conductor Assemblies:
1. AWG conductor
 2. Flexible fine wire stranded tinned copper conductors for improved electrical characteristics and reduced oxidation
 3. XLPE insulation XHHW-2, Wet/Dry
 4. Shielded with foil tape, tinned copper braid with $\geq 80\%$ optical coverage, and drain wire
 5. Oil resistant PVC jacket
 6. Black jacket RAL 9005
 7. Manufacturer: Lutze Driveflex or equivalent
- C. Multiple Conductor Cable Assemblies:
1. Conductor Material: Soft drawn annealed copper. Maximum conductor size shall be No. 8 AWG, stranded.
 2. Insulation and Jackets: 20 mils polyethylene plus 10 mils PVC thermoplastic on each conductor, filler, binder tape, overall PVC thermoplastic jacket. Number of conductors as shown on the drawings.
 3. Manufacturers: Okonite P-30, Anaconda Type 20-10, or equivalent.
- D. Terminations:
1. Conductors No. 10 AWG or Smaller: Binding head screw terminals or solderless compression type insulated connectors.
 2. 600 V Cables No. 8 AWG and Larger: Solderless pressure type lugs with set screw and taped insulation.
- E. Splices:
1. Instrument and Control Wiring: Not permitted unless approved by the Engineer.
 2. Conductors No. 10 AWG and Smaller: Pre-insulated twist type with spring insert as manufactured by Ideal Industries "Wingnut", ITT-Holub Industries "Hi-Grip", or equal.
 3. Conductors No. 8 AWG and Larger: Solderless compression type with set screw and taped insulation.
- F. Taped Insulation:
1. Install as specified for splices and terminations above.
 2. Use filler compound at sharp or irregular edges to provide smooth surface before taping.

3. Construction: 3/4-inch wide electrical tape, half-lapped, minimum two layers. Cover with 3/4-inch wide PVC electrical tape, half-lapped, minimum one layer.
- G. M.I. Cable:
1. Copper conductor, size and number as shown on the drawings.
 2. Install in accordance with the manufacturer's instructions with manufacturer's field assistance.
 3. Manufacturer: BICC Cables.
- H. Tray Cable:
1. Application: Power and Control cables.
 2. Conductor Material: Soft drawn annealed copper. Conductors' #8 or smaller shall be stranded.
 3. Insulation and Jackets: Listed by UL as type TC. XHHW insulation with a thermoplastic PVC overall jacket. Number of conductors as shown on drawings. Suitable for installation in plenum areas.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All wires and cables shall be delivered in full coils or reels and shall be properly tagged and protected against injury. Provide covered storage space at the job site to protect the wire and cable from moisture and heat prior to installation.
- B. All raceways shall be cleaned and free of dirt and debris prior to installation of wire and cable.
- C. Use proper pulling rigs and reel assemblies to minimize pulling tensions and damage to insulation. Use pulling grips on all power cable.
- D. Lubrication: Powered soapstone or commercial wire lubricant. Soapsuds solutions shall not be used.
- E. All control conductors shall be identified at each end with wire numbers as shown on the instrument schematics and control diagrams using PVC wire marking sleeves as manufactured by Brady, Electrovert or equal.

3.02 FIELD TESTING AND ADJUSTMENT

- A. Test Reports: Six copies, typewritten, listing equipment used, persons performing tests, date of testing, equipment or circuit tested, and test results. All copies bound.
- B. Insulation Resistance Tests:
 1. General: Test equipment furnished by Contractor, equal to "Megger" as manufactured by James Biddle Company, 500-1000 VDC range.

2. Resistance Measured: Line-to-ground.
3. Procedure: Disconnect all solid-state equipment before making cable tests.
4. Cable Tests: Test 600 V conductors used for power, lighting, and control circuits.
5. Equipment Tests:
 - a. Motors, 480 VAC: Minimum 1 megohm, tested at 1000 VDC range.
 - b. Motors, 120 VAC: Minimum 1 megohm, tested at 500 VDC range.
 - c. 480 VAC MCC Buses: Minimum 1 megohm, tested at 1000 VDC range.
 - d. 480 VAC Transformers: Minimum 1 megohm, tested at 500 VDC range.
6. Voltage Level Tests:
 - a. Tests: Performed after all equipment is installed and connected.
 - b. Points: Test voltage at each end of each circuit.
 - c. Load Conditions: No-load and full-load, insofar as practical.
 - d. Test Report: As specified in 3.02.A.
7. Continuity and Phase Relationship Tests:
 - a. Continuity Check: All receptacles and control circuits.
 - b. Phase Relationship: All equipment for proper rotation.
 - c. Test Report: Written statement of performance of these tests.
8. Correction of Defects:
 - a. Repair or replacement of all equipment that fails to meet testing requirements and retest.

END OF SECTION

SECTION 26 05 26**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Rod electrodes.
 - 2. Wire.
 - 3. Mechanical connectors.
 - 4. Exothermic connections.

1.02 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - 2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.

1.03 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
 - 1. Metal underground water pipe.
 - 2. Metal building frame.
 - 3. Metal underground gas piping system.
 - 4. Rod electrode.
 - 5. Metal process pipe.
 - 6. Embedded rebar.

1.04 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 25 ohms maximum.

1.05 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

1.06 COORDINATION

- A. Complete grounding and bonding of building reinforcing steel prior concrete placement.

PART 2 PRODUCTS

2.01 ROD ELECTRODES

- A. Product Description:
 - 1. Material: Copper-clad steel.
 - 2. Diameter: 3/4 inch.
 - 3. Length: 10 feet.

2.02 WIRE

- A. Material: Stranded copper.
- B. Grounding Electrode Conductor: Copper conductor. Minimum 4/0 or as shown on the drawings.
- C. Bonding Conductor: Copper conductor. Size in accordance with NEC, Article 250-95.

2.03 CONNECTORS

- A. Mechanical Connection: Use UL approved ground clamps.
- B. Exothermic Connections.
 - 1. Manufacturers:
 - a. Cadweld.
 - b. Thermoweld.
 - 2. Use molds and cartridges in accordance with equipment manufacturer's recommendations for size of cable and rods installed.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.02 PREPARATION

- A. Remove surface contaminants at connection points.

3.03 INSTALLATION

- A. Install in accordance with IEEE 142.
- B. Install rod electrodes at locations as indicated on Drawings (if required).
- C. Install grounding and bonding conductors concealed from view.

3.04 FIELD QUALITY CONTROL

- A. Ground Rod Earth Resistance:
 - 1. Either fall of potential or clamp on method acceptable. Use AEMC 4500 or 3731 respectively. Unit calibration shall be tested prior to test.
 - 2. Equipment: Furnished by Contractor.
 - 3. If the resistance measurement is greater than 25 ohms, then a second ground rod shall be installed.
- B. Test Report:
 - 1. Electronic copy, listing equipment used, person performing tests, date tested, circuit or equipment tested, and test results.
 - 2. Submit test report to the Engineer.

END OF SECTION

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SECTION 26 05 33.13**CONDUIT FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****1.01 SCOPE**

- A. Furnish and install all conduits, cable troughs, wireway and miscellaneous materials required to provide the complete raceway systems as shown on the drawings and as specified.

1.02 RELATED WORK

- A. Section 26 05 33.16 - Boxes for Electrical Systems

1.03 QUALITY ASSURANCE

- A. All materials, equipment sizes, and capacities shall conform to the requirements of the National Electric Code, the National Electrical Manufacturers Association, prevailing state and local electric codes, and to applicable regulations of the local electrical utility. All materials and equipment must be UL labeled.

1.04 REFERENCE STANDARDS

- A. NFPA 70 - National Electric Code (NEC).
- B. Materials to be submitted:
 - 1. Manufacturer's standard published catalog sheets and descriptive bulletins.

PART 2 PRODUCTS**2.01 MATERIALS AND COMPONENTS**

- A. Rigid Metallic Conduit (RMC):
 - 1. General: Standard trade sizes, $\frac{3}{4}$ -inch minimum or as shown on the drawings.
 - 2. Material: Heavy rigid threaded type, mild steel hot dipped galvanized, inside surface enamel coated or lacquered.
 - 3. Field Cutting and Threading: Use appropriate power saws or threading machines and cutting lubricants. Cut ends and threads shall have burrs removed and shall be painted with zinc chromate protective coating.
 - 4. Fittings: Galvanized, standard threaded, as manufactured by OZ Gedney, Appleton, or equivalent.
 - 5. Expansion Fittings: Install wherever conduit crosses a building or construction expansion joint. Fittings shall be OZ type EX with Bonding Jumper BJ, Appleton XJB, or equivalent.

6. Uses: All exposed and embedded conduits.
- B. Electrical Metallic Tubing (EMT):
1. General: Standard trade sizes, $\frac{3}{4}$ -inch minimum except as noted.
 2. Material: Steel, zinc coated exterior, interior surface enamel coated.
 3. Field Cutting and Bending: Use appropriate hand tools, remove burrs. Bends shall not reduce the effective cross sectional area.
 4. Fittings: Compression type with plastic inserts.
 5. Uses: For lighting or receptacle circuits in dry areas only.
- C. Flexible Liquid Tight Conduit (OT):
1. General: Standard trade sizes, $\frac{3}{4}$ -inch minimum, bearing UL label.
 2. Material: Steel, galvanized, with liquid tight polyvinyl chloride cover, with continuous copper ground built into assembly.
 3. Fittings: Compression type with plastic insert designed for liquidtight conduit.
 4. Uses: As defined by NEC Article 351, between motors or other vibration producing equipment and rigid conduit or junction box.
- D. Plastic Conduit: (PVC):
1. Material: Smoothwall polyvinyl chloride conduit and fittings in accordance with ASTM FS12.
 2. Joints: By solvent cement (weld) process.
 3. Uses: Encased in concrete, type EB and direct burial type DB.
 4. Transition to RMC 12" below grade.
- E. Liquidtight Flexible Metal Conduit: (LFMC):
1. General: Standard trade sizes, $\frac{3}{4}$ -inch minimum, bearing UL label.
 2. Material: Circular cross section having an outer liquidtight, non-metallic, sunlight-resistant jacket over an inner flexible metal core.
 3. Fittings: Compression type with plastic insert designed for liquidtight conduit.
 4. Uses: As defined by NEC Article 351, between motors or other vibration producing equipment and rigid conduit or junction box.

PART 3 EXECUTION

3.01 CONDUIT INSTALLATION

- A. General: Install in accordance with requirements of NEC and recognized standards of good practice.
- B. Location: As shown on the drawings. Actual routing to be field verified and coordinated with other work prior to installation.
- C. Sleeves: Set sleeves in concrete during construction, before concrete pour begins. Sleeves shall be galvanized sheet pipe, securely fastened in position. Sleeves through exterior walls shall be filled with oakum after conduit installation, and then sealed with poly-sulfide sealant to form a watertight seal.
- D. Embedded Conduit: Set before concrete pour begins. Use long radius bends. Conduits in structural slabs shall have minimum 2-inch cover.
- E. Bends: Not more than equivalent of three 90-degree bends between pulling points.
- F. Supports: Provide at each elbow and at end of run terminating in box or cabinet. Fasteners spaced maximum of 7 feet horizontal, 8 feet vertical.
- G. Conduit clamps shall be malleable iron one-hole straps, beam clamps, or approved device with necessary bolts and expansion shields.
- H. Trapeze hangers may be used for parallel runs of conduit, except where installation would impede overhead crane and hoist travel. Install two-hole clamps at each end of each run, and pipe clamps every intermediate hanger for each conduit. Hangers are not detailed on the drawings, but are to be fabricated from 0.055 inch thick steel channel, Unistrut P-2000, Kindorf B-900, or equal, all-thread rod and fasteners, and must be adequate to support combined weight of conduit, conductors, and hangers.
- I. Conduit Ends:
 - 1. Cap spare conduits, label as spare.
 - 2. Cap ends during construction to prevent entrance of foreign materials.
 - 3. Terminate conduits at panels, equipment and boxes with double locknuts and insulating bushings.
 - 4. Stub ups shall extend 6 inches minimum above curb or floor line. Conduit terminations in trench walls shall be flush. Terminate with insulating bushing or appropriate fitting.

END OF SECTION

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SECTION 26 05 33.16**BOXES FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****1.01 SCOPE**

- A. Furnish and install all electrical pull boxes, junction boxes, and outlet boxes as required and as shown on the drawings, and as specified.

1.02 RELATED WORK

- A. Section 09 91 00 - Painting
- B. Section 26 27 26 - Wiring Devices

1.03 QUALITY ASSURANCE

- A. All materials, sizes, and capacities shall conform to the requirements of the National Electrical Code, the National Electrical Manufacturers Association, and prevailing state and local electrical codes.
- B. Where possible, the materials must bear UL label.

1.04 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code (NEC).
- B. UL 50 - Electrical Cabinets and Boxes.
- C. UL 514 - Electrical Outlet Boxes and Fittings.

1.05 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Material to be submitted:
 - 1. Fabricated Boxes: Dimensional outline and physical arrangement drawings, listing openings, materials of construction and fasteners.
 - 2. Junction and Outlet Boxes: Manufacturer's standard published catalog sheets and descriptive bulletins.
- C. Markings:
 - 1. Fabricated Boxes: Submittals shall be marked with equipment numbers and plant area location as shown on the drawings.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Fabricated Pull and Junction Boxes:
1. Materials: Code gage galvanized sheet steel, welded seams, hot dipped after fabrication. Covers shall be secured with stainless steel threaded screws. All boxes shall have gasketed covers.
 2. Drainage: Pull boxes installed at building walls to terminated underground conduit entrances shall have a minimum $\frac{3}{4}$ -inch galvanized pipe drain installed in the bottom of the box, extending to the floor or nearest drain.
 3. Support: Independent of conduits, by means of bolts and self-drilling concrete expansion anchors as required to support weight of box and conductors.
 4. Finish: Section 09 91 00.
- B. Junction and Outlet Boxes:
1. Materials: Galvanized steel or cast aluminum in accordance with UL 50 for junction boxes, UL 514 for outlet boxes. Covers attached with round head machine screws.
 2. Size: Cubic volume in accordance with requirements of NEC.
 3. Outlet Boxes: Standard patterns suitable for specific requirements of each outlet.
 4. Flush mounted wall outlet boxes shall not be less than 4-inch square box with suitable raised cover.
 5. Exposed surface mounted outlet boxes shall be Type FD Series as manufactured by Appleton, Crouse-Hinds, or equivalent.
 6. Where more than two devices are indicated at a single location and at the same elevation, multiple gang outlet boxes shall be installed.
 7. Outlet boxes installed outdoors or exposed to moisture shall be cast aluminum or malleable iron with threaded openings and neoprene gasketed covers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Where additional pull boxes are required by code or to facilitate installation beyond those shown on the drawings, such shall be furnished and installed at locations approved by the Engineer, at no additional cost.
- B. All boxes shall be set plumb and square, and securely fastened in place.
- C. Coordinate locations of pull and junction boxes with work of other trades prior to installation to assure adequate working clearances and accessibility after final installation is completed.

- D. After conductors and devices are installed, install and tighten covers, gaskets, and fastening screws as required.

END OF SECTION

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SECTION 26 05 43**UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 RELATED WORK

- A. Section 31 23 33 – Trenching & Backfilling
- B. Section 33 05 62 - Precast Concrete Manholes & Utility Structures
- C. Section 26 05 26 – Grounding and Bonding for Electrical Systems

1.02 QUALITY ASSURANCE

- A. All materials, sizes, and capacities shall conform to the requirements of the National Electrical Safety Code, the National Electrical Code, and prevailing state and local codes.
- B. All materials shall be UL labeled.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code (NEC).
- B. ANSI C2 - National Electrical Safety Code.
- C. ANSI/SCTE 77-2013 - Underground Enclosures.

1.04 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Materials to be Submitted:
 - 1. Manufacturer's standard published catalog sheets and descriptive bulletins.
 - 2. Manufacturer's standard published installation instructions for conduits, fittings, and supports.
 - 3. Dimensional layouts and physical construction drawings for all manholes and handholes.
- C. Markings: Manhole and handhole submittals shall be marked with the equipment tag as shown on the drawings.

PART 2 PRODUCTS

2.01 ELECTRICAL POWER DISTRIBUTION SYSTEM

- A. Conduits: Type EB polyvinyl chloride (PVC) including fittings, long sweep radius bends, and end bells. Provide conduit adapters to connect PVC conduit to rigid steel conduit where conduits penetrate building walls or as shown on the drawings. Provide end bells

on conduits entering manholes and handholes. Service entrance conduits and conduits below roadways shall be Schedule 40 PVC.

- B. Supports: Plastic spacers to provide 2 inch separation minimum, placed 8 feet on center maximum. Provide base and intermediate units in accordance with conduit manufacturer's recommendations to effect ductbank configurations as shown on the drawings.
- C. Seals: Install seals at all spare conduit end bells within manholes and handholes. All conduit joints and fittings shall be chemically bonded using manufacturer's approved joint cement. Joints at couplings shall be made watertight with an approved compound and tape.
- D. Encasement:
 - 1. General: As shown on the drawings. Reinforcement and minimum encasement dimensions as shown on the drawings.
 - 2. Concrete: See Section 33 31 00 – Structural Concrete. Pre-mixed concrete shall be used. Troweled-on or painted-on finishes shall not be allowed.
 - 3. Reinforcement and Grounding: As shown on the drawings and as specified in Section 26 05 26 – Grounding and Bonding for Electrical Systems.
 - 4. To prevent floating, ductbanks shall be tied down before pouring concrete using galvanized steel anchors and wire.
 - 5. Concrete shall not be poured until the ductbank and trenching have been approved by the Engineer.
 - 6. Mechanical vibrators shall not be used for construction of ductbanks.
 - 7. Each section of ductbank shall be poured complete in one operation. If such construction is not feasible, construction joints will be permitted, subject to the approval of the Engineer.
- E. Manholes:
 - 1. General: Provide reinforced cast-in-place concrete manholes as shown on the drawings. Provide water stops at all construction joints.
 - 2. Pulling Irons: Opposite each duct entrance and beneath manhole cover, as shown on drawings. Pulling irons shall be 7/8-inch diameter x 9 inches long.
 - 3. Stubs: Provide stubs for future duct extensions as shown on the drawings. Cap ends of stubs.
 - 4. Covers: As specified in Section 33 05 62 – Precast Concrete Manholes & Utility Structures.
 - 5. Grounding: In accordance with Section 26 05 26 – Grounding and Bonding for Electrical Systems, and as shown on the drawings.
 - 6. Manholes shall have solid bottoms without drains.

- F. Handholes:
1. General: Provide reinforced pre-cast polymer handholes as shown on the drawings.
 2. Handholes shall be Quazite Pre-cast Polymer Concrete enclosures or equal. They shall be a minimum of 24" x 15" x 25". They shall be Tier 8 rated.
 3. Grounding: In accordance with Section Section 26 05 26 – Grounding and Bonding for Electrical Systems, and as shown on the drawings.
 4. Handholes shall be placed on 6" clean stone.

2.02 INSTRUMENTATION AND COMMUNICATIONS SYSTEM

- A. Conduits: Type EB PVC conduits, fittings, and end bells. Provide conduit adapters to connect PVC conduit to rigid galvanized steel conduits where ductbank passes through building walls or where shown on the drawings. Provide end bells on conduits entering handholes.
- B. Support: Plastic spacers, as specified in Section 2.01.B.
- C. Seals: As specified in Section 2.01.C.
- D. Encasement: As specified in Section 2.01.D.
- E. Handholes: As shown on the drawings.

PART 3 EXECUTION

3.01 TRENCHING & BACKFILLING

- A. Follow requirements in Section 31 23 33.
- B. Slope trenches uniformly between terminations to provide good ductbanks drainage; no pockets shall be permitted in ductruns. Slope trenches so as to drain ductruns away from building entrances toward manhole or handhole.

3.02 TESTING

- A. After construction of ductbank is complete, the Contractor shall pull mandrel through each duct. Mandrel shall be 1/4-inch smaller than inside diameter of duct. If obstructions are encountered or if evidence of water pockets in ducts is found, remove and reconstruct section of ductbank affected.

END OF SECTION

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SECTION 26 05 73.19**ARC-FLASH HAZARD ANALYSIS****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.03 DEFINITIONS

- A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- B. Field Adjusting Agency: An independent electrical testing agency with full-time employees and the capability to adjust devices and conduct testing indicated and that is a member company of NETA.
- C. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- D. Power System Analysis Software Developer: An entity that commercially develops, maintains, and distributes computer software used for power system studies.
- E. Power Systems Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.
- F. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.
- G. SCCR: Short-circuit current rating.
- H. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
- I. Single-Line Diagram: See "One-Line Diagram."

1.04 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Study Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form and/or printed form.

1. Arc-flash study input data, including completed computer program input data sheets.
2. Arc-flash study report; signed, dated, and sealed by Power Systems Analysis Specialist.
3. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. For Power Systems Analysis Software Developer.
2. For Power System Analysis Specialist.
3. For Field Adjusting Agency.

B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Provide maintenance procedures in equipment manuals according to requirements in NFPA 70E.
2. Operation and Maintenance Procedures: In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

1.07 QUALITY ASSURANCE

- A. Study shall be performed using commercially developed and distributed software designed specifically for power system analysis.
- B. Software algorithms shall comply with requirements of standards and guides specified in this Section.
- C. Manual calculations are unacceptable.
- D. Power System Analysis Software Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 1. Computer program shall be designed to perform arc-flash analysis or have a function, component, or add-on module designed to perform arc-flash analysis.
 2. Computer program shall be developed under the charge of a licensed professional

engineer who holds IEEE Computer Society's Certified Software Development Professional certification.

- E. Power Systems Analysis Specialist Qualifications: Professional engineer in charge of performing the arc-flash study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- F. Arc-Flash Study Certification: Arc-Flash Study Report shall be signed and sealed by Power Systems Analysis Specialist.
- G. Field Adjusting Agency Qualifications:
 - 1. Employer of a NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification responsible for all field adjusting of the Work.
 - 2. A member company of NETA.
 - 3. Acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 COMPUTER SOFTWARE DEVELOPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CGI CYME.
 - 2. ETAP Corporation.
 - 3. EasyPower
 - 4. Power Analytics, Corporation.
 - 5. SKM Systems Analysis, Inc.
- B. Comply with IEEE 1584 and NFPA 70E.
- C. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

2.02 ARC-FLASH STUDY REPORT CONTENT

- A. Executive summary of study findings.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
- C. One-line diagram, showing the following:
 - 1. Protective device designations and ampere ratings.

2. Conductor types, sizes, and lengths.
 3. Transformer kilovolt ampere (kVA) and voltage ratings, including derating factors and environmental conditions.
 4. Motor designations and kVA ratings.
 5. Switchgear, switchboard, motor-control center, panelboard designations, and ratings.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study Output Data: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 05 73.13 "Short-Circuit Studies"
- F. Protective Device Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 26 05 73.16 "Coordination Studies."
- G. Arc-Flash Study Output Reports:
1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each equipment location included in the report:
 2. Voltage.
 3. Calculated symmetrical fault-current magnitude and angle.
 4. Fault-point X/R ratio.
 5. No AC Decrement (NACD) ratio.
 6. Equivalent impedance.
 7. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 8. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.
- D. Incident Energy and Flash Protection Boundary Calculations:
1. Arcing fault magnitude.
 2. Protective device clearing time.
 3. Duration of arc.
 4. Arc-flash boundary.
 5. Restricted approach boundary.
 6. Limited approach boundary.
 7. Working distance.

8. Incident energy.
 9. Hazard risk category.
 10. Recommendations for arc-flash energy reduction.
- E. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of computer printout.

2.03 ARC-FLASH WARNING LABELS

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce a 3.5-by-5-inch self-adhesive equipment label for each work location included in the analysis.
- B. Label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
1. Location designation.
 2. Nominal voltage.
 3. Protection boundaries.
 - a. Arc-flash boundary.
 - b. Restricted approach boundary.
 - c. Limited approach boundary.
 4. Arc flash PPE category.
 5. Required minimum arc rating of PPE in Cal/cm squared.
 6. Available incident energy.
 7. Working distance.
 8. Engineering report number, revision number, and issue date.
- C. Labels shall be machine printed, with no field-applied markings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.02 ARC-FLASH HAZARD ANALYSIS

- A. Comply with NFPA 70E and its Annex D for hazard analysis study.
- B. Preparatory Studies: Perform the Short-Circuit and Protective Device Coordination studies prior to starting the Arc-Flash Hazard Analysis or obtain results from another source.
 - 1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 05 73.13 "Short-Circuit Studies."
 - 2. Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 26 05 73.16 "Coordination Studies."
- C. Calculate maximum and minimum contributions of fault-current size.
 - 1. Maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
 - 2. Calculate arc-flash energy at 85 percent of maximum short-circuit current according to IEEE 1584 recommendations.
 - 3. Calculate arc-flash energy at 38 percent of maximum short-circuit current according to NFPA 70E recommendations.
 - 4. Calculate arc-flash energy with the utility contribution at a minimum and assume no motor contribution.
- D. Calculate the arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.
- E. Include medium- and low-voltage equipment locations, except equipment rated 240 V ac or less fed from transformers less than 125 kVA.
- F. Calculate the limited, restricted, and prohibited approach boundaries for each location.
- G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:
 - 1. Fault contribution from induction motors shall not be considered beyond three to five cycles.
 - 2. Fault contribution from synchronous motors shall be decayed to match the actual decrement of each as closely as possible (for example, contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).
- H. Arc-flash energy shall generally be reported for the maximum of line or load side of a circuit breaker. However, arc-flash computation shall be performed and reported for both line and load side of a circuit breaker as follows:

1. When the circuit breaker is in a separate enclosure.
 2. When the line terminals of the circuit breaker are separate from the work location.
- I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.03 POWER SYSTEM DATA

- A. Obtain all data necessary for conduct of the arc-flash hazard analysis.
1. Verify completeness of data supplied on one-line diagram on Drawings and under "Preparatory Studies" Paragraph in "Arc-Flash Hazard Analysis" Article. Call discrepancies to Architect's attention.
 2. For new equipment, use characteristics from approved submittals under provisions of action submittals and information submittals for this Project.
 3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys conducted by qualified technicians and engineers.
- B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification. Data include, but are not limited to, the following:
1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 2. Obtain electrical power utility impedance or available short circuit current at the service.
 3. Power sources and ties.
 4. Short-circuit current at each system bus (three phase and line to ground).
 5. Full-load current of all loads.
 6. Voltage level at each bus.
 7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
 8. For reactors, provide manufacturer and model designation, voltage rating and impedance.
 9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating,

and breaker settings.

10. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
11. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
12. Motor horsepower and NEMA MG 1 code letter designation.
13. Low-voltage conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
14. Medium-voltage conductor sizes, lengths, conductor material, conductor construction and metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).

3.04 LABELING

- A. Apply one arc-flash label on the front cover of each section of the equipment and on side or rear covers with accessible live parts and hinged doors or removable plates for each equipment included in the study. Base arc-flash label data on highest values calculated at each location.
- B. Each piece of equipment listed below shall have an arc-flash label applied to it:
 1. Motor-control center.
 2. Low-voltage switchboard.
 3. Switchgear.
 4. Medium-voltage switch.
 5. Medium voltage transformers
 6. Low voltage transformers. Exclude transformers with high voltage side 240 V or less and less than 125 kVA.
 7. Panelboard and safety switch over 250 V.
 8. Applicable panelboard and safety switch under 250 V.
 9. Control panel.
- C. Note on record Drawings the location of equipment where the personnel could be exposed to arc-flash hazard during their work.
 1. Indicate arc-flash energy.
 2. Indicate protection level required.

3.05 APPLICATION OF WARNING LABELS

- A. Install arc-flash warning labels under the direct supervision and control of Power System

Analysis Specialist.

3.06 DEMONSTRATION

- A. Engage Power Systems Analysis Specialist to train Owner's maintenance personnel in potential arc-flash hazards associated with working on energized equipment and the significance of arc- flash warning labels.

END OF SECTION

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SECTION 26 08 01
ELECTRICAL TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. Testing of electrical components and systems:
 - 1. Insulation resistance test.
 - 2. Grounding electrode test.
 - 3. Continuity test.
 - 4. Voltage test.
 - 5. Phase relationship verification.
- B. Test reports.
- C. Correction of defective components or systems.
- D. Retest of correct components, systems.

1.02 RELATED SECTIONS

- A. Specified elsewhere:
 - 1. 01 33 00 - Submittal Procedures
 - 2. 01 70 00 - Execution Requirements
 - 3. 26 05 19.03 - Wire and Cable (600V Class)
 - 4. 26 05 26 – Grounding and Bonding for Electrical Systems

1.03 SUBMITTALS

- A. Follow procedures as outlined in Section 01 33 00.
- B. Test Reports: Submit electronic copies of all test reports to the Engineer.
 - 1. Include:
 - a. HMG Project Number.
 - b. Project title and location.
 - c. Test performed.
 - d. Date performed.

- e. Test equipment used.
- f. Electrical Contractor's name, address and telephone number.
- g. Testing firm's name, address and telephone number, if other than Electrical Contractor.
- h. Name(s) and title(s) of person(s):
 - 1) Performing test.
 - 2) Observing test.
- i. Statement verifying each test.
- j. Nameplate data from each motor and equipment item tested.
- k. Test results.
- l. Retest results after correction of defective components, systems.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Furnish all equipment, manpower and casual labor to perform specified testing.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ensure that all electrical work is complete and ready for testing.
- B. Disconnect all devices or equipment that might be damaged by application of test voltages, voltage of reversed phase sequence or other test procedures.
- C. Test all equipment as previously listed.

3.02 TESTING

- A. Conduct tests and adjust equipment to verify compliance with specified performance.

3.03 INSULATION RESISTANCE TESTS

- A. General: Test equipment furnished by Contractor, equal to "Megger" as manufactured by James Biddle Company, 500-1000 VDC range.
- B. Resistance Measured: Line-to-ground.
- C. Procedure: Disconnect all solid-state equipment before making cable tests.
- D. Cable Tests: Test 600 V conductors used for power, lighting, and control circuits.

- E. Equipment Tests:
1. Motors, 480 VAC: Tested at 1000 VDC range.
 2. Motors, 120 VAC: Tested at 500 VDC range.
 3. 480 VAC MCC Buses: Tested at 1000 VDC range.
 4. 480 VAC Transformers: Tested at 500 VDC range.
 5. Minimum insulation for motors shall be calculated using the following formula.
 - a. $2 \times \text{Rated KV} \times 1 \text{ Megohm} + 1 \text{ Megohm}$

3.04 VOLTAGE LEVEL TESTS

- A. Tests: Performed after all equipment is installed and connected.
- B. Points: Test voltage at each end of each circuit and including:
1. Service entrance at main disconnect.
 2. Secondary terminals all step down transformers.
 3. Terminals of all motors.
- C. Load Conditions: No-load and full-load, insofar as practical.
- D. Test Report: As specified in 1.03. A.

3.05 CONTINUITY AND PHASE RELATIONSHIP TESTS

- A. Continuity Check: All receptacles and control circuits.
- B. Phase Relationship: All equipment for proper rotation.
- C. Test Report: Written statement of performance of these tests.

3.06 GROUNDING ELECTRODE TEST

- A. Measure and record ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Maximum acceptable resistance: 10 ohms. When resistance exceeds 10 ohms, drive and bond another ground rod, two ground rod lengths away and repeat test.

3.07 FIBER OPTIC CABLE TEST

- A. Tests performed after fusing and connectorization.
- B. Test each fiber for fiber loss.
- C. Test Report: as specified in 1.03A.

3.08 CORRECTION OF DEFECTS

- A. When tests disclose any unsatisfactory workmanship or equipment furnished under this Contract, correct defects and retest. Repeat tests until satisfactory results are obtained.
- B. When any wiring or equipment is damaged by tests, repair or replace such wiring or equipment. Test repaired items to ensure satisfactory operation.

END OF SECTION

SECTION 26 21 00**LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE****PART 1 GENERAL****1.01 SUMMARY**

- A. The Contractor shall coordinate with the local electrical utility and the Village for service to the specified sites.

1.02 RELATED SECTIONS

- A. Section 26 00 01 - General Electrical Requirements
- B. Any section pertaining to electrically operated equipment.

1.03 SYSTEM DESCRIPTION

- A. Lift Station
 - 1. Electric Service: New 1 phase, 3 wire, 240-volt, 200 amp.

1.04 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with Utility Company written requirements.
- B. Maintain one copy of each document on site.
- C. All work performed shall be in accordance with the standards of the National Electric Code, National Electric Safety Code and local codes.
- D. The Contractor shall further determine what service and material is being provided by the local electric utility and shall include as part of his proposal the equipment to be furnished, in place, all that is necessary to make a complete electrical service from the utility, for the improvement.

1.06 FIELD MEASUREMENTS

- A. Verify field measurements as indicated on drawings.

1.07 COORDINATION

- A. Coordinate with utility company, relocation of overhead or underground lines interfering with construction. Where power lines are to be relocated, bill utility costs directly to Owner.
- B. Contact utility company regarding charges related to service installation. Include utility charges in this contract.

- C. Before ordering material and equipment, the Contractor shall determine from the local utility that is intended to provide electric service for the herein described improvement, that the service is available and will be supplied as specified. Should any changes be required, the Contractor shall immediately notify the Engineer.

PART 2 PRODUCTS

2.01 UTILITY METER

- A. Existing

2.02 UTILITY METER BASE/MAIN DISCONNECT

- B. Existing

2.03 UTILITY TRANSFORMER

- A. Existing

PART 3 EXECUTION

3.01 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify service equipment is ready to be connected and energized.

3.02 INSTALLATION

- A. Install service entrance conduits to building service entrance equipment. Terminate wires at service equipment. Utility will terminate wires at Utility transformer secondary.

3.03 TEMPORARY SERVICE

- A. The Contractor shall provide, through arrangements with the Owner, for an adequate source of electric light and power during the construction of this project. The Contractor shall furnish electric power to points of use and shall pay the utility or Owner, as the case may be, for power used. This temporary service shall be removed by the Contractor when directed by the Engineer.

3.04 CHARGES FROM UTILITY

- A. The Owner shall determine what payment, if any, the electric utility will require for providing the service requested. The Owner shall pay all such charges by the electric utility.
- B. The Contractor will not be entitled to any extra for payment of the charges by the electric utility.

END OF SECTION

SECTION 26 24 16.02
LIGHTING PANELBOARDS

PART 1 GENERAL

1.01 RELATED WORK

- A. Section 26 27 26 - Wiring Devices

1.02 EQUIPMENT DESCRIPTION

- A. Circuit breaker panelboards shall be dead front construction equipped with thermal-magnetic molded case circuit breakers of frame size and trip ratings as shown on the schedules.

1.03 QUALITY ASSURANCE

- A. Panelboards shall bear the UL label.

1.04 REFERENCES

- A. UL 67 - Panelboards.

1.05 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Materials to be submitted:
 - 1. Manufacturer's standard published catalog sheets and descriptive bulletins.
 - 2. Physical dimensions, layout, bus capacities, and branch circuit breakers proposed.
 - 3. A listing of each nameplate proposed.
 - 4. Manufacturer's standard published installation and maintenance instructions.
- C. Markings: Each submittal shall be marked to indicate the equipment number and plant location as shown on the drawings.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Type: Dead front, bolt-on main circuit breaker, surface mount, NEMA 1 indoor/dry location; NEMA 4X 304SS outdoor/wet location.
- B. Busing: Tinned copper, ratings as shown on the drawings. Bus structure shall be insulated.

- C. Circuit Breakers: Enclosed thermal magnetic plug-in, quick-make/quick-break, trip free handle, trip indicating. Quantity and poles as shown on schedules.
- D. Interrupting Ratings: 10,000 AIC at 240 VAC.
- E. Panel and Box: NEMA 1 indoor/NEMA 4X 304SS outdoor, code gauge steel, wiring space in accordance with UL 67; steel front with hinged door, vault type handle with 3-point latch. All panelboards keyed alike. Manufacturer's standard finish.
- F. Cardholder: Inside of door, clear plastic cover and typewritten schedule of panel's branch circuits.
- G. Installations:
 - 1. Location as shown; maximum distance from floor at 6 feet, 6 inches.
 - 2. Mounting: Materials as required. Use collars around mounting hardware to provide air space between panel backs and walls.
- H. Square D, Eaton, GE or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. In accordance with equipment manufacturer's recommendations.
- B. Make all final equipment connections, and test circuits for proper polarity and continuity.
- C. Contractor shall note panel schedules on drawings.
- D. Provide and install flash and shock hazard warning labels.

END OF SECTION

SECTION 26 27 26**WIRING DEVICES**

PART 1 GENERAL

1.01 RELATED WORK

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems

1.02 REFERENCE STANDARDS

- A. NFPA 70 - National Electric Code (NEC).

1.03 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Materials to be submitted:
 - 1. Manufacturer's standard published catalog sheets and descriptive bulletins.
 - 2. Physical dimensions, mounting details for surface mounted devices.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. General: Furnish as scheduled or shown on the drawings.
- B. Toggle Switch:
 - 1. Rating: 125 VAC, 20A, commercial grade.
 - 2. Color: Ivory.
 - 3. Plate: Brushed aluminum indoors, NEMA 4 outdoors and in wet locations.
 - 4. Mounting Height: 4.5 feet above finished floor.
 - 5. Number of Poles: As shown on the drawings.
 - 6. Manufacturer: General Electric, Leviton, Hubbell, Russell & Stohl or equivalent.
- C. Receptacles:
 - 1. Rating: 125 VAC, 20 A, specification grade except as noted.
 - 2. Configuration: NEMA 5-15R, parallel blade, grounding, except as noted on drawings.
 - 3. Color: Ivory.

4. Plate: Duplex, ivory indoors, gasketed aluminum with dual spring covers indoors in damp locations, and weatherproof while in use in wet locations.
 5. Connect wiring device grounds in accordance with NEC, Article 250.
 6. Manufacturer: General Electric, Leviton, Hubbell, Russell & Stohl or equivalent.
 7. Mounting Height: 1.5 feet above finished floor, 48" above finished floor in areas below grade, or as shown on the drawings.
- D. Ground Fault Receptacles:
1. Location: Exterior receptacles, receptacles in pump station levels below grade, all wet areas, above metal floors or grating, or as shown on the drawings.
 2. Type: Differential ground fault, 120 VAC, NEMA 5-15R, with integral test and reset functions.
 3. Sensitivity: 5 ma.
 4. Manufacturer: General Electric, Leviton, Hubbell, or equivalent.
- E. Special Purpose Outlets:
1. Size and configuration as shown on the drawings.
 2. Rating: 250 VAC class, current capacity as shown on the drawings.
 3. Manufacturer: General Electric, Leviton, Hubbell, Russell & Stohl or equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wall Switches:
1. Not more than one switch shall be installed in a single gang position.
 2. Switch outlets shall be adjacent to lock side door as applicable.
 3. Multiple switches shall be installed with a single wall plate.
 4. Recess in drywall areas. Surface mounted in Plant processing areas unless otherwise noted.
- B. Receptacles:
1. Recess in drywall areas. Surface mounted in Plant processing areas, unless otherwise noted.
 2. Install separate grounding conductor from lighting panelboard to receptacle outlets in conduit with branch circuit conductors.

3. Bond receptacle grounding screw to outlet box if receptacle is not self-bonding type.
- C. Mounting and Location:
1. Approximately as shown on the drawings.
 2. Verify exact location by checking drawings and equipment layout shop drawings.

END OF SECTION

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SECTION 26 29 13
ENCLOSED CONTROLLERS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electric Code (NEC).

1.02 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Materials to be submitted:
1. Manufacturer's standard published catalog sheets and descriptive bulletins.
 2. Physical dimension, installation, and mounting details.
 3. Manufacturer's standard published installation and maintenance instructions.
- C. Marking: Each submittal shall be marked with the equipment number of the device being served and plant location as shown on the drawings.

PART 2 PRODUCTS

2.01 MATERIAL AND COMPONENTS

- A. Type: FVNR, across line starting, rated 600 VAC, 3 phase, 60 Hz. For motors over 40HP, a reduced voltage solid state starter with up-to-speed bypass and adjustable maximum 30 second ramp up/down time shall be provided.
- B. Size: Minimum NEMA Size 0. Size in accordance with NEC, Article 430.
- C. Construction:
1. Disconnect, motor overload and running protection, starter contactor, control transformer, and auxiliary contacts shall be mounted in integral NEMA 1 enclosure for dry location, and in NEMA 4X 304SS enclosure in outdoor locations, or as shown on the drawings.
 2. MCBs: Quick-Make, Quick-Break, size as shown on the drawings, operating handle through door. Interrupting rating - 25,000A symmetrical, minimum.
 3. Starters shall be rated 600 VAC, with solid state overload relay in each phase leg. Coil shall be rated 120 VAC.
 4. Control voltage shall be 120 VAC. When service voltage is 240 volts, 3Ø, 3W or greater, then a 120 volt control transformer shall be provided. Control transformer shall be sized to handle the load with a 10% overload and shall have a capacity of at least 300 VA with primary fuse protection.

5. Operating handle shall be padlockable in the OFF position.
 6. Cover mounted controls shall include green running LED pilot light, reset, elapsed time meter and H-O-A selector switch with a spare contact for Auto position indication to the control system as shown on the drawings.
 7. The disconnect shall have auxiliary contacts to operate in tandem with the disconnect switch. These contacts shall be for the purpose of disconnecting power to the motor controls when the disconnect for the motor is open.
 8. The motor overload shall have auxiliary contacts for trip indication.
- D. Terminations: Suitable for copper conductors, lugs suitable for wire sizes as shown on the drawings.
- E. The control circuitry shall include an undervoltage, phase loss and phase sequence relay which shall prevent motor operation in the event the voltage level is insufficient, a phase is lost or of the wrong rotation. This relay shall include a two (2) second time delay to prevent nuisance shutdowns.
1. The voltage level and phase rotation shall be at an acceptable level for a predetermined time before allowing the motor to start, (provide Adjustable Time Delay, adjustable between 10 & 60 seconds).
 2. A warning light shall be illuminated to indicate when insufficient voltage is present for motor starting.
 3. A single undervoltage relay in conjunction with a latching relay shall provide low voltage protection.
- F. Manufacturers: Square D, Eaton, Rockwell Automation, GE, or equal.

2.02 SPARES

- A. The following list of spares shall be provided with the motor starters:
1. 3 - Feeder protection fuses each sized used
 2. 2 - Each control power fuse
 3. 3 - Each size of overload used
 4. 1 - Motor starter coil of each size used
 5. 10 - LED pilot lamps
- B. The spares provided shall be provided in a separate box with a packing slip.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with NEC and equipment manufacturer recommendations.

- B. Provide heater elements sized on motor nameplate full load current.
- C. Provide and install flash and shock hazard warning labels.

END OF SECTION

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SECTION 26 41 10
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 RELATED WORK

- A. Division 26 Specifications

1.02 QUALITY ASSURANCE

- A. All materials, equipment, sizes, and capacities shall conform to the requirements of the National Electrical Code and prevailing state and local codes.
- B. All materials shall be UL labeled.

1.03 SUBMITTALS

- C. Make submittals as specified in Section 01 33 00.
- D. Materials to be submitted:
1. Manufacturer's standard published catalog sheets and descriptive bulletins, marked to indicate accessories being furnished.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Safety Switches:
1. Construction: Heavy duty type, HP rated, single throw, quick-make/quick-break. Switch shall be padlockable in OFF position. Switch shall have defeatable door locks preventing the cover from being opened with the switch in the ON position.
 2. Enclosure: Indoors, NEMA 1. Outdoors, or wet locations, NEMA 3R, (or as shown on the drawings).
 3. Manufacturers: Eaton, Square D, GE or equal.
- B. Push-Button and Selector Switch Stations:
1. General: Stations located remotely from the motor starter or control center shall be heavy duty, oiltight, and shall be of the same manufacturer as the motor control center.
 2. Construction: Indoors - heavy duty, oiltight, outdoors and wet locations - NEMA 4, cast enclosure, with rubber boots over push-button and selector switch operators. Push-button stations shall be equipped with locking device on the OFF position.

3. Rating: 720 VA make, 720 VA break, 120-600 VAC. Silver contacts, double break, on all control units.
- C. Manual Motor Starters - Single Phase Only:
1. Construction: Single-pole with integral thermal overload protection, HP rated at 120 VAC. Switches shall be melting alloy type.
 2. Enclosures: NEMA I if indoor, 3R if outdoor or wet location cast enclosure.
 3. Manufacturers: Eaton, Square D, GE or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide mounting accessories and hardware as required.
- B. Connect devices as shown on the drawings and in accordance with equipment manufacturer's recommendations.
- C. Provide and install flash and shock hazard warning labels.

END OF SECTION

SECTION 26 43 00
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 APPLICABILITY

- A. This section describes the materials and installation requirements for Surge Protective Devices (SPDs), formerly TVSS, for the protection of AC electrical circuits.

1.02 REFERENCE STANDARDS

- A. Underwriters Laboratories: UL 1449 and UL 1283.
- B. ANSI/IEEE C62.41.1-2002, C62.41.2-2002, C62.45-2002.
- C. National Electrical Code: Article 285.

1.03 QUALITY ASSURANCE

- A. SPD shall bear the UL Mark and shall be listed to most recent editions of UL 1449 and UL 1283. "Manufactured in accordance with" is not equivalent to UL listing and does not meet the intent of this specification.

1.04 SUBMITTALS

- A. Submittals shall include UL 1449 Listing documentation verifying:
 - 1. Short Circuit Current Rating (SCCR).
 - 2. Voltage Protection Ratings (VPRs) for all modes.
 - 3. Maximum Continuous Operating Voltage Rating (MCOV).
 - 4. I-nominal rating (I-n).
 - 5. Type 1 Device Listing.
- B. Submittals shall include shop drawings including manufacturer installation instruction manual and line drawings detailing dimensions and weight of enclosure, internal wiring diagram illustrating all modes of protection in each type of SPD required, wiring diagram showing all field connections and manufacturer's recommended wire and breaker sizes.
- C. Minimum of five (5) year warranty.

PART 2 PRODUCTS

2.01 MAIN SERVICE PANEL SPD GENERAL REQUIREMENTS

- A. SPD shall be UL labeled with 200kA Short Circuit Current Rating (SCCR). Fuse ratings shall not be considered in lieu of demonstrated withstand testing of SPD, per NEC 285.6.

- B. SPD shall be UL labeled as Type 1 (verifiable at UL.com), intended for use without need for external or supplemental overcurrent controls. Every suppression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls. SPDs relying upon external or supplementary installed safety disconnectors do not meet the intent of this specification.
- C. SPD shall be UL labeled with 20kA I-nominal (I-n) (verifiable at UL.com) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
- D. Minimum surge current capability (single pulse rated) per phase shall be:
 - 1. Service Entrance or Transfer Switch: 200kA
 - 2. Distribution panelboards & MCC: 150kA
 - 3. Branch panelboards: 80kA
- E. SPD shall provide surge current paths for all modes of protection: L-N, L-G, L-L and N-G for Wye systems; L-L, L-G in Delta and impedance grounded Wye systems.

- F. UL 1449 Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

<u>System Voltage</u>	<u>L-N</u>	<u>L-G</u>	<u>L-L</u>	<u>N-G</u>
208Y/120	700V	700V	1200V	700V
240D/120	700V	700V	1200V	700V
480Y/277	1200V	1200V	1800V	1200V

(Mode VPRs verifiable at UL.com. Numerically lower is allowed/preferred; old-style Suppressed Voltage Ratings (SVRs shall not be submitted, nor evaluated due to outdated, less strenuous testing).

- G. UL 1449 Listed Maximum Continuous Operating Voltage (MCOV) (verifiable at UL.com):

<u>System Voltage</u>	<u>Allowable System Voltage Fluctuation (%)</u>	<u>MCOV</u>
208Y/120	25%	150V
240D120	25%	150V
480Y/277	15%	320V

- H. SPD shall have UL 1283 EMI/RFI filtering with minimum attenuation of -50dB at 100 kHz.
- I. SPD shall include visual LEP diagnostics including a minimum of one green LED indicator per phase, and one red service LED. SPD shall include an audible alarm with on/off silence function and diagnostic test function (excluding branch).
- J. OPTIONS
 - 1. SPD shall be provided with 1 set of NO/NC dry contacts.
 - 2. SPD shall be provided with surge event counter with backup power source.

PART 3 EXECUTION

3.01 INSTALLATION OF SUPPRESSORS

- A. SPD shall be installed per manufacturer's installation instructions with lead lengths as short (less than 24") and straight as possible. Gently twist conductors together.
- B. Installer may reasonably arrange breaker locations to ensure short and straightest possible leads to SPDs.
- C. SPD shall be installed on the load side of the main service disconnect.
- D. Before energizing, installer shall verify service and separately derived system Neutral to Ground bonding jumpers per NEC.

END OF SECTION

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SECTION 31 10 00**SITE CLEARING**

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Removing surface debris.
2. Removing designated paving, curbs, and sidewalks.
3. Removing designated trees, shrubs, and other plant life.
4. Removing abandoned utilities.
5. Excavating topsoil.

B. Related Sections:

1. Section 31 22 00 – Grading

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Tree Removal (6 to 15 Units Diameter) and Tree Removal (Over 15 Units Diameter)

1. Measurement: In accordance with IDOT Standard Specifications, Section 201, measured for payment per unit of diameter.
2. Payment: This work will be paid for at the contract unit price per unit diameter in accordance with IDOT Standard Specifications, Section 201, at specified diameters shown on the plans.

B. Tree Removal, Acres

1. Measurement: In accordance with IDOT Standard Specifications, Section 201, measured for payment per acre as unit.
2. Payment: This work will be paid for at the contract unit price per acre in accordance with IDOT Standard Specifications, Section 201.

C. Clearing, Acres (Less than 6 Units Diameter)

1. Measurement: Clearing will be measured by the acre when included in the contract as a payment item and shown at definite locations on the plans or staked for removal by the Engineer. The entire area shown on the plans, and directed by the Engineer, will be used in computing the acres (hectares). No deductions will be made for bare areas and existing roads occurring within these limits. Any removal of bushes or saplings within such areas will not be measured separately for payment.
2. Payment: This work will be paid for at the contract unit price per acre.

- D. Beaver Dam Removal and Disposal
1. Measurement: This item will be measured for payment per each.
 2. Payment: This work will be paid for at the contract unit price per each for Beaver Dam Removal and Disposal at the locations shown on the plans. The full extent of the beaver dam shall be removed to allow free flow of water. Each beaver dam removed shall be removed wholly. The density and size of the beaver dams will not be measured separately for payment.
- E. Fence Removal
1. Measurement: Fence Removal will be measured for payment in feet, along the top of the fence from center to center of end posts, excluding the length occupied by gates.
 2. Payment: This work will be paid for at the contract unit price per foot for Fence Removal, of the style specified, including the excavation and disposal of all materials, including concrete footings, to the limits indicated on the plans.
- F. Remove Concrete Spillway at Culvert Outfall
1. Measurement: Remove Concrete Spillway at Culvert Outfall will be measured for payment in square feet.
 2. Payment: This work will be paid for at the contract unit price per square foot for Removal of concrete spillway at culvert outfall, including the excavation and disposal of all materials to the limits indicated on the plans.
- G. Remove Timber Retaining Wall
1. Measurement: This item will not be measured for payment but will be paid for at the contract lump sum price.
 2. Payment: This work will be paid for at the contract lump sum price for the Removal of timber retaining wall, including the excavation and disposal of all materials to the limits indicated or general location as shown on the plans.
- H. Remove Outlet Control Structure at Phil's Beach
1. Measurement: This item will not be measured for payment but will be paid for at the contract lump sum price.
 2. Payment: This work will be paid for at the contract lump sum price for the Removal of the outlet control structure at Phil's Beach, including the excavation and disposal of all materials.
- I. Remove Concrete Headwall, Wingwalls and Junction Chamber at Main Street
1. Measurement: This item will be measured for payment per each.
 2. Payment: This work will be paid for at the contract unit price per each for Removal of concrete headwall, wingwalls and junction chamber at Main Street at the locations shown on the plans.

- J. Removal of Wooden Bridge and Concrete Supports at Kuester Manor
1. Measurement: This item will not be measured for payment but will be paid for at the contract lump sum price.
 2. Payment: This work will be paid for at the contract lump sum price for the relocation of the wooden bridge as shown on the plans and removal and disposal of the concrete supports. If the structural integrity of the wooden bridge is compromised in the attempt to relocate the bridge as shown on the plans, the bridge shall then be removed and disposed of completely. Care shall be taken during initial efforts to relocate the bridge, and multiple straps shall be used to lift the structure, however, if damaged, the bridge shall be disposed of. No additional compensation will be paid for relocation or removal. Additionally, no penalty will be charged to the contractor if the bridge is damaged during relocation efforts.

1.03 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Herbicide: As approved by authority having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verify existing plant life designated to remain is tagged or identified.
- C. Identify waste area and/or salvage area for placing removed materials.

3.02 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain.
- C. Protect benchmarks, survey control points, and existing structures from damage or displacement.
- D. Carry out construction operations in a manner and sequence that erosion and air and water pollution are minimized and held within legal limits.

3.03 CLEARING

- A. Clear areas required for access to site and execution of Work to minimum depth of 4-inches.
- B. Clearing shall consist of the removal and disposal of all obstructions such as fences, walls, foundations, buildings, accumulations or rubbish or whatever nature and existing structures, the removal of which is not otherwise provided for in Article 501.07 of the Standard Specifications; all logs, shrubs, bushes, saplings, grass, weeds, other vegetation and stumps of a diameter less than 6 inches.
- C. Remove down trees, logs, drifts, boulders, debris and other obstructions lying wholly or partly in the channel. Remove piling, piers, headwalls, overhanging trees, and sediment bars that obstruct the free flow of water if so, designated in the plans or as marked in the field.
- D. Remove trees and shrubs within marked areas or as indicated on the plans. Stumps shall be cut flush to proposed grade, however, in areas of excavation or grading, stumps shall be removed as necessary. In areas of lawn restoration (IDOT Class 1 Seed) stumps shall be removed to 12-inches below grade.
- E. Trees within the wetlands or at the bank of the stream designated to be cleared shall be cut 6 to 12 inches from the ground.
- F. Clear undergrowth and deadwood, without disturbing subsoil.
- G. Apply herbicide to remaining stumps to inhibit growth.
- H. Clearing of snagging (beaver dams) shall be primarily with hand-operated equipment, water-based equipment, or small equipment used in a manner that will minimize soil, water, and other resource disturbances. Remove all debris that obstructs the free flow of water.

3.04 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
- B. Partially remove paving, curbs, and, sidewalks as indicated on Drawings. Neatly saw cut edges at right angle to surface.
- C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- E. Do not burn or bury materials on site. Leave site in clean condition.

3.05 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.
- B. Remove topsoil from site.

END OF SECTION

SECTION 31 22 00**GRADING****PART 1 GENERAL****1.01 RELATED SECTIONS**

- A. Section 01 57 13 – Temporary Erosion and Sediment Control
- B. Section 31 22 19 - Finish Grading
- C. Section 31 23 00 - Excavation and Fill
- D. Section 31 23 33 – Trenching and Backfilling

1.02 TESTING AGENCY

- A. Inspection and testing will be performed by a firm selected and paid for in accordance with Section 01 40 00.

1.03 REFERENCE STANDARDS

- A. ASTM D1556 - Density of Soil in Place by the Sand-Cone Method
- B. ASTM D698 - Moisture-Density Relations of Soils
- C. ASTM D2049 - Relative Density of Cohesionless Soils
- D. ASTM D2167 - Density of Soil in Place by the Rubber Balloon Method
- E. ASTM D2487 - Classification of Soils for Engineering Purposes
- F. ASTM D2937 - Density of Soil in Place by Drive-Cylinder Method
- G. ASTM D2922 - Density of Soil and Soil Aggregate in place by Nuclear Method (Shallow Depth)

PART 2 PRODUCTS**2.01 FILL MATERIALS**

- A. Classification of soils shall be as specified in compliance with ASTM D2487.
 - 1. Satisfactory or suitable materials shall be those classified as SW, SC, SM, ML, and CL.
 - 2. Unsuitable materials for fills shall be those classified as PT, OH, CH, MH, and OL.
 - 3. Although general unsuitable, CH material may be used due to the lack of more suitable material on site.

- B. The inspection and testing firm shall be solely responsible for determining the suitability of material proposed for fill and shall provide all tests necessary to determine the classification of material prior to its use for fill. However, the inspection and testing firm is not responsible for delays or expenses suffered by the Contractor due to rejection of certain proposed fill materials.
- C. It is anticipated that the use of CH materials will require that special procedures be implemented by the Contractor. An unusual amount of discing and moisture adjustment may be required and larger than average compaction equipment could be required. These costs shall be included in the bid price and will not be considered as extras.
- D. Material from structure excavations may be utilized for fill if in compliance with Paragraph A. above, as determined by the Engineer.
- E. Stripped topsoil may be placed in the upper 2 feet of fill in areas not to receive structures or surface improvements. Such areas shall be as directed by the Engineer or as designated on the drawings.

2.02 BORROW MATERIALS

- A. All borrow materials required to complete the work, including those which are not available on site, shall be furnished by the Contractor.
- B. Imported borrow materials shall meet the requirements specified above for satisfactory fill material.

PART 3 EXECUTION

3.01 CLEARING

- A. Clear all stumps, trees, bushes, shrubs, and weeds and grub and remove all roots and other surface obstructions from the site. Burning permits shall be the responsibility of the Contractor.
- B. All excess soil shall be placed on site as directed by the Engineer.
- C. Strip all organic topsoil from the construction area and stockpile this material, if it is to be reused as topsoil, in an area on the property but outside the construction area, as designated by the Engineer.
- D. The Engineer will be the sole judge as to what constitutes organic soils.

3.02 PREPARATION OF SUBGRADE

- A. After removal of all vegetable matter and organic soil in other areas to receive fill, the surface shall be scarified to a depth of not less than 6 inches and then compacted to a minimum dry density of at least 95 percent of the maximum dry density determined by ASTM D698 for cohesive soils, or to a minimum relative of at least 70 percent as determined by ASTM D2049 for cohesionless soils.

3.03 PLACEMENT OF FILL

- A. Cohesive fill material shall be placed in horizontal layers not to exceed 6 inches in compacted thickness. Cohesionless fill material shall be placed in horizontal layers not to exceed 12 inches in compacted thickness. Successive lifts of fill shall be blended together.

- B. Acceptable moisture contents during filling operations are those at which satisfactory dry densities and soil strengths result and will vary depending on the type of fill soil.
- C. In general, the moisture content should be within 3 percent of optimum, but this range may be extended for CH materials at the discretion of the Engineer. Discing shall be used as necessary in reducing or increasing the moisture content.
- D. Fill shall not be placed when frozen or when weather conditions will cause freezing in the fill areas. No fill shall be placed on frozen ground.
- E. Topsoil shall be placed in the same manner as specified above.
- F. Any fill not meeting the required compaction criteria or placed without providing the testing laboratory the opportunity to observe and perform density tests shall be removed and/or revoked.

3.04 CONTROL OF SURFACE WATER

- A. The fill shall be placed in such a manner as to prohibit any rain falling outside the fill area from draining into the fill area.
- B. The surface of the fill area shall be maintained in such a manner that any rain falling inside the area will be drained off rapidly or accumulated in a sump from which it may be pumped and disposed of in a manner satisfactory to the Engineer.

3.05 COMPACTION EQUIPMENT

- A. Provide sufficient compacting equipment to obtain the required percent compaction or relative density as appropriate of the fill being placed.
- B. The equipment shall be such as to ensure a proper blending of successive lifts.
- C. For cohesive soil, a sheepsfoot roller which applies sufficient contact pressure to achieve the required compaction shall be used. Contractor shall supply and use continuously, when fill is being placed, a blade or other smoothing device for spreading and breakup of the uncompacted fill to obtain more uniform soil condition.
- D. If cohesionless soils (SW, SM, or SC) are placed in the fill, a smooth drum vibratory roller shall be provided of adequate size to obtain the required relative density.

3.06 FINAL SURFACE LEVELING OPERATION

- A. The entire surface area, both on site borrow and fill shall be finished to the required grade elevations. The surface shall be struck off level, free from all ruts and depressions. The final grade elevations shall not exceed 0.1 foot variation from that shown on the drawings.

3.07 PLACEMENT OF UNSUITABLE MATERIAL

- A. If unsuitable material is placed in the fill area, it shall be promptly removed and disposed of.

3.08 PROTECTION

- A. Embankments or subgrade areas shall be kept shaped and effectively drained at all times.
- B. The finish subgrade shall be protected from traffic or other operations and maintained in a satisfactory condition until ballast, subbase, base, or pavement is placed.
- C. Scarify and recompact any layers that are disturbed.

3.09 REQUIRED SOIL DENSIFICATION

- A. Cohesive soils placed as fill or backfill for support for structures shall be compacted to 98 percent of the standard laboratory density determined by the Standard Proctor test ASTM D698, except as specified below.
- B. Cohesive soil placed for berm construction which will not support structures should be compacted to a minimum of 95 percent of the standard laboratory density. The upper 2 feet should be compacted to 98 percent in areas to be used as roadway.
- C. Cohesionless soils placed as fill or backfill for support of structures shall be compacted to the minimum relative density of 70 percent determined by ASTM D2049.
- D. Cohesionless soils used for fill or backfill in non-critical areas which will not support structures or pavements should be compacted to 35 percent relative density.
- E. Well graded crushed stone placed in roadways or as part of a pavement section should be compacted to 100 percent of the maximum dry density as determined by ASTM D698.

3.10 TESTING

- A. The inspection and testing firm shall observe the placement and verify compaction of each lift of fill after placement and compaction.
- B. Field density testing shall comply with ASTM D698, ASTM D1556, ASTM 2049, ASTM 2167, ASTM D2937 or ASTM 2922.
- C. If a lift of fill is rejected for insufficient densification, it shall be recompact and retested to verify compliance with the specifications prior to placement of additional fill.

3.11 ROADWAY AND PARKING SUBGRADE

- A. For roadway and parking areas where fill is required, the subgrade shall be brought to final grade and compacted as specified above.

3.12 CUT AREAS

- A. Where roadways or parking areas are in cut, the final surface shall be scarified to a minimum depth of 8 inches and compacted to a minimum density of 95 percent of the maximum density determined by ASTM D698, prior to placement of any subbase or base material.

END OF SECTION

SECTION 31 22 19**FINISH GRADING**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work specified herein and elsewhere
 - 1. Work under this section includes topsoil placement and final grading of the work site.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Topsoil Furnish and Place
 - 1. Measurement: In accordance with IDOT Standard Specifications, Section 211.
 - 2. Payment: This work will be paid for at the contract unit price per square yard in accordance with IDOT Standard Specifications, Section 211, of the thickness specified or as required to reach final grade and providing sufficient topsoil for vegetation.
- B. Sand
 - 1. Measurement: This Work will be measured for payment per cubic yard.
 - 2. Payment: This work will be paid for at the contract unit price per cubic yard and shall include furnishing and installation of sand at locations detailed within the plans to match existing grades.
- C. Site Grading and Shaping
 - 1. Measurement: This Work will not be measured for payment but paid at the lump sum contract price.
 - 2. Payment: This work will be paid for at the contract lump sum price in accordance with IDOT Standard Specifications, Section 301. All finished grades shall match the grades as detailed within the plans.
- D. Stream Grading and Shaping
 - 1. Measurement: In accordance with IDOT Standard Specifications, Section 214.
 - 2. Payment: This work will be paid for at the contract unit price per foot in accordance with IDOT Standard Specifications, Section 214. All finished grades shall match the grades as detailed within the plans.

1.03 RELATED SECTIONS

- A. Section 01 57 13 – Temporary Erosion and Sediment Control
- B. Section 31 23 33 – Trenching and Backfilling

C. Section 31 23 23.23 - Compaction

PART 2 PRODUCTS

2.01 TOPSOIL

- A. Topsoil shall be fertile, friable, natural topsoil typical of the area, free from subsoil, stones, plants, roots or other extraneous material and shall not be used while muddy or frozen.
- B. Topsoil shall contain not less than 8% organic matter (AASHTO T194). The topsoil shall consist of either natural topsoil's typical of the locality and free from coarse stone aggregate or surface soils stripped from the work site and enriched with humus at a rate of 8% by volume. The soil mixture prepared by mixing surface soils and humus shall be free of oil, cinders, coarse stone, and woody root material.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide all topsoil placement and finish grading and filling to achieve the lines and grades indicated on the contract drawings. All earthwork shall be done in a manner that provides drainage.

3.02 TOPSOIL PLACEMENT

- B. Place topsoil in all areas of new grading. The compacted subgrade to receive topsoil shall be scarified to a depth of 3 inches. Topsoil shall be spread evenly and compacted to a thickness of not less than 6 inches, and to the proposed elevations and grades. Grade flush with walks, curbs, and paving.

3.03 FINISH GRADING

- A. All areas of the work site including all previously grassed areas that have been disturbed, borrow sites, excavated and filled sections and adjacent transition areas shall be uniformly smooth-graded. Depressions from settlement shall be filled and compacted. Tops of embankments and breaks in grade shall be rounded. All surfaces shall be finished to provide adequate drainage. Finished surfaces shall be reasonably smooth, compacted, free from irregular surface changes and comparable to the smoothness obtained by blade-grader operations.
- B. Slope grades to drain away from structures at a minimum of 1/4 inch per foot for 10 feet.
- C. Finished surfaces adjacent to paved or surfaced areas and within 10 feet of structures shall be within 1 inch of the proposed grade. All other areas shall be within 2 inches of the proposed grade.
- D. Newly graded areas shall be protected from traffic and erosion. All settlement or washing away that may occur from any cause prior to seeding or acceptance shall be repaired and grades re-established to the required elevations and slopes at no additional cost to Owner.
- E. Unless otherwise indicated, all surplus material shall be disposed of by Contractor.

END OF SECTION

SECTION 31 23 00
EXCAVATION AND FILL

PART 1 GENERAL

1.01 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Earth Excavation

1. Measurement: In accordance with IDOT Standard Specifications, Section 202.
2. Payment: This work will be paid for at the contract unit price per cubic yard in accordance with IDOT Standard Specifications, Section 202, for the specific type of excavation required for the project as shown in the plans.

B. Special Waste Disposal

1. Measurement: In accordance with IDOT Standard Specifications, Section 669.
2. Payment: This work will be paid for at the contract unit price per cubic yard in accordance with IDOT Standard Specifications, Section 669.

C. Hazardous Waste Disposal

1. Measurement: In accordance with IDOT Standard Specifications, Section 669.
2. Payment: This work will be paid for at the contract unit price per cubic yard in accordance with IDOT Standard Specifications, Section 669.

1.02 RELATED SECTIONS

- D. Section 01 57 13 – Temporary Erosion and Sediment Control
- E. Section 02 32 00 – Geotechnical Investigation
- F. Section 31 22 00 – Grading
- G. Section 31 23 19 - Dewatering
- H. Section 31 23 33 – Trenching and Backfilling

1.03 TESTING AGENCY

- A. Inspection and testing will be performed by a firm selected and paid for in accordance with Section 01 40 00.

1.04 REFERENCE STANDARDS

- A. ASTM D422 - Particle Size Analysis of Soils
- B. ASTM D423 - Liquid Limit of Soils
- C. ASTM D424 - Plastic Limit and Plasticity Index of Soils

- D. ASTM D1556 - Density of Soil in Place by the Sand-Cone Method
- E. ASTM D1557 - Moisture Density Relations of Soils
- F. ASTM D2049 - Relative Density of Cohesionless Soils
- G. ASTM D2167 - Density of Soil in Place by the Rubber Balloon Method
- H. ASTM D2487 - Soil Classification
- I. ASTM D2937 - Drive Cylinder Method Field Density
- J. ASTM D2922 - Density of Soil and Soil Aggregate in place by Nuclear Method (Shallow Depth)

PART 2 PRODUCTS

2.01 BACKFILL MATERIALS

- A. Materials suitable for backfill are those classified as SW, SC, SM, ML and CL in compliance with ASTM D2487.
- B. Unsatisfactory materials for backfill are those classified as PT, OH, CH, MH and OL in compliance with ASTM D2487.
- C. Although generally unsuitable CH materials may be used due to lack of more suitable material on site, but additional time and effort should be anticipated as stated in Section 31 22 00, Part 2.01 C.

PART 3 EXECUTION

3.01 CLEARING AND STRIPPING

- A. Clear all stumps, trees, bushes, shrubs, and weeds and grub and remove all roots and other surface obstructions from the site.
- B. Dispose of all material unsuitable for fill by hauling from the site and disposing of the material in a site provided by the Contractor. This shall include combustible organic material.
- C. Strip all organic topsoil from the construction area and stockpile this material in an area on the property but outside the construction area as designated by the Engineer.
- D. The Engineer shall be the sole judge as to what constitutes organic soil.

3.02 CLASSIFICATION

- A. All excavation will be unclassified.

3.03 AUTHORIZATION TO EXCAVATE

- A. Embankment areas where structures are to be constructed will be monitored by the Engineer after embankment construction until settlement has ceased.

- B. Excavation for structures in embankments shall not be initiated until authorization is given by the Engineer.

3.04 DEWATERING

- A. Dewatering of excavations shall be accomplished, where required, according to the provisions of Section 31 23 19 - Dewatering.

3.05 LIMITS OF EXCAVATION

- A. Excavate to the dimensions and elevations indicated for the buildings and structures. Extend excavation sufficient distance from walls and footings to allow for placement and removal of forms.
- B. Include trenching for utility and foundation drainage systems to five feet beyond building or structure dimensions. Excavate according to applicable portions of Section 31 23 33.

3.06 EXCAVATED MATERIAL

- A. The test borings indicate that materials to be excavated are useable for required fill or embankment areas and may be placed as such. See Section 31 22 00, Part 2.01 C. for requirements for use of CH material.
- B. If unsatisfactory materials are encountered, however, they shall be disposed of offsite as directed by the Engineer.
- C. If unsatisfactory materials are present at the base of excavation, they shall be removed and replaced with satisfactory materials placed and densified in accordance with provisions of Section 31 22 00 - Grading.

3.07 PROTECTION OF AREA

- A. Provide proper drainage away from excavation areas and/or provide pumps so that excavation areas shall be in the dry.

3.08 FINAL SURFACE

- A. The final surface of the excavation to support concrete shall be excavated to final elevation just before concrete placement. The final grade of excavation shall not be disturbed.
- B. The final surface shall be observed by the testing laboratory prior to placement of concrete.
- C. If the final surface is disturbed in any manner, the disturbed material shall be removed as directed by the Engineer and replaced with additional concrete.
- D. If approved by the Engineer, the disturbed material at the base of excavation may be removed and replaced in the manner specified above for removal and replacement of unsatisfactory material.

3.09 PLACEMENT OF BACKFILL

- A. Do not begin placement of backfill for any structure or building until construction below grade has been completed, underground utilities systems have been inspected and tested, forms removed, and the excavation cleaned of trash and debris.

- B. Do not place backfill in wet or frozen areas except for SW or SP material which may be placed in a wet area.
- C. Refer to plans for any special conditions of backfilling around pipes or sewer lines.
- D. Place backfill in horizontal layers not exceeding 8 inches in loose depth for cohesive materials or 12 inches loose condition for cohesionless materials.
- E. Do not place backfill against walls until walls have obtained sufficient strength to withstand backfill loads.
- F. Place backfill in a manner that will avoid damage to coatings, wrapping, or tanks.
- G. As far as practicable, bring backfill up on each side of the wall evenly and slope to drain away from the wall.
- H. Place backfill in a manner that will direct any drainage away from the area of backfill or to a low point where it can be pumped.

3.10 COMPACTION OF BACKFILL

- A. Do not operate heavy compaction equipment closer to foundation or retaining walls than a distance equal to the height of backfill above the top of footing.
- B. Compact the remaining area except for a zone within one foot of the walls (which shall not be tamped) with power-driven hand tampers or backhoe tampers.
- C. Each lift shall be compacted to the required densification prior to placement of additional lifts. Lifts not compacted to the degree required shall be removed or reworked.
- D. Backfill shall be compacted to the degree appropriate for the intended use of the area as described in Section 31 22 00, Part 3.09.

3.11 TESTING OF BACKFILL

- A. The inspection and testing firm shall observe the placement verify compaction of each lift of backfill after placement and compaction.
- B. Field density testing shall comply with ASTM D698, ASTM D1556, ASTM 2049, ASTM 2167, ASTM D2937 or ASTM 2922.

3.12 PLACEMENT OF UNSUITABLE MATERIAL

- A. If unsuitable material is placed in the backfill area, it shall be promptly removed and disposed of as directed by the Engineer.

3.13 RECONDITIONING OF BACKFILL

- A. Scarify and recompact previously approved compacted backfill if disturbed.

3.14 FINAL GRADING

- A. Areas to five feet outside buildings or structures shall be constructed true to grade, shaped to drain, and maintained free of trash or debris.

- B. Should settlement or washing occur in backfilled areas prior to acceptance of work, repair and reestablish grades to the required elevations and slopes.

3.15 ROCK EXCAVATION

- A. Whenever the word "rock" appears in these specifications, it shall mean boulders or pieces of rock, concrete, or masonry measuring one-half (1/2) cubic yard or more, hard shale or solid ledge rock and masonry which, in the opinion of the Engineer, requires for its removal the continuous use of pneumatic tools for drilling and blasting. Other material, including loose rock, which may be excavated with usual trenching machinery, shall not be classified as rock, even though the encountering of such materials tends to slow the rate of excavating and it may be more economical to remove the material by blasting.
- B. Boulders shall not be classified as rock unless they are larger than 1/2 cubic yard.
- C. Should rock be encountered in the excavation it shall be removed by blasting, or pneumatic tools. Where blasts are made, the excavation shall be carefully covered with suitable brush, timber, or matting to prevent danger to life and property, and the Contractor shall secure a special permit from the local governmental authorities for blasting.
- D. The Contractor shall strip the rock in sections and shall not blast or excavate until notified by the Engineer that the elevation of the top of the rock has been taken in cases where rock is to be paid for by unit price.
- E. For trench excavation, rock shall be excavated to a width of 24 inches more than the nominal diameter of the pipe.
- F. Rock excavation for pipe will be 6 inches below the bottom of the pipe or bell of a joint. Before the pipe is laid, all irregularities of the rock are to be filled with approved granular backfill, well rammed into place, and the bottom of the trench brought to the proper grade. This backfill and work is included as a part of Rock Excavation.
- G. Rock excavation, if required for manholes and diversion structures on the sewer lines, shall be carried to the bottom of the footing and on all sides to a width sufficient to allow proper jointing and/or construction procedures necessary to complete the structure.

END OF SECTION

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SECTION 31 23 19**DEWATERING****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. This section covers the design, furnishing, installation, operation, maintenance, and removal of a dewatering system, complete.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT**A. Dewatering**

1. Measurement: This Work will not be measured for payment but paid at the lump sum contract price.
2. Payment: This work will be paid for at the contract lump sum price and shall include full compensation for any dewatering that is necessary for the project. This includes cofferdams, pumping and any other methods of dewatering the work zone to complete the work in a way that prevents sediment or other pollutants from entering the water body.

1.03 RELATED SECTIONS

- B. Section 01 57 13 – Temporary Erosion and Sediment Control
- C. Section 31 22 19 - Finish Grading
- D. Section 31 23 33 – Trenching and Backfilling

1.04 REFERENCE STANDARDS

- A. ASTM D422 - Particle Size Analysis of Soils
- B. ASTM D423 - Liquid Limit of Soils
- C. ASTM D424 - Plastic Limit and Plasticity Index of Soils
- D. ASTM D2487 - Classification of Soils for Engineering Purposes

1.05 DESIGN REQUIREMENTS

- A. The dewatering system shall be sufficient to allow:
1. Proper installation of the required facilities in accordance with the plans and specifications.
 2. Completion of the required facilities within the scheduled contract period.
- B. The dewatering system shall be designed using accepted methods of design and engineering consistent with best modern practice. The dewatering system shall include

well points (if necessary) and other equipment, appurtenances, and related earthwork necessary to perform the function.

- C. The soil borings and soil reports relative to the area will be provided to the Contractor but shall not relieve the Contractor of the responsibility to verify the information available and ensure the accuracy of the design.

1.06 SUBMITTALS

- A. Submit for informational purposes drawings and complete design data showing methods and equipment Contractor proposes to utilize in dewatering, including relief of hydrostatic head and in maintaining the excavation in a dewatered and hydrostatically relieved condition.
- B. The materials to be submitted shall include but not necessarily be limited to the following:
 - 1. Drawings indicating the location and size of berms, dikes, ditches, sumps, and discharge lines, including their relation to water disposal ditches if required.
 - 2. Detailed description of dewatering procedure and maintenance method.
- C. Knowledge of the Engineer of the drawings and data submitted by the Contractor shall not, in any way, be considered to relieve the Contractor from full responsibility for errors therein, or from the entire responsibility for complete and adequate design and performance of the system in controlling the water level in the excavated area and for control of hydrostatic pressures to the depths required.
- D. The Contractor shall be solely responsible for proper design, installation, proper operation, maintenance, and any failure of any component of the system.

1.07 AVAILABLE DATA

- A. The soil test data obtained for the Owner is shown on the boring logs.
- B. The Contractor shall employ a geotechnical consultant as necessary to provide additional data and design recommendations for dewatering systems.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WELLPOINT SYSTEM

- A. In certain excavated areas, the use of pumps alone may not provide sufficient dewatering to allow construction of the required facilities in accordance with the plans and specifications and/or completion of the required work within the scheduled contract period.
- B. The Contractor shall utilize a suitable well point system for dewatering of these areas to the depth required to provide a dry excavation and to prevent saturated soil from flowing into the excavation.

3.02 DEWATERING FOR STREAM WORK

- A. Any work that is conducted near or adjacent to streams and rivers must be conducted in a way that prevents sediment or other pollutants from entering the water body. A written sedimentation and dewatering plan shall be provided before starting construction.
- B. Work must be conducted during periods of low water and when no significant rainfall is predicted and according to requirements from other state or federal agencies.
- C. No water may flow through active work areas. Any water that is pumped from the work area and contains sediment shall be discharged into an approved sediment basin or filtering device.

3.03 CONTROL OF WATER

- A. Water shall be controlled and its disposal provided for in a manner consistent with the Contractor's storm water management plan.
- B. The Contractor shall be fully responsible for disposal of the water and shall provide all necessary means at no additional cost to the Owner.
- C. Removal of water from the construction site, shall be accomplished so that erosion and the transporting of sediment and other pollutants are minimized. Dewatering activities shall be accomplished in a manner that the water table and water quality is not altered.

3.04 RESPONSIBILITY

- A. The Contractor shall be responsible for all damages to accepted work in the excavation area and for damages to any other area caused by his failure to maintain and operate the system as specified above or from water overflowing his ditch.

3.05 REMOVAL

- A. The Contractor shall remove all dewatering equipment from the site, including related temporary electrical.
- B. All wells shall be plugged and/or filled.

3.06 PAYMENT

- A. All costs associated with required dewatering systems shall be considered incidental to the Contractor's bid for completing the contract work.

END OF SECTION

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SECTION 31 23 23.23**COMPACTION****PART 1 GENERAL****1.01 DESCRIPTION**

- A. Work specified herein and elsewhere
 - 1. Work under this section includes:
 - a. Placement, compaction control, and field density testing requirements for all earthwork.

1.02 RELATED SECTIONS

- B. Section 01 40 00 - Quality Requirements
- C. Section 31 22 19 - Finish Grading
- D. Section 31 23 00 - Excavation and Fill
- E. Section 31 23 33 – Trenching and Backfilling

1.03 TESTING

- A. Section 01 40 00 - Quality Requirements

PART 2 PRODUCTS**2.01 MATERIALS**

- A. All materials and products are specified elsewhere in Division 2.

PART 3 EXECUTION**3.01 FILL PLACEMENT**

- A. If fill already placed has loosened as a result of frost action, the fill shall be recompact prior to placing additional lifts. Compacted material that has been flooded and no longer meets the density specified shall be removed and replaced.
- B. If the in-place surface has dried, sprinkle with water before placing the next lift. The surface of smooth lifts shall be scarified before the next lift is placed.
- C. Where fill is required on both sides of structures, fill and compact simultaneously on opposite sides in even layers. Other filling sequences shall be as specifically indicated on the contract drawings.

- D. Fill shall be spread in uniform horizontal lifts. The material shall be thoroughly mixed to insure uniform moisture content slightly wetter than optimum but not greater than 5 percent above optimum water content as determined by the Standard Proctor Test, ASTM D698.
- E. Where cohesive structural fill is used, the moisture content when compacted shall be within 3 percent of the optimum moisture content. If the fill does not have natural water content which falls within the acceptable range, Contractor shall mix, dry, or moisten as necessary.
- F. Place and compact each lift over an entire area prior to placing successive lifts, unless otherwise approved by the Engineer.
- G. All materials shall be placed in loose lift thicknesses indicated hereafter.

3.02 COMPACTION

A. General

- 1. Unless otherwise indicated, the type of equipment and number of passes required to obtain the specified degree of compaction shall be determined at the work site, subject to the approval of the Engineer.
- 2. Provide mechanical compaction for cohesive material and vibratory compaction for granular materials, unless otherwise approved by the Engineer. Jetting, flooding, puddling, or vibroflotation methods may be used for compacting only with the prior approval of the Engineer and if Contractor, at its expense, furnishes test results to confirm the required degree of compaction is being obtained uniformly throughout the entire mass.
- 3. Noncohesive soils shall be compacted with vibrating roller or equivalent; cohesive soils shall be compacted with sheep's-foot roller, pneumatic tamping, or approved equivalent, unless otherwise indicated.

B. Water Jetting

- 1. Water jetting, where approved by the Engineer, shall have the fill thoroughly and uniformly watered, avoiding excessive wetting of the adjacent material and surface runoff. Jet within 30 days of fill placement. Methods and procedures shall be subject to approval of the Engineer.

C. Topsoil

- 1. Topsoil, as specified in Section 31 22 19, shall be compacted with a "cultipacker", roller, or approved equivalent equipment weighing 100 to 160 pounds per lineal foot of roller width.

3.03 FILL LIFT THICKNESSES AND COMPACTION DENSITIES

- A. Unless otherwise indicated or approved by the Engineer, place fills in the loose lift thicknesses indicated hereafter, except when water jetting, and compact to a dry density not less than the following percentage of maximum dry density, determined by the Standard Proctor Test, ASTM D698, unless otherwise noted.

3.04 TESTING

- A. Contractor shall provide samples for the following field density tests to insure required densities are being obtained:
 - 1. One test for each 10,000 square feet or fraction thereof per lift of general backfilling.
 - 2. Two tests for each 10,000 square feet or fraction thereof per lift of structural fill under slabs, foundation, and pavements.
 - 3. One test per lift for each other type of fill, if so directed by the Engineer.
- B. Tests shall be in accordance with ASTM D1556 or other tests suitable for the material being tested.
- C. Contractor shall pay for field density tests incidental to contract.

END OF SECTION

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SECTION 31 23 33**TRENCHING AND BACKFILLING**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. This section covers work beyond 5 feet outside of buildings and structures.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Trench Backfill

1. Measurement: In accordance with IDOT Standard Specifications, Section 208, measured for payment per cubic yard.
2. Payment: This work will be paid for at the contract unit price per cubic yard in accordance with IDOT Standard Specifications, Section 208, to the limits detailed in the typical trench and bedding detail in the plans.

B. Porous Granular Backfill

1. Measurement: In accordance with IDOT Standard Specifications, Section 209, measured for payment per cubic yard.
2. Payment: This work will be paid for at the contract unit price per cubic yard in accordance with IDOT Standard Specifications, Section 209, to the limits detailed in the typical trench and bedding detail in the plans.

C. Select Backfill

1. Measurement: This work will be measured at contract unit price per cubic yard.
2. Payment: This work will be paid for at the contract unit price per cubic yard for select fill furnished and installed to match the grades as shown on the plans in areas where select fill is noted to be installed to achieve final grades.

D. Initial Channel Backfill, Riprap (RR4)

1. Measurement: This work will be measured at contract unit price per foot measured from end to end of the gravity wall where riprap backfill is placed.
2. Payment: This work will be paid for at the contract unit price per foot for furnishing and installation of riprap along the toe or base of the gravity wall as shown on the plans with specific type of riprap and dimensions.

E. Secondary Channel Backfill, Native Bed Material

1. Measurement: This work will not be measured for payment but paid at the contract lump sum price.
2. Payment: This work will be paid for at the contract lump sum price to install native bed material that originates from the project site. The material shall be excavated

from the original stream bed limits or can be taken from the excavated material from the gravity wall installation. The engineer will confirm the materials to be used prior to placement.

F. Undercut/Stabilization Stone:

1. Measurement: This work will be measured at contract unit price per cubic yard.
2. Payment: Includes furnishing all labor, materials, tools, all necessary equipment, earth excavation of undesirable soils as directed by the Owner or Engineer, aggregate including compaction, removal of surplus excavated material off-site as indicated on the Contract Drawings, including all Work incidental thereto and not specifically included for payment under other Unit Price Items.

The Owner or Engineer shall direct the contractor when undercuts are necessary and document the volume of the undercut. The width, depth and length of any undercuts will be measured onsite. The maximum allowable trench width will be as shown in the Contract Drawings and shall not exceed this width unless otherwise directed.

1.03 RELATED SECTIONS

- G. Section 01 40 00 - Quality Requirements
- H. Section 33 31 23 – Sanitary Sewerage Force Main Piping

1.04 TESTING AGENCY

- A. Inspection and testing will be performed by a firm selected and paid for in accordance with Section 01 40 00.

1.05 REFERENCE STANDARDS

- A. ASTM D698 - Moisture-Density Relations of Soils
- B. ASTM D4254 - Maximum Index Density and Unit Weight of Soils and Calculation of Relative Density
- C. ASTM D2321 - Underground Installation of Flexible Thermoplastic Sewer Pipe

PART 2 PRODUCTS

2.01 GRANULAR BEDDING (GRAVEL CRADLE)

- A. Bedding material, when required, shall meet one of the following gradation requirements, required by the Contractors operations in accordance to ASTM D2321.
1. Type of Granular Bedding: B
 2. IDOT Gradation: CA-7

- B. Material for granular bedding shall be stone screenings, crushed stone, pit run gravel washed gravel, crushed boiler slag or other granular material approved by the Engineer. Granular bedding shall be well graded within the limits stated above and shall be free from excess of soft or unsound particles or other objectionable matter.
- C. Granular materials, from local deposits, graded reasonably close to the limits specified above and approved by the Engineer for use as granular cradle may be used.
- D. The Contractor shall provide certified testing laboratory reports to prove that the proposed granular bedding material is suitable for such use prior to the time such material is ordered to the site.
- E. Unless noted elsewhere granular bedding is required to 12" over top of pipe for water mains greater than 8 inch diameter, sewage force mains greater than 6 inch diameter and all sewers.

2.02 GRANULAR BACKFILL

- A. Granular backfill material, when required, shall meet one of the following gradation requirements:
 - 1. Type of Select Granular Backfill: B
 - 2. IDOT Gradation: CA-7
 - a. Top 6" of Select Granular Backfill shall be CA-6.
- B. Material for granular backfill shall be sand, stone sand, crushed stone, pit run or crushed gravel, or crushed boiler slag well graded within the above limits. It shall be reasonably free from excess of soft and unsound particles and other objectionable matter.
- C. Granular materials from local deposits, graded reasonably close to the limits specified above, and approved by the Engineer, may be used.
- D. The Contractor shall provide certified testing laboratory reports to prove that the proposed granular backfill material is suitable for such use prior to the time such material is ordered to the site.
- E. If "Selected Granular Backfill" is required above centerline of pipe, it shall also be placed below centerline of pipe.
- F. Where granular or concrete cradle is used it shall extend to a plane passing through the horizontal diameter of the pipe. For conduits not requiring granular or concrete cradle, backfill below a plane passing through the horizontal diameter of the pipe shall be made with selected materials available from the trench excavation. Material placed in this zone shall be free from all rocks, which are capable of damaging the pipe or its coating. The material shall be evenly and carefully placed and shall be hand tamped around the pipe.
- G. Backfill above centerline of pipe.
 - 1. Case I
 - a. This case applies to water mains and sewers in all locations except those described in Case III and Case IV constructed in an area not now, nor likely to be in the foreseeable future, in the opinion of the Engineer, subject

to vehicular traffic. In this case backfill, from the centerline of the pipe to the surface shall be made by an acceptable method, which will not dislodge or damage the pipe or cause bridging action in the trench. Only selected excavation material, free from clods or stones, shall be used in backfilling up to 6" above the top of the pipe. Excess material shall be neatly mounded over the trench to allow for future settlement.

2. Case II

- a. This case applies to sewers only located in an area which is now, or likely to be in the foreseeable future, in the opinion of the Engineer, subject to vehicular traffic but no permanent type surface such as asphalt, brick or concrete is presently constructed. In this case backfill, above the centerline of the pipe to a plane one foot above the top of the pipe, shall be made with material specified in "Selected Granular Backfill". The remainder of the backfill shall be made by an acceptable method, which will not dislodge or damage the pipe, or cause bridging action in the trench. The location where Case II backfill is required shall be indicated on the plans.

3. Case III

- a. This case applies to any conduit located in an area which now has a permanent type street or sidewalk surface. In this case, backfill, above the top of the granular cradle to the level of the bottom of the permanent type surface, shall be made with material specified for "Selected Granular Backfill". The location where Case III backfill is required shall be indicated on the plans.

4. Case IV

- a. This case applies to those areas where, in the opinion of the Engineer, due to the nature of the soil or other factors, the use of jetting or water soaking for compaction of the trench will not give satisfactory results. In this case, backfill material shall be placed in layers of twelve (12) inches thickness, loose measure, and each layer firmly compacted by ramming or tamping with tools approved by the Engineer in such manner as not to disturb or injure the pipe. All compaction under this case shall be not less than 80% optimum, modified proctor, for the soil. The location where Case IV is required shall be indicated on the plans.

5. Case V

- a. This case applies to those areas where water mains, pipe sewers, or other conduits are crossing open areas where early settlement is not critical. In this case, backfill, from the centerline of the pipe to the surface, shall be made by an acceptable method which will not dislodge or damage the pipe or cause bridging action in the trench. Only selected excavated material free from clods or stones shall be used in backfilling up to six (6) inches above the top of the pipe. Water soaking or other methods of trench settlement will not be required in this case. Excess material shall be neatly rounded over the top of the trench as directed by the Engineer to allow for settlement of the trench. In final clean-up operations, the Contractor shall reshape the surface to level out any uneven settlement that has occurred. The location where Case V is required shall be indicated on the plans.

6. Case VI

- a. Thermoplastic Sewer Pipe - Flexible thermoplastic sewer pipe shall be backfilled to 12" over the top of pipe in accordance with ASTM D 2321 using materials specified in 2.02 A. and B. herein.
- b. Thermoplastic Sewage Force Main - shall be backfilled in accordance with ASTM D 2241 and PVC Waterman shall be in accordance with ASTM D 2321 using materials specified in 2.02 A. and B. herein except that maximum particle size shall not exceed 1/2 inch.

PART 3 EXECUTION

3.01 EXISTING IMPROVEMENTS

- A. The Contractor shall maintain, in operating condition, all active utilities, sewers, gutters, and other drains encountered in the new sewer installation, and repair, to the satisfaction of the Owner, any surface or subsurface improvement damaged during the course of the work, unless such improvement is shown to be abandoned or removed. If it is deemed necessary to relocate existing utilities crossing the proposed sewer, this relocation shall be at no expense to the Contractor unless otherwise specified herein and/or shown on the detail plans.

3.02 CONSTRUCTION METHODS

- A. Excavation shall include clearing and grubbing the site of the work, and removing and disposing of all materials, brush, paving, sidewalks, curb and gutter, or structures and debris necessary to carry on the construction in the proper manner. It shall also include sheeting, bracing, dewatering, draining, backfilling the trench, supporting of structures and utilities encountered above or below ground during construction, and all incidental work necessary for the excavation and backfilling of trenches to construct the sewers as indicated on the plans, and/or as herein specified. Trench widths shall not be excessive and sheeting, shoring, and/or bracing may be required to prevent excessive widths.
- B. The Contractor must assume the risk of encountering quicksand, hardpan, boulders, clay, rubbish, underground conduits, gas pipe, drain tile, trees, roots, timber or masonry structures, railroad tracks, pavements, sidewalks and other unforeseen obstacles. His bid price shall include the cost of any delay, repair of damage, relocation, or replacement of structures caused by the removal of the above mentioned items, whether or not these obstacles are shown on the plans.
- C. No claim for an amount of money beyond the bid price of the work will be entertained, or allowed, on account of the character of the ground in which the trenches or other excavation is made except for rock excavation as defined herein.
- D. The locations of sewers, conduits, and structures, as shown on the plans, have been selected to provide the least possible interference with, or the crossing of, existing utilities. The Owner reserves the right to make minor variations in the location of these items, during construction, to meet any changed conditions discovered during the construction, and no extra payment will be allowed the Contractor for such shifts in alignment.
- E. Necessary arrangements shall be made by the Contractor with all persons, firms, corporations, owning or using any poles, pipes, tracks, or conduits, etc. affected by the construction of this project, to maintain and protect such facilities during construction, with

the cost of any such protection paid by the Contractor and included in the bid price. In the event that any existing gas pipes, water pipes, conduits, sewers, tile drains, or poles are blocked, or interfered with, by the excavation required on this project, the Contractor shall maintain them in continuous operation, and restore them to the same, or better condition than they were prior to the start of construction on this project, all at no additional compensation.

- F. Sidewalks, roads, streets, and pavements must not, in any case, be blocked or obstructed by excavated materials, except on the authorization of the Engineer, and then only when adequate temporary provisions have been made for a satisfactory temporary passage of pedestrians and vehicles.
- G. Barriers, lights, flares and any other necessary warning devices shall be provided and maintained by the Contractor at all trenches, excavations and embankments at no additional compensation.

3.03 CLEARING

- A. The Contractor shall clear all stumps, trees, brushes, shrubs, and other surface obstructions and debris within the area of work.
- B. Grass and weeds need not be removed from the areas of trenching.
- C. Topsoil need not be stripped and may be reused for backfill.
- D. The Contractor shall dispose of all material cleared from the work area by hauling from the site and disposing at his expense.

3.04 TRENCHING

- A. General
 - 1. Excavate to lines and grades indicated on the drawings and as necessary.
 - 2. Store material excavated at a sufficient distance from the edge of trench to prevent slides or cave-ins. Remove and waste all excavated material not required for backfill. Store material within right-of-way, easement or property lines.
 - 3. During construction, provide drainage and/or sump pumps so that excavation, installation and backfill shall be maintained dry. Water shall not be allowed to rise over masonry or mortar until the concrete or mortar has set at least twenty-four (24) hours. For areas where dewatering is required to achieve dry excavation, see provisions of Section 31 23 19 - Dewatering.
 - 4. Excavate sides of trench as nearly vertical as possible especially below the top elevation of the pipe being placed.
 - 5. Accurately grade the bottom to provide uniform bearing and support for each section of the pipe on undisturbed soil along its entire length.
 - 6. After the trench bottom has been graded, provide bell holes and depressions only of such length, depth and width as required for joints. Remove gravel or stones to avoid point bearing.

7. The excavation of the trench shall not advance more than 200 feet ahead of the completed masonry and pipe work, except where in the opinion of the Engineer, it is necessary to drain wet ground.
 8. Trench bottoms shall not be less than 12 inches wider nor more than 16 inches wider than the outside diameter of the pipe laid therein, and shall be excavated true to line, so that clear space of not less than 6 inches nor more than 8 inches in width is provided on each side of the pipe.
 9. Where gravel cradle is required, it shall be placed in such a manner as required to provide a uniform, continuous, firm bearing support for the pipe. The gravel cradle shall be firmly tamped and shall provide uniform lateral support up to the top of the pipe. Care shall be taken when compacting around the sides of the pipe to prevent shifting of the pipe.
 10. If the Contractor should, by error, excavate below the proper elevation for the bottom of the trench, then the Contractor must bring the trench bottom to the proper grade by refilling, at the Contractor's expense, with the same material used for gravel cradle trench bedding. Material placed in over-excavated areas shall be brought to the proper grade in 6 inch lifts, hand tamped, at the expense of the Contractor.
 11. In the event the Contractor excavates outside the horizontal trench limits shown on the plans, the entire trench bottom shall be filled with gravel cradle trench bedding from the bottom of the trench to the top of the pipe. Backfilling of all over-excavated areas shall be at the Contractor's expense, and no additional compensation will be allowed for backfilling outside of the trench limits shown on the plans.
 12. All excavation shall be placed on one side of the trench, unless permission is given by the Engineer to place it on both sides. Excavated materials shall be placed so as not to endanger the work, and so that free access may be had at all times to all parts of the trench. All shade trees, shrubs, etc., along the line of construction shall be reasonably protected, and tunneled if necessary unless specific directions are given by the Engineer to remove them.
 13. The Contractor shall provide without additional compensation, suitable temporary channels for the water that may flow along or across the site of the work. Any water pumped from trenches, or other excavations, must be disposed of in a manner satisfactory to the Engineer.
- B. Sanitary Sewers
1. Excavate the trench above the top of pipe as necessary for sheeting and bracing a sloping installation.
 2. Manually round bottom of trench so that bottom quadrant of pipe rests firmly on undisturbed soil.
 3. PVC gravity pipe shall be bedded in granular materials as per ASTM D 2321 and as detailed on drawings.
- C. Force Mains

1. Below the top of pipe, excavate to the minimum width required to ensure proper installation of pipe and joints.
 2. Manually deepen and widen trench at joint locations, as required.
- D. Water Supply and Distribution Lines
1. Grade trenches to avoid high points and the necessity of placing vacuum and relief valves.
 2. Provide minimum cover over the top of pipe of 5 feet 6 inches from the existing ground surface or finished grade and avoid interference with other utilities.
- E. Electrical Systems
1. Sides of trenches for electrical cables and duct lines may be sloped or widened as required, provided there is no interference with other utilities.
- F. Manholes and Similar Structures
1. Provide at least 12 inches between the outer structure surfaces and the side of the excavation or shoring, etc.
 2. Any other depth excavation will be considered unauthorized and shall be refilled with crushed stone as directed by the Engineer, at no additional cost.

3.05 BRACING AND SHORING

- A. The Contractor shall, when necessary or when directed by the Engineer, furnish, put in place, and maintain all without additional compensation, such sheeting, bracing, etc., as may be required to support the sides of the excavation and to prevent any movement which can in any way damage adjacent pavement or other structures, damage or delay the work or construction, or endanger life and health. Care shall be taken to prevent voids outside the sheeting, but if voids are formed, they shall be immediately filled and rammed to the satisfaction of the Engineer.
- B. The Contractor shall leave in place, to be embedded in the backfill of the trench, all sheeting, bracing, etc., which the Engineer may direct in writing to be left in place. The Engineer may direct that timber used for sheeting and bracing in trench be cut off at any specified elevation, in which case the Contractor shall be paid for an amount equivalent to what would have been left in the ground had the sheeting been cut off at an elevation two feet higher, provided that this higher elevation does not carry into the next higher set of sheeting, in which latter case payment will be made only for the sheeting below the top of the set in which-the cutting is made.
- C. For the purpose of preventing injury to persons, corporations or property, whether public or private, (where the liability for damages on account of which is to be assumed entirely and solely by the Contractor under this Contract) he may also leave in place, to be embedded in the backfill of the trench any and all sheeting, bracing, etc. in addition to that ordered in writing by the Engineer to be left in place, except that no sheeting and bracing which is within 4 feet of the surface of the street may be left in place in the trench without written permission of the Engineer.
- D. All sheeting and bracing which may not be left in place under the foregoing clauses shall be removed in such manner as to not endanger the constructed sewer or other structures,

utilities or property, whether public or private. All voids left by the withdrawal of sheeting shall be immediately refilled and compacted by ramming or water jetting, or otherwise, as may be directed.

- E. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating an obligation on his part to issue such orders; and his failure to exercise his right to do so shall not relieve the Contractor from liability or damages to persons or property, occurring from or upon the work of constructing the sewer occasioned by negligence or otherwise, growing out of the failure of the Contractor to leave in place in the trench sufficient sheeting and bracing to prevent any caving or moving of the ground adjacent to the banks of the trench.

3.06 ROCK EXCAVATION

- A. Whenever the word "rock" appears in these specifications, it shall mean boulders or pieces of rock, concrete, or masonry measuring one-half (1/2) cubic yard or more, hard shale or solid ledge rock and masonry which, in the opinion of the Engineer, requires for its removal the continuous use of pneumatic tools for drilling and blasting. Other material, including loose rock, which may be excavated with usual trenching machinery, shall not be classified as rock, even though the encountering of such materials tends to slow the rate of excavating and it may be more economical to remove the material by blasting.
- B. Boulders shall not be classified as rock unless they are larger than 1/2 cubic yard.
- C. Should rock be encountered in the excavation it shall be removed by blasting, or pneumatic tools. Where blasts are made, the excavation shall be carefully covered with suitable brush, timber, or matting to prevent danger to life and property, and the Contractor shall secure a special permit from the local governmental authorities for blasting.
- D. The Contractor shall strip the rock in sections and shall not blast or excavate until notified by the Engineer that the elevation of the top of the rock has been taken in cases where rock is to be paid for by unit price.
- E. For trench excavation, rock shall be excavated to a width of 24 inches more than the nominal diameter of the pipe.
- F. Rock excavation for pipe will be 6 inches below the bottom of the pipe or bell of a joint. Before the pipe is laid, all irregularities of the rock are to be filled with approved granular backfill, well rammed into place, and the bottom of the trench brought to the proper grade. This backfill and work is included as a part of Rock Excavation.
- G. Rock excavation, if required for manholes and diversion structures on the sewer lines, shall be carried to the bottom of the footing and on all sides to a width sufficient to allow proper jointing and/or construction procedures necessary to complete the structure.

3.07 BACKFILLING

- A. Backfill to the ground surface with specified material.
- B. Backfill shall be placed as timely as possible in open trench installations to prohibit side sloughing before backfill can be properly placed. Where sloughing or bank cave-ins occur this material shall be removed without damage to the pipe or utility line and stockpiled an adequate distance from the trench to prohibit additional sloughing.

- C. Deposit backfill in 6-inch layers and compact to specified density until there is a cover of two feet over sewers or force mains and one foot over other utilities.
- D. The upper portions of the trench backfill shall be deposited in 8-inch layers and compacted to the specified density until the backfill is brought to the original grade or to finish elevations.
- E. For force mains and sewer lines outside areas to have restored or new surface improvements, the balance of the excavated material shall be mounted neatly over the trench and tamped.
- F. Sewers
 - 1. Select granular backfill shall be utilized for Case II and Case III Backfill conditions within the limits specified in the drawings.
 - 2. The remainder of the backfill shall be made by any acceptable method which will not dislodge or damage the pipe or cause bridging action in the trench.
 - 3. For Case I backfill conditions, only selected excavation material free from clods or stones, shall be used in backfilling up to 6 inches above the top of the pipe.
 - 4. The Engineer shall determine Backfill Case Conditions for each sewer segment and shall also determine if the excavation material is suitable as backfill material.

3.08 COMPACTION

- A. For backfill of trenches under pavement areas or areas to have surface improvements, cohesive materials shall be compacted to a minimum of 95 percent of the maximum dry density determined by ASTM D698 and cohesionless materials shall be densified to a minimum of 70 percent of the relative density determined by ASTM D2049.
- B. For all other areas, cohesive material shall be compacted to 85 percent of the maximum dry density determined by ASTM D698 and cohesionless material densified to a minimum of 35 percent of the relative density determined by ASTM D2049.
- C. Where trenches cross existing roadways, railroads or utility lines, the backfill shall be compacted in compliance with the applicable regulations or permit requirements or as specified in Paragraph A. above, whichever is more stringent.
- D. Backfill any undercutting to the proper grade with excavated cohesionless material and density to 60 percent of the relative density determined by ASTM D2049. Where special materials are specified for backfilling the lower portion of trenches in a reach, this material shall be used to backfill undercutting in the reach involved.

3.09 HIGHWAY AND RAILROAD CROSSINGS

- A. Where conduits are to be constructed along or across County, State or Federal highways or railroads, and before commencing and work within the limits of these rights-of-way, the Contractor shall have a permit from the Highway Department or the Railroad to construct the proposed conduit. The Contractor shall abide by all provisions of the permit. The permit is to be obtained by the Owner for the Contractor, but it is the Contractor's responsibility to give the Owner adequate notice of his need for the permit.

- B. Whenever the specifications and plans conflict with the requirements of the permit, then the requirements of the permit shall govern, and the cost of abiding with the provisions of the permit shall be considered incidental to the contract.

3.10 SPECIAL CROSSINGS

- A. Where special crossings are indicated on the plans with the use of cast iron pipe for bridging ditches, streams, or areas of poor soil stability, the crossing will be made in the following manner.
- B. Cast iron pipe shall be laid to the line and grade shown on the plans. The cast iron pipe shall be supported, joined and encased at its end with concrete anchor blocks. The concrete anchor blocks shall be of lean concrete with a 28-day compressive strength of 2,500 psi and extend to undisturbed soil. If this soil condition cannot be encountered within a reasonable depth, compacted approved granular backfill, gravel or crushed rock may be used to secure the needed stability for the anchor blocks to ensure the line and grade of the sewer.

3.11 CONCRETE CRADLES AND THRUST BLOCKS

- A. Concrete cradles and thrust blocks shall be as shown on the plans, or as directed by the Engineer. Concrete thrust blocks, poured against undisturbed soil, shall be provided on force mains and water mains at all changes in direction. All concrete cradles, anchors, and thrust blocks shall be of lean concrete with a 28-day compressive strength of 2,500 psi.

3.12 MAINTENANCE OF TRENCHES AND STREETS

- A. The Contractor shall be required to maintain for one year after final acceptance all trenches that cross or run under a rigid type surfacing.
- B. For all trenches that run in the parkways, alleys, across easements, and in/or across oiled streets with flexible bases, the Contractor will be required to backfill and grade the trenches as specified herein. The Contractor will be required to maintain the streets and driveways in a passable condition, as directed by the Engineer, and shall add additional black dirt in parkways and crushed stone or gravel in all streets, alleys, and other roadways as the trenches settle, until just prior to final inspection. The Contractor shall replace in kind the street surfacing. After the project is complete, and final acceptance is made by the Owner, the Owner shall be responsible for maintaining the trenches.

END OF SECTION

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SECTION 31 37 00**RIPRAP**

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 31 25 00 – Erosion and Sediment Control
- B. Section 32 92 19 – Seeding

1.02 WORK INCLUDED

- A. Furnish and place riprap material as shown on the drawings.

1.03 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Streambank Stabilization and Riprap Placement

- 1. Measurement: Streambank stabilization and riprap placement will be measured for payment in square yards.
- 2. Payment: This work will be paid for at the contract unit price per square yard for placement of riprap at streambanks and aprons for stabilization. Placement of riprap shall be of the type specified at the dimensions shown on the plans at a thickness of 18". Placement of the riprap shall be specific to match the grades as shown on the plans or as indicated on the construction details.
- 3. This item does not include the installation of rock riffles, biotechnical riprap stabilization or the installation of filter fabric.

B. Biotechnical Riprap Stabilization

- 1. Measurement: Biotechnical Riprap Stabilization will be measured for payment at the contract unit price per foot.
- 2. Payment: This work will be paid for at the contract unit price per foot for placement of riprap from the toe to the top of bank of the stream. Placement of riprap shall be of the type specified at the dimensions shown on the plans. Placement of the riprap shall be specific to match the grades as shown on the plans or as indicated on the construction details.

C. Biotechnical Riprap Stabilization with Grading

- 1. Measurement: Biotechnical Riprap Stabilization with Grading will be measured for payment at the contract unit price per foot.
- 2. Payment: This work will be paid for at the contract unit price per foot for placement of riprap at the toe of the stream and grading to match the proposed contours as shown on the plans. This work will also include the earth excavation and disposal of spoils to match the proposed grades. Placement of riprap shall be of the type specified at the dimensions shown on the plans. Placement of the

riprap shall be specific to match the grades as shown on the plans or as indicated on the construction details.

D. Rock Riffle

1. Measurement: Rock Riffles will be measured for payment at the contract unit price per each.
2. Payment: This work will be paid for at the contract unit price per each rock riffle installed at locations shown on the plans. Placement of rock riffles shall be of the type specified and as indicated on the construction details. Rock Riffles shall be keyed into the stream from both streambanks.

E. Filter Fabric

1. Measurement: In accordance with IDOT Standard Specifications, Section 282.
2. Payment: This work will be paid for at the contract unit price per square yard in accordance with IDOT Standard Specifications, Section 282 and placed at beneath the specified materials as shown in the plans.

PART 2 PRODUCTS

2.01 STONE RIPRAP MATERIAL

- A. Riprap for slope protection shall be stone.
- B. The material shall be stone quarried from undisturbed, consolidated deposits of rock reasonably free of shale and shaly stone. The ledges shall be sufficiently thick to produce the desired dimensions. The stone shall be reasonably free of laminations, seams, cracks and other structural defects or imperfections tending to destroy its resistance to weather. Field stone or boulders will not be accepted. Bedding material shall be crushed stone, crushed gravel or crushed sandstone.
- C. Stone for erosion protection, sediment control or rockfill shall be quarried from ledges meeting one of the listed quality designations. All ledges shall be sufficiently thick to produce the desired dimensions.
- D. The stone shall not exceed 15% sodium sulfate soundness loss. Elongated pieces (length is greater than 5 times average thickness) shall not exceed 10% by weight. The stone shall have a specific gravity (dry) greater than 2.45 when checked in a full gradation product.
- E. Stone for erosion protection or sediment control shall be well graded. 100 percent shall be a maximum of 150 pounds per piece and shall meet Illinois Department of Transportation gradations of rock of either Grade No. 3 or 4.
 1. 50 + 20 percent shall be 10 pounds or smaller.
 2. 8 + 8 percent shall be 1 pound or smaller.
- F. For erosion control (not basin slope lining) riprap shall meet Illinois Department of Transportation Standard Specification 281, Class A4.

2.02 STONE RIPRAP BEDDING MATERIAL

- A. Quality - Shall meet Illinois Department of Transportation Standard Specifications for Road and Bridge Construction.
- B. Gradation - CA-6 through CA-10 Illinois Department of Transportation classification.

2.02 FILTER FABRIC MATERIAL

- A. Quality - Shall meet Illinois Department of Transportation Standard Specifications for Road and Bridge Construction.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The bed for the riprap shall be trimmed and shaped so that the finished surface shall conform to the line shown on the drawings. A minimum of 4 inches of stone riprap bedding shall be placed under all riprap.
- B. Stone shall be placed on the bedding layer in such manner as to produce a reasonably well-graded mass of rock with the minimum practicable percentage of voids providing maximum interlocking of stones and shall be constructed to the lines and grades shown.
- C. The riprap shall not be placed or dropped from a height of more than 300 mm (1 ft.). The stone riprap shall be placed to its full course thickness in two layers and in such a manner as to avoid displacing the bedding material. Placing of material shall begin at the lower elevations, progressing up the slope and, from the center outward, unless otherwise determined by the Engineer. The larger stones shall be well distributed and the entire mass of stones in their final position shall be roughly graded to conform to the gradation specified. There shall be no abrupt changes in the riprap surface. All tapers between minimum thickness and any high points shall be at a uniform rate. The finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Placing riprap by dumping into chutes or by similar methods likely to cause segregation of the various sizes will not be permitted. The desired distribution of the various sizes of stones throughout the mass shall be obtained by selective loading of the material at the quarry or other source, by controlled dumping of successive loads during final placing, or by other methods of placement which will produce the specified results. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to obtain a reasonably well-graded distribution of stone sizes as specified above.
- D. Riprap shall be a minimum of 18 inches thick on top of stone bedding or filter fabric.
- E. The site shall be seeded up to the line of riprap.

END OF SECTION

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SECTION 31 41 16.13

STEEL SHEET PILING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Specified Herein and Elsewhere
 - 1. Work under this Section includes:
 - a. furnishing and installation of permanent sheet piling to the limits and tolerances as shown on the plans
 - 2. Related Work specified elsewhere:
 - a. Structural Excavation and Backfill – Section 31 23 00
 - b. Temporary Erosion & Sediment Control – Section 01 57 13

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Steel Sheet Piling Retaining Wall with Cap
 - 1. Measurement: Steel Sheet Piling Retaining Wall with Cap will be measured for payment in feet, along the centerline top of the wall from edge to edge.
 - 2. Payment: This work will be paid for at the contract unit price per foot for Steel Sheet Piling Retaining Wall with Cap, of the height and style specified, including the installation of the steel channel cap. Sheet Piling shall be installed according to section 522 or the Standard Specifications. If the limit of sheet piling is located along an existing sheet pile wall, the new sheet pile and cap shall be connected to the existing and shall be considered incidental to this pay item.

1.03 REFERENCE STANDARDS

- A. "Standard Specifications for Road and Bridge Construction" (January 1, 2022), "Supplemental Specifications and Recurring Special Provisions" (January 1, 2024), all by the Illinois Department of Transportation.

PART 2 PRODUCTS

2.01 STEEL SHEET PILE MATERIAL

- A. Steel shall have a minimum yield strength of 50 ksi (345 MPa) according to ASTM A 572.
- B. The sheeting shall be identifiable and free of bends and other structural defects.
- C. The Contractor shall furnish a copy of the published sheet pile section properties to the Engineer for verification purposes. The Engineer's approval will be required prior to driving any sheeting. All driven sheeting not approved by the Engineer shall be removed at the Contractor's expense.

- D. The Contractor shall furnish a sheet pile section, to be used for each wall section, with a published section modulus equal to or larger than that specified on the plans.
- E. The selection of the sheet pile section shall not relieve the Contractor of the responsibility to satisfy all details including minimum clearances, cover, reinforcement, shear stud locations, interlocking, and field cutting. Any modifications of the plans to accommodate the Contractor's selection shall be paid for by the Contractor and subject to the approval of the Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall verify locations of all underground utilities before driving any sheet piling.
- B. Any disturbance or damage to existing structures, utilities or other property, caused by the Contractor's operation, shall be repaired by the Contractor in a manner satisfactory to the Engineer at no additional cost to the Owner.
- C. The Contractor shall be responsible for determining the appropriate equipment necessary to drive the sheeting to the tip elevation(s) specified on the plans or according to the Contractor's approved design.
- D. The sheet piling shall be driven, as a minimum, to the tip elevation(s) specified, prior to commencing any related construction.
- E. If unable to reach the minimum tip elevation, the adequacy of the sheet piling design will require re-evaluation by the Engineer prior to allowing construction adjacent to the sheet piling in question.
- F. Obstructions shall be defined as any object (such as but not limited to, boulders, logs, old foundations, etc.) that cannot be driven through with normal driving procedures, but requires special equipment to remove the obstruction. When obstructions are encountered, the Contractor shall notify the Engineer and upon concurrence of the Engineer, the Contractor shall begin working to break up, push aside, or remove the obstruction.

END OF SECTION

SECTION 31 41 16.13

STEEL PLATE BEAM GUARDRAIL AND TRAFFIC BARRIER TERMINALS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Specified Herein and Elsewhere
 - 1. Work under this Section includes:
 - a. furnishing and installation of steel plate beam guardrail and traffic barrier terminals to the limits and locations as shown on the plans.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Steel Plate Beam Guardrail, Type A, 6' Steel Posts
 - 1. Measurement: In accordance with IDOT Standard Specifications, Section 630.
 - 2. Payment: This work will be paid for at the contract unit price per unit foot in accordance with IDOT Standard Specifications, Section 630, at specified locations as shown on the plans.
- B. Traffic Barrier Terminal
 - 1. Measurement: In accordance with IDOT Standard Specifications, Section 631.
 - 2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 631, of the type and locations specified on the plans.
- C. Guardrail Removal
 - 1. Measurement: In accordance with IDOT Standard Specifications, Section 632.
 - 2. Payment: This work will be paid for at the contract unit price per unit foot in accordance with IDOT Standard Specifications, Section 632.

1.03 REFERENCE STANDARDS

- A. "Standard Specifications for Road and Bridge Construction" (January 1, 2022), "Supplemental Specifications and Recurring Special Provisions" (January 1, 2024), all by the Illinois Department of Transportation.

PART 2 PRODUCTS

2.01 STEEL PLATE BEAM GUARDRAIL

- A. All materials shall be furnished, fabricated and tested in accordance with IDOT Standard Specification, Section 630.

2.02 TRAFFIC BARRIER TERMINALS

- A. All materials shall be furnished, fabricated and tested in accordance with IDOT Standard Specification, Section 631.
- B. Traffic Barrier Terminal, Type 1 Special shall meet IDOT's Qualified Product List effective October 14, 2022.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall verify locations of all underground utilities before driving any sheet posts.
- B. Any disturbance or damage to existing structures, utilities or other property, caused by the Contractor's operation, shall be repaired by the Contractor in a manner satisfactory to the Engineer at no additional cost to the Owner.
- C. Work shall be completed in accordance with IDOT Standard Specifications, Section 630 and 631.
- D. Work shall be completed per IDOT Standard Drawings 630001-12, 631011-10 and per the manufacturer's direction.

3.01 GUARDRAIL REMOVAL

- A. Guardrail Removal shall be completed in accordance with the construction requirements as outlined in IDOT Standard Specifications, Section 632.
- B. Posts shall be pulled out completely. All holes shall be filled and tamped.

END OF SECTION

SECTION 32 01 21**REMOVAL AND REPLACEMENT OF PAVEMENT AND APPURTENANCES**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall replace all curb, gutter, curb & gutter, sidewalk, driveway pavement and roadway pavement which may be removed, disturbed, or damaged in connection with his/her operation under the Contract. The Contractor shall reconstruct to the original lines and grades, or as shown on the drawings, and in such a manner as to leave all such surfaces in as good or better condition than that which existed prior to his operations.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Sidewalk Removal

- 1. Measurement: In accordance with IDOT Standard Specifications, Section 440.
- 2. Payment: This work will be paid for at the contract unit price per square foot in accordance with IDOT Standard Specifications, Section 440.

B. Concrete Curb and Gutter Removal

- 1. Measurement: In accordance with IDOT Standard Specifications, Section 440.
- 2. Payment: This work will be paid for at the contract unit price per foot in accordance with IDOT Standard Specifications, Section 440.

C. Pavement Removal

- 1. Measurement: In accordance with IDOT Standard Specifications, Section 440.
- 2. Payment: This work will be paid for at the contract unit price per square yard in accordance with IDOT Standard Specifications, Section 440 at full depth removal.

D. Milling

- 1. Measurement: In accordance with IDOT Standard Specifications, Section 440.
- 2. Payment: This work will be paid for at the contract unit price per square yard in accordance with IDOT Standard Specifications, Section 440 at specified thickness.

PART 2 PRODUCTS

2.01 SURFACING MATERIALS

- A. Materials used for the replacement of curb, gutter, curb & gutter, sidewalk, driveway pavement and roadway pavement shall meet the requirements of the IDOT Standard Specifications for Road and Bridge Construction in conjunction with the IDOT

Supplemental Specifications (combined will be referred to as the IDOT Standard Specs) and the IDOT Highway Standards, all of which would be in force at the time of opening bids.

PART 3 EXECUTION

3.01 PREPARATION

- A. Existing features shall be sawn full-depth prior to removal. Subsequent saw-cutting shall be required prior to surface restoration if a full-depth, vertical edge does not exist.

3.02 CONCRETE PAVEMENT AND CONCRETE SIDEWALK

- A. Where portland cement concrete roadway pavement must be removed, it shall be replaced at a thickness equivalent to the existing pavement, but in no case less than 8 inches (8"). Pavement removal and replacement shall be constructed according to the applicable IDOT Highway Standard and Section 442 of the IDOT Standard Specs for Class B Patches. It also shall be subject to the approval of the Owner's Representative and the agency having jurisdiction there over.
- B. Where portland cement concrete driveway pavement must be removed, it shall be replaced at a thickness equivalent to the existing pavement, but in no case less than six inches (6"). Pavement replacement shall be constructed according to Section 423 of the IDOT Standard Specs, and it shall be subject to the approval of the Owner's Representative and the agency having jurisdiction there over.
- C. Where portland cement concrete sidewalk must be removed, it shall be replaced at a thickness equivalent to the existing sidewalk, but in no case less than 4 inches (4"). Sidewalk replacement shall be constructed according to Section 424 of the IDOT Standard Specs, and it shall meet/exceed the requirements set forth in the most current Americans with Disabilities Act (ADA compliant). It also shall be subject to the approval of the Owner's Representative and the agency having jurisdiction there over.
 1. Where the sidewalk removal impacts a curb ramp, it shall be replaced according to the applicable IDOT Highway Standards for curb ramps and Section 424 of the IDOT Standard Specs.

3.03 HOT-MIX ASPHALT PAVEMENT

- A. Where hot-mix asphalt roadway pavement must be removed, it shall be replaced to a thickness equivalent to the existing pavement, but in no case less than 6 inches (6"). Pavement removal and replacement shall be constructed according to the applicable IDOT Highway Standard and Section 442 of the IDOT Standard Specs for Class D Patches. It also shall be subject to the approval of the Owner's Representative and the agency having jurisdiction there over.
 1. The initial lift of hot-mix asphalt binder course shall be 4". Subsequent lifts shall not exceed 4", and they shall meet the minimum thickness specified in Article 406.06(d).
 - a. Within IDOT jurisdiction, the hot-mix asphalt binder course shall be an IDOT approved mix design with an IL-19.0 Mixture Composition Gradation with a $N_{des} = 70$.

- b. Outside IDOT jurisdiction, the hot-mix asphalt binder course shall be an IDOT approved mix design with an IL-19.0 Mixture Composition Gradation with a minimum $N_{des} = 50$.
 2. The maximum lift thickness of the hot-mix asphalt surface course shall not exceed 2", and it shall meet the minimum thickness specified in Article 406.06(d).
 - a. Within IDOT jurisdiction, the hot-mix asphalt surface course shall be an IDOT approved mix design with an IL-9.5 Mixture Composition Gradation, with Frictional Aggregate Mixture D and a $N_{des} = 70$.
 - b. Outside IDOT jurisdiction, the hot-mix asphalt surface course shall be an IDOT approved mix design with an IL-9.5 Mixture Composition Gradation with Frictional Aggregate Mixture C or better and a minimum $N_{des} = 50$.
- B. Where hot-mix asphalt driveway pavement must be removed, it shall be replaced to a thickness equivalent to the existing pavement, but in no case less than 4 inches (4"). Pavement removal and replacement shall be constructed according to Section 406 of the IDOT Standard Specs, and it shall be subject to the approval of the Owner's Representative and the agency having jurisdiction there over.
 1. The initial lift of hot-mix asphalt shall be 4", and it may be either binder course or surface course. Subsequent lifts of binder course shall not exceed 4", and they shall meet the minimum thickness specified in Article 406.06(d). Subsequent lifts of hot-mix asphalt surface course shall not exceed 2", and they shall meet the minimum thickness specified in Article 406.06(d).
 - a. The hot-mix asphalt binder course shall be an IDOT approved mix design with an IL-19.0 Mixture Composition Gradation with a minimum $N_{des} = 50$.
 - b. The hot-mix asphalt surface course shall be an IDOT approved mix design with an IL-9.5 Mixture Composition Gradation with Frictional Aggregate Mixture C or better and a minimum $N_{des} = 50$.

3.04 REPLACEMENT OF CURB, GUTTER AND CURB & GUTTER

- A. Where curb, gutter and/or curb & gutter must be removed, it shall be replaced to conform to the existing section. Replacement of the existing feature shall be constructed according to Section 606 of the IDOT Standard Specs, and it shall be subject to the approval of the Owner's Representative and the agency having jurisdiction there over.

3.05 AGGREGATE ROADWAY AND ENTRANCES

- A. Where an aggregate roadway must be removed, it shall be replaced according to the details shown in the plans and according to Section 402 of the IDOT Standard Specs for Aggregate Surface Course, Type B.
- B. Where an aggregate entrance must be removed, it shall be replaced according to the details shown in the plans and according to Section 402 of the IDOT Standard Specs for Aggregate Surface Course, Type B.

END OF SECTION

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SECTION 32 05 16
AGGREGATE MATERIALS

PART 1 GENERAL

1.01 GENERAL

- A. Aggregate materials for use as specified in other sections.

1.02 RELATED SECTIONS

- B. Section 01 57 13 – Temporary Erosion and Sediment Control
- C. Section 31 22 00 - Grading
- D. Section 31 23 00 - Excavation and Fill
- E. Section 31 23 33 – Trenching and Backfilling
- F. Section 32 11 00 - Base Course

1.03 REFERENCE STANDARDS

- A. ASTM D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft.-lbf/ft³ (600 kNm/m³))
- B. ASTM D 1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method
- C. ASTM D 1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lbf/ft³ (2,700 Knm/m³))
- D. ASTM D 2167 Density and Unit Weight of Soil in Place by the Rubber Balloon Method
- E. ASTM D 2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
- F. ASTM D 2487 Classification of Soils for Engineering Purposes
- G. ASTM D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- H. ASTM D 3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- I. ASTM D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- J. American Association of State Highway and Transportation Officials (AASHTO) latest edition T 88 Particle Size Analysis of Soils

1.04 QUALITY ASSURANCE

- A. Tests and analysis of aggregate materials will be performed in accordance with ASTM and AASHTO procedures specified herein.

1.05 SUBMITTALS

- A. Submit 100 pound sample of each aggregate or mixture that is to be incorporated into project in air-tight containers to the independent testing laboratory or submit gradation and certification of aggregate material that is to be incorporated into project to the independent testing laboratory for review.
- B. Submit name of each material supplier and specific type and source of each material. Any change in source requires approval of Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Construction and materials shall meet or exceed requirements of this section and applicable state highway department specifications section(s) referred to or noted on the Construction Drawings which pertain to paving base course design, materials, preparation, and execution. Materials shall be as indicated on Construction Drawings and shall comply with state highway department specifications regarding source, quality, gradation, liquid limit, plasticity index, and mix proportioning.

2.02 EQUIPMENT

- A. Off-site materials shall be transported to project using well maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger any improvements by rutting, overloading, or pumping.

PART 3 EXECUTION

3.01 STOCKPILING

- A. Stockpile on-site at locations indicated by Engineer in such manner that there will be no standing water or mixing with other materials.

3.02 BORROW SITES

- A. Upon completion of borrow operations, clean up borrow areas as indicated on Construction Drawings in neat and reasonable manner to satisfaction of Property Owner and Owner.

END OF SECTION

SECTION 32 11 00**BASE COURSE**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work includes construction of granular base for Portland Cement concrete paving, and/or bituminous surface treatment.

1.02 RELATED SECTIONS

- A. Section 31 22 00 - Grading
- B. Section 32 02 16 - Aggregate Materials
- C. Section 32 12 16 – Asphalt Paving
- D. Section 32 13 13 - Concrete Paving
- E. Section 32 15 00 - Aggregate Surfacing
- F. Section 32 16 00 – Curbs, Gutters, Sidewalks & Driveways
- G. Section 32 92 19 - Seeding

1.03 REFERENCES

- A. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN.m/m³))
- B. ASTM D 1556 - Density and Unit Weight of Soil in Place by the Sand-Cone Method
- C. ASTM D 1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft. lbf/ft³ (2,700 Kn.m/m³))
- D. ASTM D 2167 - Density and Unit Weight of Soil in Place by the Rubber Balloon Method
- E. ASTM D 2216 - Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
- F. ASTM D 2487 - Classification of Soils for Engineering Purposes
- G. ASTM D 2922 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- H. ASTM D 3017 - Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- I. ASTM D 4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- J. American Association of State Highway and Transportation Officials (AASHTO) latest edition T 311 Grain Size Analysis of Soils

1.04 SUBMITTALS

- A. Make submittals in accordance with Section 01 33 00.
- B. Submit copies of all test reports.
- C. Submit certificate signed by materials supplier and Contractor that surfacing materials meet specification requirements.

1.05 TESTING

- A. Testing will be performed by a firm selected and paid for by the Contractor as specified in Section 01 40 00.
- B. An independent testing laboratory, selected and paid by Contractor, shall be retained to perform construction testing of in-place base course for compliance with requirements for thickness, compaction, density, and tolerances. Paving base course tolerances shall be verified by rod and level readings on not more than 50-foot centers to be not more than 0.05-feet above design elevation which will allow for paving thickness as shown on Construction Drawings. Contractor shall provide instruments and suitable benchmark.
- C. Following tests shall be performed on each type of material used as base course material:
 - 1. Moisture and Density Relationship: ASTM D 698 (or ASTM D 1557)
 - 2. Mechanical Analysis: AASHTO T 88
 - 3. Plasticity Index: ASTM D 4318
 - 4. Base material thickness: Perform 1 test for each 20,000 sq. ft. of in-place base material area.
 - 5. Base material compaction: Perform 1 test in each lift for each 20,000 sq. ft. of in-place base material area.
 - 6. Test each source of base material for compliance with state highway department specifications.
- D. Field density tests for in-place materials shall be performed in accordance with one of following standards:
 - 1. Sand-Cone Method: ASTM D 1556
 - 2. Balloon Method: ASTM D 2167
 - 3. Nuclear Method: ASTM D 2922 (Method B-Direct Transmission)
- E. The independent testing laboratory shall prepare reports that indicate test location, elevation data, and test results. Owner and Contractor shall be provided with copies of the reports within 96 hours of the time the test was performed. In the event that the test results show failure to meet any of the specifications; Owner and Contractor shall be notified immediately by the independent testing laboratory.
- F. Costs related to retesting due to failures shall be paid for by Contractor at no additional expense to Owner. Owner reserves right to employ an independent testing laboratory and

to direct testing that is deemed necessary. Contractor shall provide free access to the site for testing activities.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. Submit materials certificate to the independent testing laboratory which is signed by materials producer and Contractor, certifying that materials comply with, or exceed, requirements specified herein.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Contractor shall verify to the Owner in writing that the subgrade has been inspected, tested, and gradients and elevations are correct, dry, and properly prepared in accordance with these specifications.

3.02 CONSTRUCTION

- A. Perform base course construction in manner that will drain surface properly and prevent runoff from adjacent areas from draining onto base course construction.
- B. Compact base material to not less than 98 percent of optimum density as determined by ASTM D 698 (or 95 percent of optimum density, as determined by ASTM D 1557) unless otherwise indicated on Construction Drawings.
- C. Granular Base: Construct to thickness indicated on Construction Drawings. Apply in lifts or layers not exceeding 8-inches, measured loose.
- D. Sand/Shell Base: Construct to thickness indicated on Construction Drawings. Apply in lifts or layers not exceeding 4-inches, measured loose.
- E. Asphalt Institute Type IV Mix for Full Depth Asphalt Base: Construct to thickness indicated on Construction Drawings in lifts or layers not exceeding 3-inches, measured loose.
- F. Asphalt Institute Type VI, VII, or VIII Mixes for Hot-mix Sand Asphalt Bases: Construct to thickness indicated on Construction Drawings. Apply in lifts or layers not exceeding 3-inches, measured loose.
- G. Soil Cement Stabilized Base: Construct to thickness and strength as indicated on Construction Drawings and in accordance with state highway department specifications. If not indicated on Construction Drawings, minimum compressive strength shall be 500 psi tested at 28 days.

END OF SECTION

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SECTION 32 12 16.13**BITUMINOUS CONCRETE PAVING**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work includes construction on prepared subgrade of granular subbase, bituminous base course, and asphaltic concrete surface course.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Hot-Mix Asphalt Surface Course

1. Measurement: All Work to be measured for payment as shown by the Contract Limits on the Contract Drawings including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices.
2. Payment: This work will be paid for at the contract unit price per square yard and shall include full compensation for all pavement installed as indicated and specified for quantities determined above. Any pavement installed in excess of the maximum quantity allowed by the Contract Limits as shown on the Contract Drawings shall be by Contractor at Contractor's own expense.

B. Hot-Mix Asphalt Binder Course

1. Measurement: All Work to be measured for payment as shown by the Contract Limits on the Contract Drawings including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices.
2. Payment: This work will be paid for at the contract unit price per square yard and shall include full compensation for all pavement installed as indicated and specified for quantities determined above. Any pavement installed in excess of the maximum quantity allowed by the Contract Limits as shown on the Contract Drawings shall be by Contractor at Contractor's own expense.

C. Hot-Mix Asphalt Leveling Binder Course

1. Measurement: All Work to be measured for payment as shown by the Contract Limits on the Contract Drawings including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices.
2. Payment: This work will be paid for at the contract unit price per ton and shall include full compensation for all pavement installed as indicated and specified for quantities determined above. Any pavement installed in excess of the maximum quantity allowed by the Contract Limits as shown on the Contract Drawings shall be by Contractor at Contractor's own expense.

- D. Class D Base Patches
 - 1. Measurement: In accordance with IDOT Standard Specifications, Section 442, measured for payment per square yard.
 - 2. Payment: This work will be paid for at the contract unit price per square yard in accordance with IDOT Standard Specifications, Section 442, at the depth specified in the plans. To be placed on over utility trenches on Main Street, below leveling binder.

1.03 RELATED SECTIONS

- E. Section 31 22 00 - Grading
- F. Section 32 05 16 – Aggregate Materials
- G. Section 32 11 00 – Base Course

1.04 QUALITY ASSURANCE

- A. All materials, construction methods, and equipment, including asphaltic mixing plant, shall meet the requirements of the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, except as modified below.
- B. The maximum dry density and optimum moisture content for subbase materials shall be determined in accordance with ASTM D1557 from one sample of material obtained from the quarry stockpile.
- C. Laboratory compaction tests for density of base course and surface course materials shall be made in accordance with AASHTO T167. Two tests shall be performed on samples furnished by Contractor.

1.05 REFERENCE STANDARDS

- A. Standard Specifications for Road and Bridge Construction, Illinois Department of Transportation (IDOT Standards)
- B. ASTM D1557 - Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb. (4.5 kg) Rammer and 18 inch (457 mm) Drop
- C. ASTM D3017 - Moisture Content of Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth)
- D. AASHTO T167 - Compressive Strength of Hot Wire Asphalt
- E. ASTM D2950 - Density of Bituminous Concrete in place by Nuclear Method

1.06 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Certifications, signed by materials suppliers and Contractor, that granular subbase and bituminous concrete materials meet specification requirements.
- C. Mix design for bituminous concrete mix required.

- D. Certified copies of laboratory and field tests.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate Sub Base, 8" of CA-6 crushed stone over 4" of CA-2 or CA-3 crushed stone.
- B. Aggregate Base Course, Type A, gradation CA-6 shall be constructed in accordance with Section 301 of the Standard Specifications for Road and Bridge Construction.
- C. The Bituminous Concrete Binder Course Treatment shall be as shown in the plans and in accordance with the Standard Specifications for Road and Bridge Construction, State of Illinois, Department of Public Works and Buildings, Division of Highways, current edition.
- D. The Bituminous Concrete Surface Course shall be as shown in the plans and in accordance with the Standard Specifications for Road and Bridge Construction, State of Illinois, Department of Public Works and Buildings, Division of Highways, current edition.

PART 3 EXECUTION

3.01 INSPECTION OF SUBGRADE

- A. The sub-grade shall be compacted to not less than 95% of the standard laboratory density as specified in Section 212 of the Standard Specifications in both cut and fill areas. If necessary the sub-grade shall be air dried and recompact. The base course shall not be placed until the Engineer accepts the sub-grade.
- B. Do not proceed until defects have been corrected.

3.02 GRANULAR SUBBASE COURSE

- A. Construct in accordance with IDOT Standards.

3.03 AGGREGATE BASE COURSE

- A. Construct in accordance with IDOT Standards.

3.04 BITUMINOUS SURFACE COURSE

- A. Construct in accordance with IDOT Standards for Bituminous Treatment.

3.05 FIELD QUALITY CONTROL

- A. The average installed thickness of asphalt paving per lift and in total shall be as shown on the drawings and the minimum thickness shall be 90 percent of that shown on the drawings.
- B. Both the base and surface courses shall be tested for smoothness in the presence of the Engineer with a 10 foot straight edge applied parallel to and at right angles to the centerline of paved areas, at intervals directed by the Engineer. The maximum permissible variation shall be 1/4 inch in 10 feet for base courses and 3/16 inch in 10 feet for surface courses. The surface is to be free of "birdbaths".

- C. Variations exceeding 1/4 inch in the base course shall be corrected as directed by the Engineer. In all cases where the variation in the surface course equals or exceeds 1/2 inch, the entire area affected shall be removed and replaced with fresh surface course mixture at the expense of the Contractor.
- D. Average thickness of the subbase shall be as shown on the drawings. If minimum thickness is less than 90 percent of the nominal thickness shown on the drawings, additional aggregate shall be added to obtain the required nominal thickness. The surface elevation of the completed subbase shall not exceed by more than 1/8 inch the surface elevation shown on the drawings or authorized by the Engineer.
- E. Field density of compacted subbase shall be determined in accordance with ASTM D3017 (Nuclear Method). Tests shall be located where directed by the Engineer and shall consist of one per lift per 500 linear feet of roadway. Minimum compaction on the subbase materials shall not be less than 90 percent of the laboratory density.
- F. Field density of compacted base and surface courses shall be determined in accordance with ASTM D2950 (Nuclear Method). One test shall be performed per lift per 500 feet for each lane. Minimum field density shall be 97 percent of laboratory density.
- G. If any field density tests on subbase, base, or surface course materials fail to meet requirements, additional tests shall be performed at expense of Contractor after corrective work has been completed until requirements are met.

END OF SECTION

SECTION 32 13 13
CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Furnishing, placing, and compacting granular material on the subgrade.
- B. Installation of sidewalks, curbs, and gutters, and Portland Cement concrete paving of roads, drives, and parking areas.

1.02 RELATED SECTIONS

- A. Section 31 22 00 - Site Grading

1.03 REFERENCE STANDARDS

- A. Standard Specifications for Road and Bridge Construction, Illinois Department of Transportation (IDOT Standards).
- B. ASTM C94 - Ready Mixed Concrete
- C. ASTM C150 - Portland Cement
- D. ASTM C260 - Air Entraining Admixtures for Concrete
- E. ASTM D1557 - Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 10 Pound (4.5 Kg) Rammer and 18 inches (457 mm) Drop
- F. ASTM D2922 - Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

1.04 QUALITY ASSURANCE

- A. All materials, construction methods, and equipment shall meet the requirements of IDOT Standards except as modified below in these specifications.
- B. Surface tolerance: Level within 1/4 inch when tested with a 10 foot straightedge.
- C. Maximum dry density and optimum moisture content for subbase material shall be determined in accordance with ASTM D1557 from these tests of material taken along the road alignments.

1.05 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Submit certifications signed by material suppliers and Contractor, that granular subbase, concrete, joint filler, and curing compound materials meet specification requirements.
- C. Submit mix design for concrete.

- D. Submit certified copies of laboratory test results.

1.06 TESTING

- A. Testing will be performed by a firm selected and paid for as specified in Section 01 40 00.

PART 2 PRODUCTS

2.01 CRUSHED STONE SUBBASE MATERIALS

- A. CA6 as described in IDOT Standards.

2.02 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type 1.
- B. Fine Aggregates: Gradation FA1, Class A quality.
- C. Coarse Aggregates: Gradations CA3 and CA7, Class A quality.
- D. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.
- E. Air entraining admixtures: ASTM C260.

2.03 REINFORCEMENT

- A. Reinforcing Steel and Tie Wires: IDOT Standards for Reinforcement Bars and for Concrete Reinforcement Bars, Fabric, and Strand.

2.04 FORMWORK AND ACCESSORIES

- A. Forms and Form Setting: IDOT Standards for Forms and Form Setting and for Forms for Pavement.
- B. Joint Filler: IDOT Standards for Bituminous Preformed Joint Filler, minimum 1/2 inch thick.
- C. Concrete Curing Compound: IDOT Standards for curing Portland Cement concrete.

2.05 CONCRETE MIX

- A. Mix and proportion to produce minimum 3,500 psi concrete at 28 days with maximum slump of 3 inches and 4 to 6 percent air entrainment, ASTM C94.
- B. Use accelerating admixtures in cold weather only when acceptable to Engineer. Use of admixtures shall not relax cold weather placement requirements. Do not use calcium chloride.
- C. Use set-retarding admixtures during hot weather only when acceptable to Engineer.

PART 3 EXECUTION**3.01 PREPARATION OF SUBGRADE**

- A. Ensure rough grading has brought subgrade to required elevations.
- B. Fill soft spots and hollows with additional fill.
- C. Level and compact subgrade per IDOT Standards for Subgrade to receive granular base for concrete walks, drives, roads, curbs, and gutters.

3.02 PLACEMENT OF CRUSHED STONE SUBBASE

- A. Install in accordance with IDOT Standards for Granular Subbase to compacted depth indicated on drawings.

3.03 FORMING

- A. Install in accordance with IDOT Standards for Forms and Form Setting except that forms shall be set not less than 400 feet in advance of placing concrete for Portland Cement concrete.

3.04 PLACEMENT OF REINFORCING

- A. Reinforce road pavement and curbs and gutters as indicated on the drawings and in accordance with IDOT Standards.

3.05 FORMING EXPANSION AND CONTRACTION JOINTS

- A. Place expansion and contraction joints as shown on the drawings and in accordance with IDOT Standards. Where possible, make joints of curbs coincide with joints in walks. When sidewalks abut building, provide continuous joint filler.

3.06 PLACING CONCRETE

- A. Place and finish concrete in accordance with IDOT Standards for Portland Cement Concrete Pavement; Concrete Gutter, Concrete Curb, Combination Concrete Curb and Gutter, Concrete Median, Paved Ditch; Portland Cement Driveway Pavement; and Portland Cement Concrete Sidewalk.
- B. Ensure finished surfaces do not vary from true lines, levels or grade by more than 1/4 inch when measured with 10 foot straightedge.

3.07 FIELD QUALITY CONTROL

- A. Three concrete test cylinders will be taken for every 100 or less cubic yards of concrete placed.
- B. One additional test cylinder will be taken during cold weather concreting, and be cured on job site under same conditions as concrete it represents.
- C. One slump test and one air test will be taken for each set of test cylinders taken.
- D. Field density of compacted subbase will be determined in accordance with ASTM D2922 (Nuclear Method). Tests will be made where directed by the Engineer and will consist of

one per lift per 500 linear feet of roadway. Minimum compaction on the subbase material shall not be less than 90 percent of the laboratory density.

- E. Average thickness of the subbase shall be as shown on the drawings. If minimum thickness is less than 90 percent of the nominal thickness shown on the drawings, additional subbase material shall be added to obtain the required nominal thickness. The surface elevation of the completed subbase shall not exceed by more than 1/8 inch the surface elevation shown on the drawings or authorized by the Engineer.
- F. The concrete surface course shall be tested for smoothness by Contractor in the presence of the Engineer with a 10 foot straightedge applied parallel to and at right angles to the centerline of paved areas, at intervals directed by the Engineer. The maximum permissible variation shall be 1/4 inch in 10 feet.

3.08 TYPICAL DETAILS

- A. Portland Cement concrete pavement shall be constructed in accordance with IDOT Highway Standard 420001 and Village Detail

END OF SECTION

SECTION 32 15 00
AGGREGATE SURFACING

PART 1 GENERAL**1.01 DESCRIPTION**

- A. Work included in this section consists of furnishing all material and labor necessary to install bituminous surface treated drives as noted on the drawings.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Aggregate Path
 - 1. Measurement: This work will be measured for at contract unit price per square yard.
 - 2. Payment: This work will be paid for at the contract unit price per square yard to the limits detailed in the plans. The furnished aggregate shall be placed and compacted in two lifts, each lift will be differing aggregate materials. The surface aggregate shall be placed to match the grades as shown in the plans.

1.03 REFERENCE STANDARDS

- B. Illinois Department of Transportation (IDOT Standards) Standard Specifications for Road and Bridge Construction.
- C. ASTM D1557 - Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 Pound (4.5 kg) Rammer and 18 inch (457 mm) Drop
- D. ASTM D3017 - Moisture Content of Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth)

1.04 SUBMITTALS

- A. Make submittals in accordance with Section 01 33 00.
- B. Submit copies of all test reports.
- C. Submit certificate signed by materials supplier and Contractor that surfacing materials meet specification requirements.

1.05 TESTING

- A. Testing will be performed by a firm selected and paid for as specified in Section 01 40 00.

PART 2 PRODUCTS**2.01 SURFACING MATERIALS**

- A. Material for aggregate base as shown on the drawings shall meet IDOT Standards for Type A Aggregate Surface Course, Gradation CA6.

- B. Material for oil and chip surface shall consist of a bituminous surface treatment, Class A-3 per Article 403 of IDOT Standard Specifications.

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

- A. Subgrade shall be prepared in accordance with 31 37 00.

3.02 INSTALLATION OF GRAVEL SURFACED AREAS

- A. Install material to a compacted depth of 8 inches in accordance with IDOT Standards for Aggregate Surface Course, Type A.
- B. Location of gravel surfaced areas as shown on drawings.

3.03 INSTALLATION OF AGGREGATE YARD SURFACING

- A. Install material to a depth of 6 inches. The equipment used shall be such that the required amount of material will be deposited uniformly over entire surface area. As soon as practicable the material which has been deposited shall be spread to the approximate cross section. Hauling shall be routed over the spread material. Do not use equipment in the hauling operation of such weight as to cause ruts extending through the spread material and into the subgrade, so that the subgrade material is being mixed with the surfacing material. Keep surface smooth by dragging or blading as frequently each day as the Engineer may direct. Holes, waves and undulations which develop and which are not filled by blading, shall be filled by adding more material.

3.04 FIELD QUALITY CONTROL

- A. Maximum dry density and optimum moisture content for material to be installed on secondary access road: ASTM D1557.
 - 1. Obtain sample from quarry stockpile.
 - 2. Number of tests: One.
- B. Field density of compacted surface material on secondary access road: ASTM D3017 (Nuclear Method).
 - 1. Location: Where directed by Engineer.
 - 2. Number of Tests: One per lift per 500 feet of roadway.
 - 3. Compaction required: 95 percent of laboratory density.

END OF SECTION

SECTION 32 16 00**CURBS, GUTTERS, SIDEWALKS & DRIVEWAYS**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work includes preparation and placement of combination Portland Cement concrete curb and gutter, preparation and placement of Portland Cement concrete curb, and preparation and placement of Portland Cement concrete sidewalk.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Concrete Sidewalk

- 1. Measurement: In accordance with IDOT Standard Specifications, Section 424.
- 2. Payment: This work will be paid for at the contract unit price per square foot in accordance with IDOT Standard Specifications, Section 424 of the thickness specified.

B. Combination Concrete Curb and Gutter

- 1. Measurement: In accordance with IDOT Standard Specifications, Section 606.
- 2. Payment: This work will be paid for at the contract unit price per foot in accordance with IDOT Standard Specifications, Section 606 of the type specified.

1.03 RELATED SECTIONS

- A. Section 03 31 00 - Structural Concrete
- C. Section 31 22 00 - Grading
- D. Section 31 23 23.23 – Compaction
- E. Section 32 05 16 – Aggregates Materials
- F. Section 32 11 00 - Base Course

1.04 REFERENCE STANDARDS

- G. ACI 304R - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
- H. ACI 308 - Standard Practice for Curing Concrete
- I. ASTM A 615 - Deformed and Plain Billet-Steel for Concrete Reinforcement
- J. ASTM C 33 - Concrete Aggregates
- K. ASTM C 94 - Ready-Mixed Concrete

- L. ASTM C 150 - Portland Cement
- M. ASTM C 260 - Air-Entraining Admixtures for Concrete
- N. ASTM C 309 - Liquid Membrane-Forming Compounds for Curing Concrete
- O. ASTM C 494 - Chemical Admixtures for Concrete
- P. ASTM D 1751 - Performed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- Q. FS TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces

1.05 QUALITY ASSURANCE

- A. Establish and maintain required lines and elevations.
- B. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable work as directed by Engineer.

1.06 SUBMITTALS

- A. Make submittals in accordance with Section 01 33 00.
- B. Submit copies of all test reports.
- C. Submit certificate signed by materials supplier and Contractor that surfacing materials meet specification requirements.

1.07 TESTING

- A. Testing will be performed by a firm selected and paid for by the Contractor specified in Section 01 40 00.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Forms shall be of depth equal to depth of curbing or sidewalk, and so designed as to permit secure fastening together at tops. Coat forms with nonstaining type of coating that will not discolor or deface surface of concrete.
- B. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 40.
- C. Concrete Materials: Comply with requirements of Section 03 31 00 for concrete materials, admixtures, bonding materials, curing materials and others as required.
- D. Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D 1751 FS HH-F-341, Type 11, Class A.

- E. Joint Sealers: Non-priming, pourable, self-leveling polyurethane. Acceptable sealants are Sonneborn "Sonolastic Paving Joint Sealant" Sonneborn "Sonomeric CT 1 Sealant", Sonneborn "Sonomeric CT 2 Sealant", Mameco "Vulken 245", or Woodmont Products "Chem-Caulk", or equal.

2.02 MIX DESIGN AND TESTING

- A. Concrete mix design and testing shall comply with requirements of Section 03 31 00.
- B. Design mix to produce normal weight concrete consisting of Portland Cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce following:
 - 1. Compressive Strength: 3,500 psi, minimum at 28 days, unless otherwise indicated on Construction Drawings.
 - 2. Slump Range: 2 to 5 inches at time of placement.
 - 3. Air Entrainment: 5 to 8 percent.

PART 3 EXECUTION

3.01 PREPARATION

- A. Proofroll prepared base material surface to check for unstable areas. Paving work shall begin only after unsuitable areas have been corrected and are ready to receive paving.
- B. Remove loose material from compacted base material surface to produce firm, smooth surface immediately before placing concrete.

3.02 INSTALLATION

- A. Form Construction
 - 1. Set forms to required grades and lines rigidly braced and secured.
 - 2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place minimum of 24 hours after concrete placement.
 - 3. Check completed formwork for grade and alignment to following tolerances:
 - 4. Top of forms not more than 1/8 inch in 10' - 0".
 - 5. Vertical face on longitudinal axis, not more than 1/4 inch in 10' - 0".
 - 6. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.
- B. Concrete Placement
 - 1. Place concrete in accordance with requirements of Section 03 31 00.
 - 2. Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall not be placed around

manholes or other structures until they are at required finish elevation and alignment.

3. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
4. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place construction joint. Automatic machine may be used for curb and gutter placement. Machine placement must be at required cross section, line, grade, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified herein.

C. Joint Construction

1. Contraction Joints: Concrete curb or combination concrete curb and gutter, where specified on Construction Drawings, shall be constructed in uniform sections of length specified on Construction Drawings. Joints between sections shall be formed either by steel templates, 1/8 inch in thickness, of length equal to width of curb and gutter, and with depth which will penetrate at least 2 inches below surface of curb and gutter; or with 3/4 inch thick performed expansion joint filler cut to exact cross section of curb and gutter; or by sawing to depth of at least 2 inches while concrete is between 4 and 24 hours old. If steel templates are used, they shall be left in place until concrete has set enough to hold its shape, but shall be removed while forms are still in place.
2. Longitudinal Construction Joints: Concrete curb or combination concrete curb and gutter, where specified on Construction Drawings, shall be tied to concrete pavement with 1/2 inch round deformed reinforcement bars of length and spacing shown on Construction Drawings.
3. Transverse Expansion Joints: Concrete curb, combination concrete curb and gutter, or concrete sidewalk shall have filler cut to exact cross section of curb, gutter, or sidewalk. Joints shall be similar to type of expansion joint used in adjacent pavement.

D. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint fillers in 1 piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip joint filler sections together.

E. Joint Sealants: Joints shall be sealed with approved exterior pavement joint sealants and shall be installed in accordance with manufacturer's recommendations.

3.03 CONCRETE FINISHING

- A. After striking off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10' - 0" straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide continuous smooth finish.

- B. Work edges of sidewalks, gutters, back top edge of curb, and formed joints with edging tool, rounding edge to 1/2 inch radius. Eliminate tool marks on concrete surface. After completion of floating and toweling, when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
- C. Curbs, gutters, and sidewalks: Broom finish by drawing fine-hair broom across surface perpendicular to flow of traffic. Repeat operation as necessary to produce fine line texture.
- D. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up minor honeycombed areas. Remove and replace areas or sections with major defects, as directed Owner.
- E. Protect and cure finished concrete paving using acceptable moist-curing methods, more particularly described in "water-curing" section of ACI 308.

3.04 BACKFILL

- A. After concrete has set sufficiently, spaces on either side of concrete curb, combination concrete curb and gutter, or concrete sidewalk shall be refilled to required elevation with suitable material compacted in accordance with Section 31 22 00.

3.05 CLEANING AND ADJUSTING

- A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

END OF SECTION

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SECTION 32 17 23.13**PAINTED PAVEMENT MARKINGS**

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Traffic lines and markings.
 - 2. Legends.
 - 3. Paint.
 - 4. Glass beads.
- B. Related Sections:
 - 1. Section 32 12 16.13 - Bituminous Concrete Paving
 - 2. Section 32 13 13 - Concrete Paving

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Thermoplastic Pavement Marking - Line
 - 1. Measurement: In accordance with IDOT Standard Specifications, Section 780.
 - 2. Payment: This work will be paid for at the contract unit price per foot in accordance with IDOT Standard Specifications, Section 780, at specified line width.

1.03 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M247 - Standard Specification for Glass Beads Used in Traffic Paint.
- B. ASTM International:
 - 1. ASTM D34 - Standard Guide for Chemical Analysis of White Pigments.
 - 2. ASTM D126 - Standard Test Methods for Analysis of Yellow, Orange, and Green Pigments Containing Lead Chromate and Chromium Oxide Green.
 - 3. ASTM D562 - Standard Test Method for Consistency of Paints Using the Stormer Viscometer.
 - 4. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
 - 5. ASTM D713 - Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials.

6. ASTM D969 - Standard Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint.
7. ASTM D1301 - Standard Test Methods for Chemical Analysis of White Lead Pigments.
8. ASTM D1394 - Standard Test Methods for Chemical Analysis of White Titanium Pigments.
9. ASTM D1475 - Standard test Method for Density of Liquid Coatings, Inks, and Related Products.
10. ASTM D1640 - Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.
11. ASTM D2202 - Standard Test Method for Slump of Sealants.
12. ASTM D2371 - Standard Test Method for Pigment Content of Solvent-Reducible Paints.
13. ASTM D2621 - Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints.
14. ASTM D2743 - Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography.

1.04 PERFORMANCE REQUIREMENTS

- A. Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.
- B. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within two minutes after application.

1.05 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit paint formulation for each type of paint.
- C. Test Reports: Submit source and acceptance test results in accordance with AASHTO M247.
- D. Manufacturer's Installation Instructions: Submit instructions for application temperatures, eradication requirements, application rate, line thickness, type of glass beads, bead embedment and bead application rate, and any other data on proper installation.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Invert containers several days prior to use when paint has been stored more than 2 months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.

- C. Glass Beads. Store glass beads in cool, dry place. Protect from contamination by foreign substances.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.
- D. Do not apply paint when temperatures are expected to fall below 50 degrees F for 24 hours after application.
- E. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

1.08 WARRANTY

- A. Section 01 70 00 - Execution Requirements: Requirements for warranties.

1.09 MAINTENANCE SERVICE

- A. Section 01 70 00 - Execution Requirements: Requirements for maintenance service.
- B. Furnish service and maintenance of traffic paints for three years from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PAINTED PAVEMENT MARKINGS

- A. Furnish materials in accordance with IDOT Standard Specifications
- B. Glass Beads: AASHTO M247, Type 1, coated to enhance embedment and adherence with paint.

2.02 EQUIPMENT

- A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities.
 - 1. Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.
 - 2. Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.
 - 3. Measuring device to automatically and continuously measure length of each line placed, to nearest foot.

B. Other Equipment:

1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind strippers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

2.03 SOURCE QUALITY CONTROL

- A. Section 01400 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Make paints and glass beads available for inspection at manufacturer's factory prior to packaging for shipment. Notify Engineer at least seven days before inspection is allowed.
- C. Allow witnessing of factory inspections and test at manufacturer's test facility. Notify Engineer at least seven days before inspections and tests are scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Do not apply paint to concrete surfaces until concrete has cured for 28 days.

3.02 PREPARATION

- A. Maintenance and Protection of Traffic:
 1. Provide short term traffic control in accordance with Section 01 50 00 - Temporary Facilities and Controls.
 2. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.
 3. Maintain travel lanes between 7: 00 AM to 9: 00 AM, and between 4: 00 PM and 6: 00 PM.
- B. Surface Preparation.
 1. Clean and dry paved surface prior to painting.
 2. Blow or sweep surface free of dirt, debris, oil, grease or gasoline.
 3. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 25 feet on center.
 4. Notify Engineer after placing pavement spots and minimum 3 days prior to applying traffic lines.

3.03 EXISTING WORK

- A. Remove existing markings in an acceptable manner. Do not remove existing pavement markings by painting over with blank paint. Remove by methods that will cause least damage to pavement structure or pavement surface. Satisfactorily repair any pavement or surface damage caused by removal methods.
- B. Clean and repair existing lines and legends.

3.04 APPLICATION

- C. Install Work in accordance with IDOT Standard Specifications.

3.05 APPLICATION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Wet Film Thickness: 1 mil.
- C. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
- D. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F

3.06 FIELD QUALITY CONTROL

- A. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.
- B. Repair lines and markings, which after application and curing do not meet following criteria:
 - 1. Incorrect Location: Remove and replace incorrectly placed patterns.
 - 2. Insufficient Thickness, Line Width, Paint Coverage, Glass Bead Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove loose particles and debris. Apply new markings on cleaned surface in accordance with this Section.
 - 3. Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this Section and clean pavement surface one foot beyond affected area. Apply new markings on cleaned surface in accordance with this Section.
- C. Prepare list of defective areas and areas requiring additional inspection and evaluation to decide where material may need replaced. Provide traffic control as necessary if markings require more detailed evaluation.
- D. Replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during warranty period:
 - 1. Average retroreflectivity within any 528 foot section is less than 1225 mcd/m²/1x for white pavement markings and 100 mcd/m²/1x for yellow pavement markings.

- 2. Marking is discolored or exhibits pigment loss, and is determined to be unacceptable by three member team based on visual comparison with beaded color plates.
 - 3. More than 15 percent of area of continuous line, or more than 15 percent of combined area of skip lines, within any 528 foot section of roadway is missing.
- E. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16 inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to transverse and longitudinal joint sealers, and repair any damage according to requirements in Section 32 12 16.13 or Section 32 13 13.
- F. Maintain daily log showing work completed, results of above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. Make legible entries in log in ink, sign and submit by end of each work day. Enter environmental data into log prior to starting work each day and at two additional times during day.

3.07 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution Requirements: Requirements for protecting finished Work.
- B. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

3.08 SCHEDULES

- A. Pavement Markings:

Items	Location
4 inch White Conventional	Edge
4 inch White Fast Dry	Edge
24 inch White Fast Dry	Stop Line
4 inch Yellow Conventional	Center
4 inch Yellow Fast Dry	Center

END OF SECTION

SECTION 32 31 20**ALUMINUM ORNAMENTAL FENCE SYSTEM****PART 1 GENERAL****1.01 WORK INCLUDED**

- A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the welded ornamental steel fence system defined herein at specified project site.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT**A. Ornamental Fence**

1. Measurement: Ornamental Fence will be measured for payment in feet, along the top of the fence from center to center of end posts, excluding the length occupied by gates.
2. Payment: This work will be paid for at the contract unit price per foot for Ornamental Fence, of the height and style specified, including the excavation and placement of concrete footings, required coring into concrete or block, grouting, and all other means of anchoring the fencing. Fencing shall be installed according to section 664 or the Standard Specifications. If the limit of fencing is located along an existing fence line or corner, the new fencing shall tie into the existing fencing and shall be considered incidental to this pay item.

1.03 RELATED WORK

- B. Section 31 22 00 – Grading
- C. Section 03 31 00 – Structural Concrete

1.04 QUALITY ASSURANCE

- A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified

1.05 REFERENCES

- A. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- C. ASTM D523 - Test Method for Specular Gloss.
- D. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.

- E. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- F. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- G. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- H. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- I. AAMA 2603 - Voluntary Specification, Performance Requirements & Test Procedures for Pigmented organic Coatings on Aluminum Extrusions and Panels.

1.06 SUBMITTALS

- A. The manufacturer's literature shall be submitted prior to installation.

1.07 PRODUCT HANDLING AND STORAGE

- A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.08 PRODUCT WARRANTY

- A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 20 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.
- B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufacturer's warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 MATERIALS

2.01 MANUFACTURER

- A. The ornamental fence system shall conform to Ameristar's Echelon II aluminum 6' tall ornamental fencing, Majestic, 3-rail style manufactured by Ameristar Fence Products, Inc. in Tulsa, Oklahoma.

2.02 MATERIAL

- A. Aluminum material for fence framework (i.e., tubular pickets, rails and posts) shall conform to the requirements of ASTM B221. The aluminum extrusions for posts and rails shall be Alloy and Temper Designation 6005-T52. The aluminum extrusions for pickets shall be Alloy and Temper Designation 6063-T52.
- B. The manufactured framework shall be subjected to the Ameristar thermal stratification coating process (high-temperature, in-line, multi-stage, and multi-layer) including, as a minimum, a six-stage pretreatment/wash, and an electrostatic spray application of a

polyester finish. The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be Black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.

- C. Bracket-to-rail attachments shall be made using specially designed one-way tamperproof security nuts with carriage bolt. Bracket to post connections shall be made using self-drilling hex-head screws.
- D. Accessories: Aluminum castings shall be used for all post caps, scrolls, finials, and other miscellaneous hardware. Hinges and latches shall be fabricated from aluminum, stainless steel or composite materials.

2.03 FABRICATION

- A. Pickets, rails and posts shall be pre-cut to specified lengths. ForeRunner rails shall be pre-punched to accept pickets. Grommets shall be inserted into the pre-punched holes in the rails and pickets shall be inserted through the grommets so that pre-drilled picket holes align with the internal upper raceway of the ForeRunner rails (Note: This can best be accomplished by using an alignment template). Retaining rods shall be inserted into each ForeRunner rail so that they pass through the pre-drilled holes in each picket, thus completing the panel assembly.
- B. Finish: All fence components shall be subject to a six-stage pretreatment/wash followed by an electrostatic spray application of a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2-4 mils. The color shall be (specify black, bronze or white).
- C. Completed panels shall be capable of supporting a 300 lb. load (applied at midspan) without permanent deformation. Panels without rings shall be biasable to a 12.5% change in grade.
- D. Gates shall be fabricated using 1.75" sq. reinforced ForeRunner rail material, 2" sq. x .250" gate ends, and 1" sq. x .125" pickets. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall be joined by welding.

PART 3 EXECUTION

3.01 PREPARATION

- A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.02 INSTALLATION

- A. Fence post shall be spaced according to Table 3, plus or minus ½". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers 33" depth recommended (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.03 FENCE INSTALLATION MAINTENANCE

- A. When cutting/drilling rails or posts adhere to the following steps to seal the exposed surfaces; 1) Remove all metal shavings from cut area. 2) Apply custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1 & 2 above will negate warranty. Ameristar spray cans or paint pens shall be used to finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.04 GATE INSTALLATION

- A. Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.05 CLEANING

- A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

Table 1 – Minimum Sizes for Echelon II Posts				
<u>Fence Posts</u>		<u>Panel Height</u>		
2-1/2" x 2-1/2" x .080" Alum. w/ reinforced web		Up to & Including 6' Height		
3" x 3" x .120" Alum.		Over 6' Up to & Including 8' Height		
4" x 4" x .250" Alum.		Over 8' Height Up to 10'		
<u>Gate Leaf</u>	<u>Gate Height</u>			
	<u>Up to & Including 4'</u>	<u>Over 4' Up to & Including 6'</u>	<u>Over 6' Up to & Including 8'</u>	<u>Over 8' Up to & Including 10'</u>
Up to 4'	3" x 3" x .120" Alum.	4" x 4" x .250 Alum. or 3" x 12 Ga. steel	4" x 11 Ga. steel	4" x 11 Ga. steel
4'1" to 6'	4" x 4" x .250 Alum. or 3" x 12Ga. steel	3" x 12 Ga. steel	4" x 11 Ga. steel	4" x 11 Ga. steel
6'1" to 8'	4" x 11 Ga. steel	4" x 11 Ga. steel	4" x 11 Ga. steel	6" x 3/16" steel
8'1" to 10'	4" x 11 Ga. steel	4" x 11 Ga. steel	6" x 3/16" steel	6" x 3/16" steel
10'1" to 12'	4" x 11 Ga. steel	6" x 3/16" steel	6" x 3/16" steel	6" x 3/16" steel
12'1" to 14'	6" x 3/16" steel	6" x 3/16" steel	6" x 3/16" steel	6" x 3/16" steel

Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117 & D1654	Corrosion Resistance over 1,000 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

Span	For INVINCIBLE® 8' Nominal (91.25" Rail)		For CLASSIC, GENESIS, & MAJESTIC 8' Nominal (92.625" Rail)					
	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Industrial Flat Mount (BB301)		Industrial Universal (BB302)	Industrial Universal (BB303)	Industrial Flat Mount (BB301)		Industrial Swivel (BB304)*	
Post Settings ± 1/2" O.C.	94-1/2"	95"	96"	96.5"	96"	96-1/2"	*97.5"	*98"

Span	For INVINCIBLE® 6' Nominal (71.375" Rail)		For CLASSIC, GENESIS, & MAJESTIC 6' Nominal (67.75" Rail)					
	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Industrial Flat Mount (BB301)		Industrial Universal (BB302)	Industrial Universal (BB303)	Industrial Flat Mount (BB301)		Industrial Swivel (BB304)*	
Post Settings ± 1/2" O.C.	75"	75.5"	71.5"	72"	71.5"	72"	*73"	*73.5"

*Note: When using BB304 swivel brackets on either or both ends of a panel installation, care must be taken to ensure the spacing between post and adjoining pickets meets applicable codes. This will require trimming one or both ends of the panel.

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SECTION 32 32 16**PRECAST MODULAR BLOCK RETAINING WALL****PART 1 – GENERAL****1.01 SUMMARY**

- A. This Section includes furnishing all materials and labor required for the design and construction of a precast concrete modular block (PMB) retaining wall with or without geosynthetic reinforcement. Precast modular block retaining wall blocks under this section shall be cast utilizing a wet-cast concrete mix and exhibit a final handling weight in excess of 1,000 pounds (450 kg) per unit and may utilize concrete-reinforcing steel.
- B. Scope of Work: The work shall consist of furnishing materials, labor, equipment and supervision for the construction of a precast modular block (PMB) retaining wall structure in accordance with the requirements of this section and in acceptable conformity with the lines, grades, design and dimensions shown in the project site plans.
- C. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 31, Division 32 and Division 33 also apply to this Section.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Allowances. No allowance shall be made in the price of the retaining wall for excavation beyond the limits required for retaining wall construction as shown on the project plans. The cost of excavation for the purposes of site access shall be the responsibility of the General Contractor. Removal of unsuitable soils and replacement with select fill shall be as directed and approved in writing by the Owner or Owner's representative and shall be paid under separate pay items.
- B. Unit Prices. In addition to a lump sum price pursuant to completion of the scope of work described in Part 1.01 of this Section, the General Contractor shall provide a unit price per square foot of vertical wall face that shall be the basis of compensation for up to a ten (10) percent increase or reduction in the overall scope of the retaining wall work.
- C. Measurement and Payment.
 - 1. The unit of measurement for furnishing the precast modular block retaining wall system shall be the vertical area of the wall face surface as measured from the top of the leveling pad to the top of the wall including coping or capstone. The final measured quantity shall include supply of all material components and the installation of the precast modular block system.
 - 2. The final accepted quantities of the precast modular block retaining wall system will be compensated per the vertical face area as described above. The quantities of the precast modular block retaining wall as shown on the plans and as approved by the Owner shall be the basis for determination of the final payment quantity. Payment shall be made per square foot of vertical wall face. All labor, equipment, materials, earth excavation, disposal of materials, bedding, foundation, reinforcing, concrete and any other work or materials

required for the installation of the precast modular block retaining wall shall be included with this pay item.

1.03 REFERENCES

- A. Where the specification and reference documents conflict, the Owner's designated representative will make the final determination of the applicable document.
- B. Definitions:
1. Precast Modular Block (PMB) Unit – machine-placed, “wet cast” concrete modular block retaining wall facing unit.
 2. Geotextile – a geosynthetic fabric manufactured for use as a separation and filtration medium between dissimilar soil materials.
 3. Geogrid – a geosynthetic material comprised of a regular network of tensile elements manufactured in a mesh-like configuration of consistent aperture openings. When connected to the PMB facing units and placed in horizontal layers in compacted fill, the geogrid prevents lateral deformation of the retaining wall face and provides effective tensile reinforcement to the contiguous reinforced fill material.
 4. Drainage Aggregate – clean, crushed stone placed within and immediately behind the precast modular block units to facilitate drainage and reduce compaction requirements immediately adjacent to and behind the precast modular block units.
 5. Unit Core Fill – clean, crushed stone placed within the hollow vertical core of a precast modular block unit. Typically, the same material used for drainage aggregate as defined above.
 6. Foundation Zone – soil zone immediately beneath the leveling pad and the reinforced zone.
 7. Retained Zone – soil zone immediately behind the drainage aggregate and wall infill for wall sections designed as modular gravity structures. Alternatively, in the case of wall sections designed with geosynthetic soil reinforcement, the retained zone is the soil zone immediately behind the reinforced zone.
 8. Reinforced Zone – structural fill zone within which successive horizontal layers of geogrid soil reinforcement have been placed to provide stability for the retaining wall face. The reinforced zone exists only for retaining wall sections that utilize geosynthetic soil reinforcement for stability.
 9. Reinforced Fill – structural fill placed within the reinforced zone.
 10. Leveling Pad – hard, flat surface upon which the bottom course of precast modular blocks is placed. The leveling pad may be constructed with crushed stone or cast-in-place concrete. A leveling pad is not a structural footing.
 11. Wall Infill – the fill material placed and compacted between the drainage aggregate and the excavated soil face in retaining wall sections designed as modular gravity structures.
- C. Reference Standards
1. Design
 - a. AASHTO LRFD Bridge Design Specifications, 7th Edition, 2014.
 - b. Minimum Design Loads for Buildings and Other Structures – ASCE/SEI 7-10.
 - c. International Building Code, 2018 Edition.
 - d. FHWA-NHI-10-024 Volume I and GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.
 - e. FHWA-NHI-10-025 Volume II and GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes.

- f. National Concrete Masonry Association (NCMA) Design Manual for Segmental Retaining Walls (ASD), 3rd Edition
2. Precast Modular Block Units
- a. ACI 201 – Guide to Durable Concrete
 - b. ACI 318 – Building Code Requirements for Structural Concrete
 - c. ASTM A615 – Steel Bars for Concrete Reinforcement
 - d. ASTM A767 – Galvanized Steel Bars for Concrete Reinforcement
 - e. ASTM A775 – Epoxy-Coated Steel Reinforcing Bars
 - f. ASTM C33 – Standard Specification for Concrete Aggregates
 - g. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - h. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
 - i. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - j. ASTM C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete.
 - k. ASTM C150 – Standard Specification for Portland Cement
 - l. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - m. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
 - n. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
 - o. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
 - p. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - q. ASTM C666 – Standard Test Method for Concrete Resistance to Rapid Freezing and Thawing.
 - r. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
 - s. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 - t. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
 - u. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.
 - v. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
 - w. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
 - x. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
 - y. ASTM C1611 – Standard Test Method for Slump Flow of Self-Consolidating Concrete.
 - z. ASTM C1776 – Standard Specification for Wet-Cast Precast Modular Retaining Wall Units.
 - aa. ASTM D6638 – Standard Test Method for Determining Connection Strength Between Geosynthetic Reinforcement and Segmental Concrete Units (Modular Concrete Blocks).
 - bb. ASTM D6916 – Standard Test Method for Determining Shear Strength Between Segmental Concrete Units (Modular Concrete Blocks).
3. Geosynthetics
- a. AASHTO M 288 – Geotextile Specification for Highway Applications.
 - b. ASTM D3786 – Standard Test Method for Bursting Strength of Textile Fabrics Diaphragm Bursting Strength Tester Method.
 - c. ASTM D4354 – Standard Practice for Sampling of Geosynthetics for Testing.

- d. ASTM D4355 – Standard Test Method for Deterioration of Geotextiles
 - e. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - f. ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - g. ASTM D4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - h. ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - i. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - j. ASTM D4759 – Standard Practice for Determining Specification Conformance of Geosynthetics.
 - k. ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
 - l. ASTM D4873 – Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.
 - m. ASTM D5262 – Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics.
 - n. ASTM D5321 – Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
 - o. ASTM D5818 – Standard Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage of Geosynthetics.
 - p. ASTM D6241 – Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
 - q. ASTM D6637 – Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method.
 - r. ASTM D6706 – Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil.
 - s. ASTM D6992 – Standard Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method.
4. Soils
- a. AASHTO M 145 – AASHTO Soil Classification System.
 - b. AASHTO T 104 – Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
 - c. AASHTO T 267 – Standard Method of Test for Determination of Organic Content in Soils by Loss of Ignition.
 - d. ASTM C33 – Standard Specification for Concrete Aggregates.
 - e. ASTM D448 – Standard Classification for Sizes of Aggregates for Road and Bridge Construction.
 - f. ASTM D698 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. (12,400 ft-lbf/ft (2,700 kN-m/m)).
 - g. ASTM D1241 – Standard Specification for Materials for Soil-Aggregate Subbase, Base and Surface Courses.
 - h. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
 - i. ASTM D1557 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort. (56,000 ft-lbf/ft (2,700 kN-m/m)).

- j. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - k. ASTM D2488 – Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
 - l. ASTM D3080 – Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions.
 - m. ASTM D4254 – Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - n. ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - o. ASTM D4767- Test Method for Consolidated-Undrained Triaxial Compression Test for Cohesive Soils.
 - p. ASTM D4972 – Standard Test Method for pH of Soils.
 - q. ASTM D6913 – Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
 - r. ASTM D6938 – Standard Test Method for In-Place Density and Water Content of Soil and Aggregate by Nuclear Methods (Shallow Depth).
 - s. ASTM G51 – Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing.
 - t. ASTM G57 – Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method.
5. Drainage Pipe
- a. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - b. ASTM F2648 – Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preconstruction Meeting. As directed by the Owner, the General Contractor shall schedule a preconstruction meeting at the project site prior to commencement of retaining wall construction. Participation in the preconstruction meeting shall be required of the General Contractor, Retaining Wall Design Engineer (RWDE), Retaining Wall Installation Contractor (RWIC), Grading Contractor, and Inspection Engineer. The General Contractor shall provide notification to all parties at least 10 calendar days prior to the meeting.

1. Preconstruction Meeting Agenda:

- a. The RWDE shall explain all aspects of the retaining wall construction drawings.
- b. The RWDE shall explain the required bearing capacity of soil below the retaining wall structure and the shear strength of in-situ soils assumed in the retaining wall design to the Inspection Engineer.
- c. The RWDE shall explain the required shear strength of fill soil in the reinforced, retained and foundation zones of the retaining wall to the Inspection Engineer.
- d. The RWDE shall explain any measures required for coordination of the installation of utilities or other obstructions in the reinforced or retained fill zones of the retaining wall.
- e. The RWIC shall explain all excavation needs, site access and material staging area requirements to the General Contractor and Grading Contractor.

1.05 SUBMITTALS

- A. **Product Data.** At least 14 days prior to construction, the General Contractor shall submit the retaining wall product submittal package to the Owner's Representative for review and approval. The submittal package shall include technical specifications and product data from the manufacturer for the following:
1. Precast Modular Block System brochure
 2. Precast Modular Block concrete test results specified in paragraph 2.01, subparagraph B of this section as follows:
 - a. 28-day compressive strength
 - b. Air content
 - c. Slump or Slump Flow (as applicable)
 3. Drainage Pipe
 4. Geotextile
 5. Geosynthetic Soil Reinforcement (if required by the retaining wall design). The contractor shall provide certified manufacturer test reports for the geosynthetic soil reinforcement material in the manufactured roll width specified. The test report shall list the individual roll numbers for which the certified material properties are valid.
- B. **Installer Qualification Data.** At least 14 days prior to construction, the General Contractor shall submit the qualifications of the business entity responsible for installation of the retaining wall, the RWIC, per paragraph 1.07, subparagraph A of this section.
- C. **Retaining Wall Design Calculations and Construction Shop Drawings.** At least 14 days prior to construction, the General Contractor shall furnish electronic versions construction shop drawings and the supporting structural calculations report to the Owner for review and approval. This submittal shall include the following:
1. Signed, sealed and dated drawings and engineering calculations prepared in accordance with these specifications.
 2. Qualifications Statement by the RWDE summarizing their Experience.
 3. Certificate of Insurance of the RWDE as specified in paragraph 1.06, subparagraph B of this section.

1.06 CONSTRUCTION SHOP DRAWING PREPARATION

- A. The RWDE shall coordinate the retaining wall construction shop drawing preparation with the project Civil Engineer, project Geotechnical Engineer and Owner's Representatives. The General Contractor shall furnish the RWDE the following project information required to prepare the construction shop drawings. This information shall include, but is not limited to, the following:
1. Current versions of the site, grading, drainage, utility, erosion control, landscape, and irrigation plans;
 2. electronic CAD file of the civil site plans listed in (1);
 3. report of geotechnical investigation and all addenda and any supplemental reports;
 4. recommendations of the project Geotechnical Engineer regarding effective stress shear strength and total stress shear strength (when applicable) parameters for in-situ soils in

the vicinity of the proposed retaining wall(s) and for any fill soil that may potentially be used as backfill in retained and/or foundation zones of the retaining wall.

- B. The RWDE shall provide the Owner with a certificate of professional liability insurance verifying the minimum coverage limits of \$1 million per claim and \$1 million aggregate.
- C. Design of the precast modular block retaining wall shall satisfy the requirements of this section. Where local, State, or national design or building code requirements exceed these specifications, these requirements shall also be satisfied.
- D. The RWDE shall note any exceptions to the requirements of this section by listing them at the bottom right corner of the first page of the construction shop drawings.
- E. Approval or rejection of the exceptions taken by the Retaining Wall Design Engineer (RWDE) will be made in writing as directed by the Owner.
- F. The RWDE shall determine the appropriate standard(s) to be utilized, and to which the precast modular block design shall be based upon, except as noted herein. Refer to Part 1.03, Paragraph C, Part 1.
- G. In the event that a conflict is discovered between these specifications and a reasonable interpretation of the design specifications and methods referenced in paragraph F above, these specifications shall prevail. If a reasonable interpretation is not possible, the conflict shall be resolved per the requirements in paragraph 1.03, subparagraph A of this section.
- H. Soil Shear Parameters. The RWDE shall prepare the construction shop drawings based upon soil shear strength parameters from the available project data and the recommendations of the project Geotechnical Engineer. If insufficient data exists to develop the retaining wall design, the RWDE shall communicate the specific deficiency of the project information or data to the Owner in writing.
- I. Allowable bearing pressure requirements for each retaining wall shall be clearly shown on the construction drawings.
- J. Global Stability. Overall (global) stability shall be evaluated in accordance with the principals of limit equilibrium analysis as set forth in FHWA-NHI-10-024 Volume I and FHWA-NHI-10-025 Volume II GEC 11 Design of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, or other methods, as determined by the RWDE, as referenced in Section 1.06, Part F. The minimum factors of safety shall be as follows:

Normal Service (Static)	1.3
Seismic	1.1
Rapid Drawdown (if applicable)	1.2

Note: RWDE to select appropriate FOS

- K. Seismic Stability. Seismic loading shall be evaluated in accordance with AASHTO Load and Resistance Factor Design (LRFD) methodology, or NCMA (ASD) methodology as determined by the RWDE as referenced in Section 1.06, Part F.

1.07 QUALITY ASSURANCE

- A. RWIC Qualifications. In order to demonstrate basic competence in the construction of precast modular block walls, the RWIC shall possess the following:
1. Experience.
 - a. Construction experience with a minimum of 3,000 square feet (280 square meters) of the proposed precast modular block retaining wall system.
 - b. Construction of at least three (3) precast modular block (large block) retaining wall structures within the past three (3) years.
 - c. Construction of at least 5,000 square feet (465 square meters) of precast modular block (large block) retaining walls within the past five (5) years.
 2. RWIC experience documentation for each qualifying project shall include:
 - a. Project name and location
 - b. Date (month and year) of construction completion
 - c. Contact information of Owner or General Contractor
 - d. Type (trade name) of precast modular block system used
 - e. Maximum height of the wall constructed
 - f. Face area of the wall constructed
 3. In lieu of these specific requirements, the contractor may submit alternate documentation demonstrating competency in Precast Modular Block retaining wall construction.
- B. RWDE (RWDE) Qualifications and Statement of Experience. The RWDE shall submit a written statement affirming that he or she has the following minimum qualifications and experience.
1. The RWDE shall be licensed to practice in the jurisdiction of the project location.
 2. The RWDE shall be independently capable of performing all internal and external stability analyses, including those for seismic loading, compound stability, rapid draw-down and deep-seated, global modes of failure.
 3. The RWDE shall affirm in writing that he or she has personally supervised the design of the retaining walls for the project, that the design considers all the requirements listed in paragraph 1.06 and that he or she accepts responsibility as the design engineer of record for the retaining walls constructed on the project.
 4. The RWDE shall affirm in writing that he or she has designed a minimum of approximately 3,000 face square feet (280 face square meters) of modular block earth retaining walls within the previous five (5) years.
 5. In lieu of these specific requirements, the engineer may submit alternate documentation demonstrating competency in Precast Modular Block retaining wall design.
- C. The Owner reserves the right to reject the services of any engineer, engineering firm, or contractor who, in the sole opinion of the Owner, does not possess the requisite experience or qualifications.

1.08 QUALITY CONTROL

- A. The Owner's Representative shall review all submittals for materials, design, RWDE qualifications and the RWIC qualifications.
- B. The General Contractor shall retain the services of an Inspection Engineer who is experienced with the construction of precast modular block retaining wall structures to perform inspection

- and testing. The cost of inspection shall be the responsibility of the General Contractor. Inspection shall be continuous throughout the construction of the retaining walls.
- C. The Inspection Engineer shall perform the following duties:
1. Inspect the construction of the precast modular block structure for conformance with construction shop drawings and the requirements of this specification.
 2. Verify that soil or aggregate fill placed and compacted in the reinforced, retained and foundation zones of the retaining wall conforms with paragraphs 2.04 and 2.05 of this section and exhibits the shear strength parameters specified by the RWDE.
 3. Verify that the shear strength of the in-situ soil assumed by the RWDE is appropriate.
 4. Inspect and document soil compaction in accordance with these specifications:
 - a. Required dry unit weight
 - b. Actual dry unit weight
 - c. Allowable moisture content
 - d. Actual moisture content
 - e. Pass/fail assessment
 - f. Test location – wall station number
 - g. Test elevation
 - h. Distance of test location behind the wall face
 5. Verify that all excavated slopes in the vicinity of the retaining wall are bench-cut as required.
 6. Notify the RWIC of any deficiencies in the retaining wall construction and provide the RWIC a reasonable opportunity to correct the deficiency.
 7. Notify the General Contractor, Owner and RWDE of any construction deficiencies that have not been corrected in a timely manner.
 8. Document all inspection results and provide reports to Owner, RWDE, and RWIC.
 9. Test compacted density and moisture content of the retained backfill with the following frequency:
 - a. At least once every 500 square feet (45 square meters) (in plan) per vertical lift, and
 - b. At least once per every 18 inches (460 mm) of vertical wall construction.
- D. The General Contractor's engagement of the Inspection Engineer does not relieve the RWIC of responsibility to construct the proposed retaining wall in accordance with the approved construction shop drawings and these specifications.
- E. The RWIC shall inspect the on-site grades and excavations prior to construction and notify the RWDE and General Contractor if on-site conditions differ from the elevations, assumptions, and grading conditions depicted in the retaining wall construction shop drawings.
- 1.09 DELIVERY, STORAGE AND HANDLING
- A. The RWIC shall inspect the materials upon delivery to ensure that the proper type, grade and color of materials have been delivered.
- B. The RWIC shall store and handle all materials in accordance with the manufacturer's recommendations as specified herein and in a manner that prevents deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, UV exposure or other causes. Damaged materials shall not be incorporated into the work.
- C. Geosynthetics

1. All geosynthetic materials shall be handled in accordance with ASTM D4873. The materials should be stored off the ground and protected from precipitation, sunlight, dirt and physical damage.
- D. Precast Modular Blocks
1. Precast modular blocks shall be stored in an area with positive drainage away from the blocks. Be careful to protect the block from mud and excessive chipping and breakage. Precast modular blocks shall not be stacked more than three (3) units high in the storage area.
- E. Drainage Aggregate and Backfill Stockpiles
1. Drainage aggregate or backfill material shall not be piled over unstable slopes or areas of the project site with buried utilities.
 2. Drainage aggregate and/or reinforced fill material shall not be staged where it may become mixed with or contaminated by poor draining fine-grained soils such as clay or silt.

PART 2 – MATERIALS

2.01 PRECAST MODULAR BLOCK RETAINING WALL UNITS

- A. All units shall be wet-cast precast modular retaining wall units conforming to ASTM C1776.
- B. All units for the project shall be obtained from the same manufacturer. The manufacturer shall be licensed and authorized to produce the retaining wall units by the precast modular block system patent holder/licensor and shall document compliance with the published quality control standards of the proprietary precast modular block system licensor for the previous three (3) years or the total time the manufacturer has been licensed, whichever is less.
- C. Concrete used in the production of the precast modular block units shall be first-purpose, fresh concrete. It shall not consist of returned, reconstituted, surplus or waste concrete. It shall be an original production mix meeting the requirements of ASTM C94 and exhibit the properties as shown in the following table:

Concrete Mix Properties

Freeze Exposure Class ⁽¹⁾	Thaw	Minimum 28-Day Compressive Strength ⁽²⁾	Maximum Water Cement Ratio	Nominal Maximum Aggregate Size	Aggregate Class Designation ⁽³⁾	Air Content ⁽⁴⁾
Moderate		4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3M	4.5% +/- 1.5%
Severe		4,000 psi (27.6 MPa)	0.45	1 inch (25 mm)	3S	6.0% +/- 1.5%
Very Severe		4,500 psi (30.0 MPa)	0.40	1 inch (25 mm)	4S	6.0% +/- 1.5%
Maximum Water-Soluble Chloride Ion (Cl⁻) Content in Concrete, Percent by Weight of Cement^(5,6)						0.15
Maximum Chloride as Cl⁻ Concentration in Mixing Water, Parts Per Million						1000
Maximum Percentage of Total Cementitious Materials By Weight ^(7,9) (Very Severe Exposure Class Only):						
Fly Ash or Other Pozzolans Conforming to ASTM C618						25
Slag Conforming to ASTM C989						50
Silica Fume Conforming to ASTM C1240						10
Total of Fly Ash or Other Pozzolans, Slag, and Silica Fume ⁽⁸⁾						50
Total of Fly Ash or Other Pozzolans and Silica Fume ⁽⁸⁾						35
Alkali-Aggregate Reactivity Mitigation per ACI 201						
Slump (Conventional Concrete) per ASTM C143⁽¹⁰⁾				5 inches +/- 1½ inches (125 mm +/- 40 mm)		
Slump Flow (Self-Consolidating Concrete) per ASTM C1611				18 inches – 32 inches (450 mm – 800 mm)		

⁽¹⁾Exposure class is as described in ACI 318. "Moderate" describes concrete that is exposed to freezing and thawing cycles and occasional exposure to moisture. "Severe" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture. "Very Severe" describes concrete that is exposed to freezing and thawing cycles and in continuous contact with moisture and exposed to deicing chemicals. Exposure class should be specified by owner/purchaser prior to order placement.

⁽²⁾Test method ASTM C39.

⁽³⁾Defined in ASTM C33 Table 3 *Limits for Deleterious Substances and Physical Property Requirements of Coarse Aggregates for Concrete*.

⁽⁴⁾Test method ASTM C231.

⁽⁵⁾Test method ASTM C1218 at age between 28 and 42 days.

⁽⁶⁾Where used in high sulfate environments or where alkali-silica reactivity is an issue, water soluble chloride shall be limited to no more than trace amounts (from impurities in concrete-making components, not intended constituents.)

⁽⁷⁾The total cementitious material also includes ASTM C150, C595, C845, C1157 cement. The maximum percentages shall include:

- (a) Fly ash or other pozzolans in type IP, blended cement, ASTM C595, or ASTM C1157.
- (b) Slag used in the manufacture of an IS blended cement, ASTM C595, or ASTM C1157.
- (c) Silica fume, ASTM C1240, present in a blended cement.

⁽⁸⁾Fly ash or other pozzolans and silica fume shall constitute no more than 25 and 10 percent, respectively, of the total weight of the cementitious materials.

⁽⁹⁾Prescriptive limits shown may be waived for concrete mixes that demonstrate excellent freeze/thaw durability in a detailed and current testing program.

⁽¹⁰⁾Slump may be increased by a high-range water-reducing admixture.

- D. Concrete reinforcing steel, when required for the specified block, shall conform to ASTM A615 and have a minimum yield strength of 60,000 psi. When required by the Owner to be galvanized or epoxy-coated, reinforcing steel shall conform to ASTM A767 or ASTM A775, respectively, and have a minimum yield strength of 60,000 psi.
- E. At least 1 inch of concrete cover shall be maintained over all reinforcing steel bars.
- F. Each concrete block shall be cast in a single continuous pour without cold joints. With the exception of half-block units, corner units and other special application units, the precast modular block units shall conform to the nominal dimensions listed in the table below and be produced to the dimensional tolerances shown.

Block Type	Dimension	Nominal Value	Tolerance
28" (710 mm) Block	Height	18" (457 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	28" (710 mm)	+/- 1/2" (13 mm)
41" (1030 mm) Block	Height	18" (457 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	40-1/2" (1030 mm)	+/- 1/2" (13 mm)
60" (1520 mm) Block	Height	18" (457 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	60" (1520 mm)	+/- 1/2" (13 mm)
52" (1320 mm) XL Block	Height	36" (914 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	60" (1520 mm)	+/- 1/2" (13 mm)
72" (1830 mm) XL Block	Height	36" (914 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	60" (1520 mm)	+/- 1/2" (13 mm)
96" (2440 mm) XL Block	Height	36" (914 mm)	+/- 3/16" (5 mm)
	Length	46-1/8" (1172 mm)	+/- 1/2" (13 mm)
	Width*	60" (1520 mm)	+/- 1/2" (13 mm)

* Block tolerance measurements shall exclude variable face texture

- G. With the exception of half-block units, corner units and other special application units, the precast modular block units shall have two (2), circular dome shear knobs that are 10 inches (254 mm), 7.5 inches (190 mm), or 6.75 inches (171 mm) in diameter and 4 inches (102 mm) or 2 inches (51 mm) in height. The shear knobs shall fully index into a continuous semi-cylindrical shear channel in the bottom of the block course above. The Peak interlock shear between any two (2) vertically stacked precast modular block units, with 10-inch (254 mm) diameter shear knobs, measured in accordance with ASTM D6916 shall exceed 6,500 lb/ft (95 kN/m) at a minimum normal load of 500 lb/ft (7kN/m). as well as an ultimate peak interface shear capacity in excess of 11,000 lb/ft (160 kN/m). The peak interlock shear between any two (2) vertically stacked precast modular block units, with 7.5-inch (190 mm) or 6.75-inch (171 mm) diameter shear knobs, measured in accordance with ASTM D6916 shall exceed 1,850 lb/ft (27 kN/m) at a minimum normal load of 500 lb/ft (7kN/m) as well as an ultimate peak interface shear capacity in excess of 10,000 lb/ft (146 kN/m). Test specimen blocks tested under ASTM D6916 shall be actual, full-scale production blocks of known compressive strength. The interface shear capacity reported shall be corrected for a 4,000 psi (27.6 MPa) concrete compressive strength. Regardless of precast modular block configuration, interface shear testing shall be completed without the inclusion of unit core infill aggregate.

- H. The 28-inch (710 mm) and 41-inch (1030 mm) precast modular block units may be cast with a continuous vertical core slot that will permit the insertion of a 12-inch (305 mm) inch wide strip of geogrid reinforcement to pass completely through the block. When installed in this manner, the geogrid reinforcement shall form a non-normal load dependent, positive connection between the block unit and the reinforcement strip. The use of steel for the purposes of creating the geogrid-to-block connection is not acceptable.
- I. Without field cutting or special modification, the precast modular block units shall be capable of achieving a minimum radius of 14 ft - 6 in (4.42 m).
- J. The precast modular block units shall be manufactured with an integrally cast shear knobs that establishes a standard horizontal set-back for subsequent block courses. The precast modular block system shall be available in the standard horizontal set-back facing batter options listed below:

18-inch High Blocks		36-inch High Blocks	
<u>Horizontal Set-Back/Blk. Course</u>	<u>Max. Facing Batter</u>	<u>Horizontal Set-Back/Blk. Course</u>	<u>Max. Facing Batter</u>
3/8" (10 mm)	1.2°	3-1/4" (83 mm)	5.2°
1-5/8" (41 mm)	5.2°		
9-3/8" (238 mm)	27.5°		
16-5/8" (422 mm)	42.7°		

The precast modular block units shall be furnished with the required shear knobs that provide the facing batter required in the construction shop drawings.

- K. The precast modular block unit face texture shall be selected by the owner from the available range of textures available from the precast modular block manufacturer. Each textured block facing unit shall be a minimum of 5.76 square feet (0.54 square meters) with a unique texture pattern that repeats with a maximum frequency of once in any 15 square feet (1.4 square meters) of wall face.
- L. The block color shall be selected by the owner from the available range of colors available from the precast modular block manufacturer.
- M. All precast modular block units shall be sound and free of cracks or other defects that would interfere with the proper installation of the unit, impair the strength or performance of the constructed wall. PMB units to be used in exposed wall construction shall not exhibit chips or cracks in the exposed face or faces of the unit that are not otherwise permitted. Chips smaller than 1.5" (38 mm) in its largest dimension and cracks not wider than 0.012" (0.3 mm) and not longer than 25% of the nominal height of the PMB unit shall be permitted. PMB units with bug holes in the exposed architectural face smaller than 0.75" (19 mm) in its largest dimension shall be permitted. Bug holes, water marks, and color variation on non-architectural faces are acceptable. PMB units that exhibit cracks that are continuous through any solid element of the PMB unit shall not be incorporated in the work regardless of the width or length of the crack.

- N. Preapproved Manufacturers.
Manufacturers of Redi-Rock Retaining Wall Systems as licensed by Redi-Rock International, LLC, 05481 US 31 South, Charlevoix, MI 49720 USA; telephone (866) 222-8400; website www.redi-rock.com.
- O. Substitutions. Technical information demonstrating conformance with the requirements of this specification for an alternative precast modular block retaining wall system must be submitted for preapproval at least 14 calendar days prior to the bid date. Acceptable alternative PMB retaining wall systems, otherwise found to be in conformance with this specification, shall be approved in writing by the owner 7 days prior to the bid date. The Owner's Representative reserves the right to provide no response to submissions made out of the time requirements of this section or to submissions of block retaining wall systems that are determined to be unacceptable to the owner.
- P. Value Engineering Alternatives. The owner may evaluate and accept systems that meet the requirements of this specification after the bid date that provide a minimum cost savings of 20% to the Owner. Construction expediency will not be considered as a contributing portion of the cost savings total.

2.02 GEOGRID REINFORCEMENT

- A. Geogrid reinforcement shall be a woven or knitted PVC coated geogrid manufactured from high-tenacity PET polyester fiber with an average molecular weight greater than 25,000 ($M_n > 25,000$) and a carboxyl end group less than 30 ($CEG < 30$). The geogrid shall be furnished in prefabricated roll widths of certified tensile strength by the manufacturer. The prefabricated roll width of the geogrid shall be 12" (300 mm) +/- 1/2" (13 mm). No cutting of geogrid reinforcement down to the 12" (300 mm) roll width from a larger commercial roll width will be allowed under any circumstances.
- B. The ultimate tensile strength (T_{ult}) of the geogrid reinforcement shall be measured in accordance with ASTM D6637.
- C. Geogrid – Soil Friction Properties
1. Friction factor, F^* , shall be equal to $2/3 \tan \phi$, where ϕ is the effective angle of internal friction of the reinforced fill soil.
 2. Linear Scale Correction Factor, α , shall equal 0.8.
- D. Long-Term Tensile Strength (T_{al}) of the geogrid reinforcement shall be calculated in accordance with Section 3.5.2 of FHWA-NHI-10-024 and as provided in this specification.
1. The creep reduction factor (RF_{CR}) shall be determined in accordance with Appendix D of FHWA-NHI-10-025 for a minimum 75 year design life.
 2. Minimum installation damage reduction factor (RF_{ID}) shall be 1.25. The value of RF_{ID} shall be based upon documented full-scale tests in a soil that is comparable to the material proposed for use as reinforced backfill in accordance with ASTM D5818.
 3. Minimum durability reduction factor (RF_D) shall be 1.3 for a soil pH range of 3 to 9.
- E. Connection between the PMB retaining wall unit and the geogrid reinforcement shall be determined from short-term testing per the requirements of FHWA NHI-10-025, Appendix B.4 for a minimum 75-year design life.

- F. The minimum value of T_{al} for geogrid used in design of a reinforced precast modular block retaining wall shall be 2,000 lb/ft (29 kN/m) or greater.
- G. The minimum length of geogrid reinforcement shall be the greater of the following:
1. 0.7 times the wall design height, H.
 2. 6 feet (1.83 m).
 3. The length required by design to meet internal stability requirements, soil bearing pressure requirements and constructability requirements.
- H. Constructability Requirements. Geogrid design embedment length shall be measured from the back of the precast modular block facing unit and shall be consistent for the entire height of a given retaining wall section.
- I. Geogrid shall be positively connected to every precast modular block unit. Design coverage ratio, R_c , as calculated in accordance with AASHTO LRFD Bridge Design Specifications Figure 11.10.6.4.1-2 shall not exceed 0.50.
- J. Preapproved Geogrid Reinforcement Products.
1. Miragrid XT Geogrids as manufactured by TenCate Geosynthetics of Pendergrass, Georgia USA and distributed by Manufacturers of the Redi-Rock Retaining Wall System.
- K. Substitutions. No substitutions of geogrid reinforcement products shall be allowed.

2.03 GEOTEXTILE

- A. Nonwoven geotextile fabric shall be placed as indicated on the retaining wall construction shop drawings. Additionally, the nonwoven geotextile fabric shall be placed in the v-shaped joint between adjacent block units on the same course. The nonwoven geotextile fabric shall meet the requirements Class 3 construction survivability in accordance with AASHTO M 288.
- B. Preapproved Nonwoven Geotextile Products
1. Mirafi 140N
 2. Propex Geotex 451
 3. Skaps GT-142
 4. Thrace-Linq 140EX
 5. Carthage Mills FX-40HS
 6. Stratatex ST 142

2.04 DRAINAGE AGGREGATE AND WALL INFILL

- A. Drainage aggregate (and wall infill for retaining walls designed as modular gravity structures) shall be a durable crushed stone conforming to No. 57 size per ASTM C33 with the following particle-size distribution requirements per ASTM D6913:

U.S. Standard <u>Sieve Size</u>	<u>% Passing</u>
1-½" (38 mm)	100
1" (25 mm)	95-100

½" (13 mm)	25-60
No. 4 (4.76 mm)	0-10
No. 8 (2.38 mm)	0-5

2.05 REINFORCED FILL

- A. Material used as reinforced backfill material in the reinforced zone (if applicable) shall be a granular fill material meeting the requirements of USCS soil type GW, GP, SW or SP per ASTM D2487 or alternatively by AASHTO Group Classification A-1-a or A-3 per AASHTO M 145. The backfill shall exhibit a minimum effective internal angle of friction, $\phi = 34$ degrees at a maximum 2% shear strain and meet the following particle-size distribution requirements per ASTM D6913.

U.S. Standard	
<u>Sieve Size</u>	<u>% Passing</u>
¾" (19 mm)	100
No. 4 (4.76 mm)	0-100
No. 40 (0.42 mm)	0-60
No. 200 (0.07 mm)	0-15

- B. The reinforced backfill material shall be free of sod, peat, roots or other organic or deleterious matter including, but not limited to, ice, snow or frozen soils. Materials passing the No. 40 (0.42 mm) sieve shall have a liquid limit less than 25 and plasticity index less than 6 per ASTM D4318. Organic content in the backfill material shall be less than 1% per AASHTO T-267 and the pH of the backfill material shall be between 5 and 8.
- C. Soundness. The reinforced backfill material shall exhibit a magnesium sulfate soundness loss of less than 30% after four (4) cycles, or sodium sulfate soundness loss of less than 15% after five (5) cycles as measured in accordance with AASHTO T-104.
- D. Reinforced backfill shall not be comprised of crushed or recycled concrete, recycled asphalt, bottom ash, shale or any other material that may degrade, creep or experience a loss in shear strength or a change in pH over time.

2.06 LEVELING PAD

- A. The precast modular block units shall be placed on a leveling pad constructed from crushed stone or unreinforced concrete. The leveling pad shall be constructed to the dimensions and limits shown on the retaining wall design drawings prepared by the RWDE.
- B. Crushed stone used for construction of a granular leveling pad shall meet the requirements of the drainage aggregate and wall infill in section 2.04 or a preapproved alternate material.
- C. Concrete used for construction of an unreinforced concrete leveling pad shall satisfy the criteria for AASHTO Class B. The concrete should be cured a minimum of 12 hours prior to placement of the precast modular block wall retaining units and exhibit a minimum 28-day compressive strength of 2,500 psi (17.2 MPa).

2.07 DRAINAGE

- A. Drainage Pipe
 - 1. Drainage collection pipe shall be a 4" (100 mm) diameter, 3-hole perforated, HDPE pipe with a minimum pipe stiffness of 22 psi (152 kPa) per ASTM D2412.
 - 2. The drainage pipe shall be manufactured in accordance with ASTM D1248 for HDPE pipe and fittings.
- B. Preapproved Drainage Pipe Products
 - 1. ADS 3000 Triple Wall pipe as manufactured by Advanced Drainage Systems, or Equal.

PART 3 – EXECUTION

3.01 GENERAL

- A. All work shall be performed in accordance with OSHA safety standards, state and local building codes and manufacturer's requirements.
- B. The General Contractor is responsible for the location and protection of all existing underground utilities. Any new utilities proposed for installation in the vicinity of the retaining wall, shall be installed concurrent with retaining wall construction. The General Contractor shall coordinate the work of subcontractors affected by this requirement.
- C. New utilities installed below the retaining wall shall be backfilled and compacted to a minimum of 98% maximum dry density per ASTM D698 standard proctor.
- D. The General Contractor is responsible to ensure that safe excavations and embankments are maintained throughout the course of the project.
- E. All work shall be inspected by the Inspection Engineer as directed by the Owner.

3.02 EXAMINATION

- A. Prior to construction, the General Contractor, Grading Contractor, RWIC and Inspection Engineer shall examine the areas in which the retaining wall will be constructed to evaluate compliance with the requirements for installation tolerances, worker safety and any site conditions affecting performance of the completed structure. Installation shall proceed only after unsatisfactory conditions have been corrected.

3.03 PREPARATION

- A. Fill Soil.
 - 1. The Inspection Engineer shall verify that reinforced backfill placed in the reinforced soil zone satisfies the criteria of this section.
 - 2. The Inspection Engineer shall verify that any fill soil installed in the foundation and retained soil zones of the retaining wall satisfies the specification of the RWDE as shown on the construction drawings.

- B. Excavation.
1. The Grading Contractor shall excavate to the lines and grades required for construction of the precast modular block retaining wall as shown on the construction drawings. The Grading Contractor shall minimize over-excavation. Excavation support, if required, shall be the responsibility of the Grading Contractor.
 2. Over-excavated soil shall be replaced with compacted fill in conformance with the specifications of the RWDE and "Division 31, Section 31 20 00 – Earthmoving" of these project specifications.
 3. Embankment excavations shall be bench cut as directed by the project Geotechnical Engineer and inspected by the Inspection Engineer for compliance.
- C. Foundation Preparation.
1. Prior to construction of the precast modular block retaining wall, the leveling pad area and undercut zone (if applicable) shall be cleared and grubbed. All topsoil, brush, frozen soil and organic material shall be removed. Additional foundation soils found to be unsatisfactory beyond the specified undercut limits shall be undercut and replaced with approved fill as directed by the project Geotechnical Engineer. The Inspection Engineer shall ensure that the undercut limits are consistent with the requirements of the project Geotechnical Engineer and that all soil fill material is properly compacted in accordance with project specifications. The Inspection Engineer shall document the volume of undercut and replacement.
 2. Following excavation for the leveling pad and undercut zone (if applicable), the Inspection Engineer shall evaluate the in-situ soil in the foundation and retained soil zones.
 - a. The Inspection Engineer shall verify that the shear strength of the in-situ soil assumed by the RWDE is appropriate. The Inspection Engineer shall immediately stop work and notify the Owner if the in-situ shear strength is found to be inconsistent with the retaining wall design assumptions.
 - b. The Inspection Engineer shall verify that the foundation soil exhibits sufficient ultimate bearing capacity to satisfy the requirements indicated on the retaining wall construction shop drawings per paragraph 1.06 I of this section.
- D. Leveling Pad.
1. The leveling pad shall be constructed to provide a level, hard surface on which to place the first course of precast modular block units. The leveling pad shall be placed in the dimensions shown on the retaining wall construction drawings and extend to the limits indicated.
 2. Crushed Stone Leveling Pad. Crushed stone shall be placed in uniform maximum lifts of 6" (150 mm). The crushed stone shall be compacted by a minimum of 3 passes of a vibratory compactor capable of exerting 2,000 lb (8.9 kN) of centrifugal force and to the satisfaction of the Inspection Engineer.
 3. Unreinforced Concrete Leveling Pad. The concrete shall be placed in the same dimensions as those required for the crushed stone leveling pad. The RWIC shall erect proper forms as required to ensure the accurate placement of the concrete leveling pad according to the retaining wall construction drawings.

3.04 PRECAST MODULAR BLOCK WALL SYSTEM INSTALLATION

- A. The precast modular block structure shall be constructed in accordance with the construction drawings, these specifications and the recommendations of the retaining wall system

- component manufacturers. Where conflicts exist between the manufacturer's recommendations and these specifications, these specifications shall prevail.
- B. Drainage components. Pipe, geotextile and drainage aggregate shall be installed as shown on the construction shop drawings.
- C. Precast Modular Block Installation
1. The first course of block units shall be placed with the front face edges tightly abutted together on the prepared leveling pad at the locations and elevations shown on the construction drawings. The RWIC shall take special care to ensure that the bottom course of block units are in full contact with the leveling pad, are set level and true and are properly aligned according to the locations shown on the construction drawings.
 2. Backfill shall be placed in front of the bottom course of blocks prior to placement of subsequent block courses. Nonwoven geotextile fabric shall be placed in the V-shaped joints between adjacent blocks. Drainage aggregate shall be placed in the V-shaped joints between adjacent blocks to a minimum distance of 12" (300 mm) behind the block unit. If stone infill of hollow core blocks exceeds 45% of the block design volume, drainage aggregate will not be required to extend beyond the back of the blocks, with the approval of the RWDE.
 3. Drainage aggregate shall be placed in 9-inch maximum lifts and compacted by a minimum of three (3) passes of a vibratory plate compactor capable exerting a minimum of 2,000 lb (8.9 kN) of centrifugal force.
 4. Unit core fill shall be placed in the precast modular block unit vertical core slot. The core fill shall completely fill the slot to the level of the top of the block unit. The top of the block unit shall be broom-cleaned prior to placement of subsequent block courses. No additional courses of precast modular blocks may be stacked before the unit core fill is installed in the blocks on the course below.
 5. Base course blocks for gravity wall designs (without geosynthetic soil reinforcement) may be furnished without vertical core slots. If so, disregard item 4 above, for the base course blocks in this application.
 6. Nonwoven geotextile fabric shall be placed between the drainage aggregate and the retained soil (gravity wall design) or between the drainage aggregate and the reinforced fill (reinforced wall design) as required on the retaining wall construction drawings.
 7. Subsequent courses of block units shall be installed with a running bond (half block horizontal course-to-course offset). With the exception of 90-degree corner units, the shear channel of the upper block shall be fully engaged with the shear knobs of the block course below. The upper block course shall be pushed forward to fully engage the interface shear key between the blocks and to ensure consistent face batter and wall alignment. Geogrid, drainage aggregate, unit core fill, geotextile and properly compacted backfill shall be complete and in-place for each course of block units before the next course of blocks is stacked.
 8. The elevation of retained soil fill shall not be less than 1 block course (18 inches (457 mm)) below the elevation of the reinforced backfill throughout the construction of the retaining wall.
 9. If included as part of the precast modular block wall design, cap units shall be secured with an adhesive in accordance with the precast modular block manufacturer's recommendation.

- D. Geogrid Reinforcement Installation (if required)
1. Geogrid reinforcement shall be installed at the locations and elevations shown on the construction drawings on level fill compacted to the requirements of this specification.
 2. Continuous 12" (300 mm) wide strips of geogrid reinforcement shall be passed completely through the vertical core slot of the precast modular block unit and extended to the embedment length shown on the construction plans. The strips shall be staked or anchored as necessary to maintain a taut condition.
 3. Reinforcement length (L) of the geogrid reinforcement is measured from the back of the precast modular block unit. The cut length (L_c) is two times the reinforcement length plus additional length through the block facing unit. The cut length is calculated as follows:

$$L_c = 2*L + 3 \text{ ft } (2*L + 0.9 \text{ m}) \text{ (28" (710 mm) block unit)}$$

$$L_c = 2*L + 5 \text{ ft } (2*L + 1.5 \text{ m}) \text{ (41" (1030 mm) block unit)}$$

4. The geogrid strip shall be continuous throughout its entire length and may not be spliced. The geogrid shall be furnished in nominal, prefabricated roll widths of 12" (300 mm) +/- 1/2" (13 mm). No field modification of the geogrid roll width shall be permitted.
 5. Neither rubber tire nor track vehicles may operate directly on the geogrid. Construction vehicle traffic in the reinforced zone shall be limited to speeds of less than 5 mph (8 km/hr) once a minimum of 9 inches (230 mm) of compacted fill has been placed over the geogrid reinforcement. Sudden braking and turning of construction vehicles in the reinforced zone shall be avoided.
- E. Construction Tolerance. Allowable construction tolerance of the retaining wall shall be as follows:
1. Deviation from the design batter and horizontal alignment, when measured along a 10' (3 m) straight wall section, shall not exceed 3/4" (19 mm).
 2. Deviation from the overall design batter shall not exceed 1/2" (13 mm) per 10' (3 m) of wall height.
 3. The maximum allowable offset (horizontal bulge) of the face in any precast modular block joint shall be 1/2" (13 mm).
 4. The base of the precast modular block wall excavation shall be within 2" (50 mm) of the staked elevations, unless otherwise approved by the Inspection Engineer.
 5. Differential vertical settlement of the face shall not exceed 1' (300 mm) along any 200' (61 m) of wall length.
 6. The maximum allowable vertical displacement of the face in any precast modular block joint shall be 1/2" (13 mm).
 7. The wall face shall be placed within 2" (50 mm) of the horizontal location staked.

3.05 WALL INFILL AND REINFORCED BACKFILL PLACEMENT

- A. Backfill material placed immediately behind the drainage aggregate shall be compacted as follows:
1. 98% of maximum dry density at $\pm 2\%$ optimum moisture content per ASTM D698 standard proctor or 85% relative density per ASTM D4254.
- B. Compactive effort within 3' (0.9 m) of the back of the precast modular blocks should be accomplished with walk-behind compactors. Compaction in this zone shall be within 95% of maximum dry density as measured in accordance with ASTM D698 standard proctor or 80%

- relative density per ASTM D 4254. Heavy equipment should not be operated within 3' (0.9 m) of the back of the precast modular blocks.
- C. Backfill material shall be installed in lifts that do not exceed a compacted thickness of 9" (230 mm).
 - D. At the end of each work day, the RWIC shall grade the surface of the last lift of the granular wall infill to a 3% ± 1% slope away from the precast modular block wall face and compact it.
 - E. The General Contractor shall direct the Grading Contractor to protect the precast modular block wall structure against surface water runoff at all times through the use of berms, diversion ditches, silt fence, temporary drains and/or any other necessary measures to prevent soil staining of the wall face, scour of the retaining wall foundation or erosion of the reinforced backfill or wall infill.

3.06 OBSTRUCTIONS IN THE INFILL AND REINFORCED FILL ZONE

- A. The RWIC shall make all required allowances for obstructions behind and through the wall face in accordance with the approved construction shop drawings.
- B. Should unplanned obstructions become apparent for which the approved construction shop drawings do not account, the affected portion of the wall shall not be constructed until the RWDE can appropriately address the required procedures for construction of the wall section in question.

3.07 COMPLETION

- A. For walls supporting unpaved areas, a minimum of 12" (300 mm) of compacted, low-permeability fill shall be placed over the granular wall infill zone of the precast modular block retaining wall structure. The adjacent retained soil shall be graded to prevent ponding of water behind the completed retaining wall.
- B. For retaining walls with crest slopes of 5H:1V or steeper, silt fence shall be installed along the wall crest immediately following construction. The silt fence shall be located 3' to 4' (0.9 m to 1.2 m) behind the uppermost precast modular block unit. The crest slope above the wall shall be immediately seeded to establish vegetation. The General Contractor shall ensure that the seeded slope receives adequate irrigation and erosion protection to support germination and growth.
- C. The General Contractor shall confirm that the as-built precast modular block wall geometries conform to the requirements of this section. The General Contractor shall notify the Owner of any deviations.

END OF SECTION

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SECTION 32 92 19**SEEDING**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work specified herein and elsewhere
 - 1. Work under this section includes:
 - a. Fine grading of topsoil.
 - b. Seeding.
 - c. Care of grass during establishment period.
 - d. 3-Year Maintenance of Restoration

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Seeding
 - 1. Measurement: This Work will be measured for payment per square yard, in place within the limits indicated on the Contract Drawings, including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices.
 - 2. Payment: The Unit Price per square yard shall include full compensation for all seeding furnishings and installation of specific type as indicated on the plans and specified for quantities determined above. Any landscaping seeding required in excess of the maximum quantity allowed by the Contract Limits shown on the Contract Drawings shall be furnished by Contractor at Contractor's own expense.
- B. Sodding
 - 1. Measurement: In accordance with IDOT Standard Specifications, Section 252.
 - 2. Payment: This work will be paid for at the contract unit price per square yard in accordance with IDOT Standard Specifications, Section 252. The contractor shall provide supplemental watering as necessary for full establishment of sod, owner to provide water.
- C. Interseeding
 - 1. Measurement: This Work will be measured for payment per square yard, in place within the limits indicated on the Contract Drawings, including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices.
 - 2. Payment: The Unit Price per square yard shall include full compensation for all interseeding furnishings and installation of specific type as indicated on the plans and specified for quantities determined above. Any interseeding required in

excess of the maximum quantity allowed by the Contract Limits shown on the Contract Drawings shall be furnished by Contractor at Contractor's own expense.

Methods of interseeding shall be determined by the contractor to successfully integrate the new seed class and shall follow the construction requirements in accordance with the IDOT Standard Specifications, Section 250.

D. Erosion Control Blanket

1. Measurement: This Work will be measured for payment per square yard, in place within the limits indicated on the Contract Drawings, including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices.
2. Payment: The Unit Price per square yard shall include full compensation for all erosion control blanket furnishings and installation as indicated on the plans and specified for quantities determined above. Any landscaping required in excess of the maximum quantity allowed by the Contract Limits shown on the Contract Drawings shall be furnished by Contractor at Contractor's own expense.

E. Project Maintenance and Monitoring (Bangs Lake to Larkdale Row)

1. Measurement: This Work will be measured for payment at the unit price per year, starting the date of substantial completion.
2. Payment: The Unit Price per year shall include full compensation for all maintenance-related tasks as detailed in section 3.14 of this specification. The project maintenance and monitoring shall take place from Bangs Lake to Larkdale Row culvert crossing.

Owner to make payments on the maintenance contract item twice per year, once after the spring maintenance and once after the fall maintenance. If maintenance is determined that it is not required, payment will not be required by the Owner.

F. Project Maintenance and Monitoring (Larkdale Row to IL Route 176)

1. Measurement: This Work will be measured for payment at the unit price per year, starting the date of substantial completion.
2. Payment: The Unit Price per year shall include full compensation for all maintenance-related tasks as detailed in section 3.14 of this specification. The project maintenance and monitoring shall take place from Larkdale Row to IL Route 176.

Owner to make payments on the maintenance contract item twice per year, once after the spring maintenance and once after the fall maintenance. If maintenance is determined that it is not required, payment will not be required by the Owner.

1.03 RELATED SECTIONS

- A. Section 31 22 19 - Finish Grading
- B. Section 01 57 13 – Temporary Erosion and Sediment Control

PART 2 PRODUCTS

2.01 LIME

- A. Lime shall be agricultural grade dolomitic limestone, ground sufficiently fine so that at least 80 percent will pass through a No. 8 sieve, and it shall contain not less than 80 percent calcium carbonate equivalent. Moisture content at time of delivery shall not exceed 8 percent.

2.02 FERTILIZER

- B. Fertilizer shall be a composition recommended by a local County Agricultural Agent or State Agricultural Extension Service or a preformulated 10 - 6 - 4 mixture.

2.03 EROSION CONTROL FABRIC

- A. Erosion control fabric shall consist of a knitted mesh of polypropylene yarn interwoven with uniform strips of paper designed to degrade over selected periods of time recommended by the manufacturer for the specific installation and approved by the Engineer. Both the yarn and paper shall be biodegradable. Fabric shall weigh approximately 0.2 pounds per square yard. Staples to hold fabric in place shall be 6 inches long of 11 gage wire.

2.04 JUTE MATTING EROSION CONTROL

- A. Jute matting for erosion control shall be of plain, uniform, open-weave, new and unbleached single jute yarn. The matting shall have approximately 1 inch square openings between strands and shall weigh approximately 1 pound per square yard.

2.05 VEGETATIVE MULCH

- A. Vegetative mulch for seeded areas shall be a high quality, air-dried straw of wheat, rye, oats, beans or other approved straw, and shall be free from Johnson grass, broom sedge, noxious weeds and weed seeds detrimental to growth of grass.

2.06 WATER

- A. Water shall be free from oil, acid, alkali, salts, and other harmful substances.

2.07 SEED

- A. Seed shall be new crop seed furnished in standard sealed containers bearing seed tags showing purity, germination and weed seed content. The seed shall be reasonably free of wild onion, Canadian thistle, Johnson grass, crab grass and seeds of other noxious weeds. Weed content shall not exceed 1 percent.
- B. Seed which has been wet, moldy or otherwise damaged in transit or storage, shall not be used. Seed mixtures shall be composed by weight and meet the minimum requirements as specified below.

<u>Seed Type</u>	<u>Purity</u>	<u>Germination</u>
Kentucky Blue Grass	80%	70%
Red Top	90%	90%
Red Fescue	95%	90%
Alta Fescue	98%	80%

Annual Ryegrass	92%	85%
Perennial Ryegrass	94%	80%

- C. On slopes steeper than four horizontal to one vertical, use a mixture of 20% Red Top, 20% Creeping Red Fescue, 45% Kentucky Blue Grass, and 15% Annual Ryegrass sown at a rate of 3 pounds per 1,000 square feet.
- D. In level areas, use a mixture of 60% Kentucky Blue Grass, 15% Red Fescue, 10% Red Top, and 15% Annual Ryegrass sown at a rate of 3 pounds per 1,000 square feet.
- E. Crown Vetch ground cover shall be used on earthen basin interior slopes and where otherwise indicated on the contract drawings, and shall consist of a mixture of 60% Crown Vetch, 25% Annual Ryegrass, and 15% White Dutch Clover, and shall be sown at a rate of 1 pound per 1,000 square feet.
- F. Seeding for areas not to be routinely mowed shall be 35% Perennial Ryegrass, 10% Red Top, and 55% Alta Fescue, sown at a rate of 140 pounds per acre.

2.08 HYDROSEED

- A. At Contractor's option, hydroseeding may be substituted for seeding, but at no additional cost.
- B. The composition and type of hydroseed mixture shall conform to the following:

Mulch:

Weyerhaeuser's Sylva-Fiber
1,200 - 1,500 lbs./acre

Adhesive

Terra-Tack
40 lbs./acre

Fertilizer

10 - 10 - 10 Mix of Nitrogen
Phosphorous Potassium
400 lbs./acre

Grass Seed

25% Perennial Ryegrass
25% Reuben's Kentucky Bluegrass
25% Common Kentucky Bluegrass
25% Creeping Red Fescue
150 lbs./acre

Water

3,000 gals/acre

- C. Contractor may propose to use a hydroseed mixture other than that shown above. However, Contractor shall submit to the Engineer, prior to hydroseeding, the mixture

Contractor proposes to use. The mixture must be approved by the Engineer prior to its use.

2.09 SOD

- A. Sod shall be either field or nursery grown sod that is native to the locality of the Project. Contractor shall obtain Engineer's approval of the source of the sod prior to cutting the sod.
- B. Sod grown on soil high in organic matter, such as peat, will not be acceptable. The consistency of sod shall be such that it will not break, crumble or tear during handling and placing. Sod shall be reasonably free of stones, crab grass, noxious weed, and other objectionable plants or substances injurious to plant growth.
- C. Sod shall have at least 1 inch of soil adhering firmly to the roots and cut in rectangular pieces with the shortest side not less than 12 inches. At the time of cutting sod the grass shall be mowed to a height not less than 2 inches nor more than 4 inches.
- D. Sod cut for more than 48 hours shall not be used without the approval of the Engineer.

2.10 INTERSEEDING

- A. Evaluate the existing stand for exotic and invasive species. If present, a herbicide treatment may be necessary to reduce and control weed pressure prior to interseeding. Determine whether the herbicide used has a residual carryover that will require a certain amount of time to pass prior to interseeding, and plan accordingly.

PART 3 EXECUTION

3.01 REGRADING OF TOPSOIL

- A. Topsoil shall be graded reasonably smooth and level after final settlement. All humps shall be removed and depressions or eroded areas filled in with additional topsoil before proceeding with seeding.

3.02 PREPARATION FOR SODDING OR SEEDING

- A. Preparation shall not be started until all other site work, and utility work, and finished grading within the areas to be seeded have been completed.
- B. Loosen topsoil by tilling it to a depth of at least 3 inches and smooth out all surface irregularities resulting therefrom. Leave area free of rocks or hard soil clods which will not pass through the tines of a standard garden rake.
- C. At least 7 days before applying fertilizer, spread lime uniformly in sufficient quantity to produce in the soil a pH of 6.5. Work lime thoroughly into topsoil to a depth of 3 inches.
- D. Apply fertilizer uniformly at a rate of 270 pounds per acre. Work fertilizer into soil prior to seeding or sodding.

3.03 SODDING

- A. Provide sod in areas of high erosion as ditches and drainage swales and on all embankment slopes steeper than 3 to 1 unless protection is provided against erosion of

seeding. At Contractor's option, sodding may be substituted for seeding, but at no additional cost.

- B. Place sod with the edges in close contact and alternate courses staggered. Lightly tamp or roll to eliminate air pockets. On slopes 2 to 1 or steeper, stake sod with not less than 4 stakes per square yard and with a least one stake for each piece of sod. Stakes shall be driven with the flat side parallel to the slope. Do not place sod when the ground surface is frozen or when air temperature may exceed 90 degrees F.
- C. In ditches, the sod shall be placed with the longer dimension perpendicular to the flow of water in the ditch. On slopes, starting at the bottom of the slope, the sod shall be placed with the longer dimension parallel to the contours of the ground.
- D. All exposed edges of sod shall be buried flush with the adjacent turf.
- E. Within 8 hours after placement begin watering and continually keep moist until the sod has firmly knit itself to the topsoil and becomes well established.

3.04 SEEDING

- A. Seed all areas disturbed by construction operations and not receiving sod, and as indicated on contract drawings.
- B. Seed shall be sown between September 1 and November 1, or in spring from time ground can be worked until May 15.
- C. Apply seed during favorable climatic conditions. Do not seed in windy weather or when soil is very wet. Sow seed at the rate specified for each seed mixture. Sow seed either mechanically or by broadcasting in two directions at right angles to each other to achieve an even distribution of seed.
- D. After seeding, rake seed lightly into ground and roll with a roller weighing between 100 and 200 pounds per foot of roller width.

3.05 PREPARATION FOR INTERSEEDING

- A. Interseeding site preparation may include mowing, spraying, tillage, prescribed burning, or grazing to suppress or kill the existing stand. To reduce a thick thatch layer, tillage, prescribed burning, or grazing may be necessary.

3.06 INTERSEEDING

- A. Construction Requirements for interseeding shall be in accordance with IDOT Standard Specifications, Section 250.

3.07 EROSION CONTROL MATTING OR FABRIC

- A. Immediately after rolling seeded areas, place erosion control fabric or jute matting on slopes steeper than 3 horizontal to 1 vertical. Unless otherwise indicated, also place erosion control material at sides and bottom of ditches, swales, and all areas within 10 feet of catch basins in seeded areas.
- B. Apply erosion control in accordance with Article 280 of the Illinois Department of Transportation Standard Specification for Road and Bridge Construction, referenced herein as the "STD. SPECS."

3.08 MULCHING SEEDED AREAS

- A. Immediately after rolling seeded areas, apply mulch at the rate of 2 tons per acre within 24 hours after seeding. Use vegetative mulch on all seeded areas unless otherwise approved or specified. Upon approval of the Engineer, fragmented mulch may be substituted for straw mulch.
- B. Apply mulch in accordance with Article 280 of the "STD. SPECS."

3.09 WATERING

- A. Immediately after placing erosion control or mulch, water seeded areas thoroughly with a fine mist spray. Keep soil thoroughly moist until seeds have sprouted and achieved a growth of 1 inch. For sod, immediately begin watering and continually keep moist until the sod has firmly knit itself to the topsoil.

3.10 PROTECTION OF WORK

- A. Protect newly seeded and sodded areas from all traffic by erecting temporary fences and signs. Protect slopes from erosion. Properly and promptly repair all damaged work when required.

3.11 APPLICATION OF FERTILIZER

- A. Six weeks after completion of seeding or sodding apply granular fertilizer over all areas at the rate of two pounds of nitrogen nutrients per 1,000 square feet of area.

3.12 CLEAN-UP

- A. At the time of final inspection of the work, but before Final Acceptance, remove from seeded and sodded areas all debris, rubbish, excess materials, tools, and equipment.

3.13 GUARANTY

- A. In addition to the guaranties specified in Section 00 72 00 - General Conditions, comply with the following requirements:
- B. All seeding and sodding shall be guaranteed by Contractor to be true to name and in a vigorous growing condition through one growing cycle including one summer and one winter season.
- C. Maintenance for lawns shall begin immediately after seeding or sodding. Provide watering, mowing and replanting and continue as necessary until a close healthy stand of specified grasses is established.

3.14 MAINTENANCE

- A. The Contractor shall provide at least 3 growing seasons of onsite plant maintenance, management and stewardship or until vegetation is established and fully accepted.
- B. The Contractor and the Owner shall inspect the site at least twice per year. These inspections shall occur approximately around May 1st and July 15th unless the parties agree to an adjusted schedule. The vegetative monitoring will be based on meander surveys of all seeded areas. During these inspections, the site shall be evaluated for germination and presence of both the desired native species and of the presence of non-native, weedy or

invasive species. Upon site inspection, any determined maintenance actions should be performed to best assure the successful establishment of the desired species. These inspections shall continue through the second and final year of the term, with specific remedial actions determined and scheduled after each inspection of the site.

- C. The Contractor shall treat re-emerging invasive species and noxious weeds a minimum of two times per year (Spring and Fall). Condition of the erosion control blanket shall be inspected and defects remedied, and bare spots shall be supplemented with additional seed.
- D. Within one week of completion of each site visit, the contractor shall document the activities undertaken, condition of the site, status of germination of the planted seed, and identify any necessary actions to remedy issues observed. The owner or engineer shall be present for the inspections.
- E. Herbicide Maintenance Treatments shall include either Glyphosate (Roundup) or Clopyralid (Transline). The Contractor shall apply the herbicides per the manufacturer's recommendations and as instructed by the Owner. The application may be selective in nature, or broadly applied depending on the composition of the vegetation present at the time of treatment.
- F. When indicated by the site inspections, the Contractor shall perform additional seeding in specific areas as directed by the Owner. The seed mix shall be the original mix specified and the installation method shall be determined by the extent of vegetation present in the targeted areas.

3.15 LAWN REPLACEMENT

- A. Lawn not showing a close uniform stand of healthy specified grasses at the end of the guaranty period shall be replaced and maintained until acceptance. Scattered bare spots, none of which is larger than one square foot, will be allowed up to a maximum of 3% of the total area.

END OF SECTION

SECTION 33 01 30.01**BYPASS PUMPING**

PART 1 GENERAL

1.01 DESCRIPTION

A. Work Specified Herein and Elsewhere

1. The Work under this Section includes:
 - a. Bypass Pumping around sections of Sanitary Sewer designated for rehabilitation.
2. Related Work specified elsewhere:
 - a. Utilities Trenching, Bedding and Backfilling - Section 02221

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Bypass Pumping for Sanitary Sewer

1. Measurement: Bypass Pumping will not be measured for payment but will be paid for at the contract lump sum price.
2. Payment: This work will be paid for at the contract lump sum price for Bypass Pumping associated with sanitary sewer replacement or rehabilitation at locations shown on the plans. This pay item shall include all bypass pumping required for the project and no additional compensation will be paid for additional bypass pumping necessary than what is currently shown on the plans.

1.03 RESPONSIBILITY

- A. Contractor is solely responsible for the design, installation, operation, an subsequent removal of Bypass Pumping systems and their safety and conformity with local codes and regulations.

PRODUCTS - NOT USED

EXECUTION

3.01 BYPASS PUMPING

- A. Bypassing of the flow around the sections of pipe designated for rehabilitation shall be made by plugging the line at a point upstream of the proposed work and pumping the flow to a downstream point. Contractor shall maintain continuous sanitary service for all sewer customers.

It shall be the responsibility of the Contractor to plan and execute, where necessary, bypass pumping operations sufficient to avoid causing sewer back-ups to residential and commercial customers, and to avoid illegal discharge onto land or into waterways.

- B. Wherever practical, bypass pumping intakes shall be located in existing manholes. The Contractor shall take all necessary precautions to avoid creating surcharged conditions in the sewer collection and transmission systems located upstream from the work zones and shall immediately remedy any condition which, in the opinion of the E/A, is likely to cause sewage back-ups in homes or businesses. If it is necessary to excavate sump pits adjacent to existing sewer lines or manholes in order to accomplish bypass pumping objectives, the Contractor shall submit excavation plans to the E/A for approval prior to commencing this work. Excavated sump pits shall be considered incidental to the contract, and shall be performed at no additional charge.
- C. Provide ramps for hoses at all street and driveway crossings.
- D. The Contractor shall take all necessary precautions to ensure that in the event of bypass pump system failure, alternate systems are in place to prevent sewer back-up. The Contractor is required at a minimum to provide on-site at all times while bypass operations are in effect, a back-up pumping system of equal or greater pumping capacity than the primary bypass pump system.
- E. A bypass pumping plans shall be submitted for review and approval two weeks prior to the start of construction. As part of this submittal, the Contractor shall list all bypass pumping locations, bypass pipe types, sizes and lengths, bypass pump sizes, alternate bypass pumping plans and pump sound level as stated in dBA. Bypass pumping plan diagrams may be attached. The costs of bypass pumping and backup bypass pumping systems and all related equipment and labor required for bypass pumping shall be included as part of the Contractor's unit price for Bypass Pumping.
- F. The Contractor shall provide written notice to all parties whose service laterals will be out of commission to advise against water usage until the mainline is back in service. Written notices must be approved by E/A prior to publication, and must contain specific information as to when the service disruption will begin and end. No customer shall be deprived of sanitary sewer service for more than six consecutive hours. If service disruption exceeds six hours, the Contractor may, with prior approval by the E/A, excavate the service lateral to facilitate bypass pumping, or may pay for temporary lodging for the affected customer. The Contractor shall assume responsibility for any damage to private property resulting from failure to provide adequate bypass pumping services. Excavation of service laterals for the purpose of bypass pumping, as well as restoration of excavated laterals, shall be considered incidental to the contract, and shall be done at no additional charge.
- G. The Contractor's bypass pumping system shall be capable of conveying the maximum flow in the existing sewer.

END OF SECTION

SECTION 33 05 62**PRECAST CONCRETE MANHOLES & UTILITY STRUCTURES**

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work includes the furnishing and installation of precast concrete structures to include but not limited to manholes, wet wells, utility vaults, draw off structures and headwalls.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Sanitary Manholes

1. Measurement: The number of sanitary sewer manhole/drop manholes structures to be paid for under this Unit Price Item shall be equal to the actual number of structures furnished and installed.
2. Payment: The Unit Price for this Unit Price Item shall constitute full compensation for furnishing and installing structures, complete with appurtenances, steps, frame and lid, external chimney seals, external drop connection (where applicable), internal and external coatings, manhole pipe connectors, excavation, dewatering, removal of surplus excavated material off-site, topsoil removal, bedding and backfill as indicated on the Contract Drawings and as specified including all Work incidental thereto and not specifically included for payment under other Unit Price Items.

B. Sanitary Manhole Modifications

1. Measurement: The number of sanitary sewer manhole structure modifications to be paid for under this Unit Price Item shall be equal to the actual number of structures modified as shown on the plans.
2. Payment: The Unit Price for this Unit Price Item shall constitute full compensation for modifications to existing structures, including coring, plugging, patching, external coatings, manhole pipe connectors, excavation, dewatering, removal of surplus excavated material off-site, topsoil removal, bedding and backfill as indicated on the Contract Drawings and as specified including all Work incidental thereto and not specifically included for payment under other Unit Price Items.

C. Sanitary Manhole Adjustments Including External Chimney Seal

1. Measurement: The number of sanitary sewer manhole adjustments including external chimney seal to be paid for under this Unit Price Item shall be equal to the actual number of structures adjusted with external chimney seals.
2. Payment: The Unit Price for this Unit Price Item shall constitute full compensation for height adjustments to existing structures to match proposed grades including the installation of a external chimney seal; including excavation, dewatering, removal of surplus excavated material off-site, topsoil removal, bedding and backfill as indicated on the Contract Drawings and as specified including all Work incidental thereto and not specifically included for payment under other Unit Price Items.

1.03 RELATED SECTIONS

- B. Section 31 23 00 - Excavation & Fill

1.04 REFERENCE STANDARDS

- A. IDOT Highway Standards and Standard Specifications for Road and Bridge Construction
- B. Standard Specifications for Water and Sewer Main Construction in Illinois (Standard Specifications)
- C. ASTM A48/A48M - Standard Specification for Gray Iron Castings
- D. ASTM C150 – Standard Specification for Portland Cement
- E. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete
- F. ASTM C595 - Standard Specification for Blended Hydraulic Cements
- G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- H. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections
- I. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete
- J. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile
- K. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures
- L. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
- M. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
- N. ASTM D4101 - Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials

1.05 SUBMITTALS

- A. Make submittals in accordance with Section 01 33 00.
- B. Submit copies of all test reports.
- C. Submit certificates signed by materials supplier and Contractor that surfacing materials meet specification requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete and Reinforcement per ASTM C478.

1. Portland Cement Type II or IP (MS) Type I or II shall conform to ASTM C150. Type IP shall conform to ASTM C595. Type IP (MS) shall not contain more than 25% pozzolan.
 - a. Fly ash shall not be used as the pozzolan.
 2. Air-entraining admixtures shall conform to ASTM C260.
- B. Manhole frames and covers
1. ASTM A48, Class 308 cast iron with horizontal and vertical mating surfaces machined.
 2. Frames and covers shall be heavy duty and capable of sustaining wheel loads of 16,000 pounds.
 3. Frames shall be provided with two anchor boltholes for attachment to manhole section.
 4. Solid coverlids shall be provided with one concealed pickhole and shall be of the self-sealing type with a one-eighth (1/8) inch rubber gasket all around the lip where the cover rests.
 5. Frame and lid shall be as noted in the drawings.
 6. All workmanship and materials shall be of the highest quality. The manhole cover shall be the product of a manufacturer actively engaged in research, development, and manufacturing of watertight manhole rings and covers.
- C. Manhole & utility vault steps
1. ASTM A48, Class 308 cast iron equal to Neenah R-1980E; or reinforced polypropylene meeting the requirements outlined in ASTM D4101.
 2. Steel used as internal reinforcement shall be a deformed 3/8 inch diameter reinforcing rod, grade 60 conforming to all of the requirements of ASTM A-615.
 3. Step shall be Model #PS-I as manufactured by M.A. Industries, Incorporated, Peachtree City, Georgia or equal.
 4. Load and pullout ratings shall meet OSHA requirements.
- D. Pipe Gaskets
1. Z-Lok flexible pipe to manhole connector meeting ASTM C923.
- E. Joint Sealant
1. Butyl-rubber-based preformed flexible sealant conforming to ASTM C990.
- F. External Sanitary Manhole Chimney Seals
1. External rubber seals used for sealing the joint between the manhole or valve vault frame and the chimney or corbel/cone section, shall be Classic model manufactured by Cretex or approved equal.

- G. External Sanitary Manhole Coatings
 - 1. Outside surface of manholes and valve vaults (bases, risers, and cones) shall be waterproofed with two coats coal tar epoxy.
- H. External Sanitary Manhole Sealing System
 - 1. All manhole riser joints are to be sealed with an external sealing system consisting of extruded rolls of EPDM rubber with mastic on both edges of one side.
 - 2. Thickness to be 60 mil and mastic shall be a non-hardening butyl rubber sealant.
 - 3. Materials to meet specifications ASTM C923, ASTM C443 and ASTM F477.
 - 4. Product to be Infi-Shield Barrel and Cone Seal or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. General Requirements
 - 1. Examine each precast section upon arrival to the jobsite for cracks and other unsightly imperfections or structural defects. Notify the Engineer in the event that defects have occurred.

3.02 PREPARATION

- A. Waterproofing
 - 1. Repair all cracks, holes and voids as specified in Section 03 31 00.
 - 2. Protect other work from spillage of materials and prevent materials from penetrating and clogging drains.
 - 3. Clean concrete substrate free of loose aggregate, protrusions, dirt, dust, oil, grease, asphalt, curing compound or other substances, which would affect installation of membrane. Surface shall be smooth, dry, and free of voids, standing water, snow or ice.

3.03 FABRICATION

- A. Manhole steps shall be no more than 16 inches, center to center, and shall be placed with the top steps within 6 inches of the top of the benching, and the bottom step within 12 inches of the top of the concrete channel fillet.
- B. Access hatches shall be integrally cast into the structure lid section.

3.04 INSTALLATION

- A. Precast sections shall be laid so that the axis is vertical and shall be constructed in accordance with the manufacturer's recommendations.

- B. Joints of precast sections shall be sealed, and leak proofed by the use of Butyl Rubber flexible joint sealant conforming to ASTM C990. Exposed grooves shall be completely filled with the sealant. Sealant shall extend at least 4 inches on either side of the joint with a minimum thickness of one-quarter (1/4) inch unless the manufacturer recommends a thicker application.
- C. No backfilling of structure excavation above elevation of top of interior concrete fill shall be performed until waterproof coating has cured for at least twenty-four (24) hours and inspected and approved by the Engineer.
- D. Contractor shall construct manhole flow channels of concrete of sewer pipe of semi-circular section conforming to the inside diameter of the connecting sewers. Contractor shall make changes in size or grade gradually and changes in direction by true curves. Contractor shall provide such channels for all connecting sewers to each manhole and benching as shown on the plans.
- E. Contractor shall provide drop inlets into manholes or sanitary sewers for incoming lines having inverts two (2) feet or more above the invert of the manhole outlet lines. Contractor shall encase drop pipe and fittings in concrete extending from manhole base to top of the incoming sewer.
- F. Unless otherwise shown on the drawings, set frames and covers for manholes at exact finished grade or street surface, and, where possible, over the invert near the steps to facilitate future cleaning.
- G. Set frames and covers accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from the established lines and levels. Follow manufacturer's installation instructions.
- H. Frames and covers placed on concrete surfaces shall be set in full coat tar sealant or bituminous mastic beds having a thickness of at least one-quarter (1/4) inch.
- I. Two widths of joint sealant tape shall be used across stepped joints.

3.05 FIELD QUALITY CONTROL

A. Vacuum Testing

1. General: Test using air prior to backfilling to assist in locating leaks. Make joint repairs on both outside and inside of joint to ensure permanent seal. Test manholes with manhole frame set in place.
2. Vacuum test in accordance with ASTM C1244 and as follows:
 - a. Plug pipe openings; securely brace plugs and pipe.
 - b. Inflate compression band to effect seal between vacuum base and structure; connect vacuum pump to outlet port with valve open; draw vacuum to 10 inches of Hg; close valve; start test.
 - c. Test:
 - 1) Determine test duration for manhole from the following table:

Manhole Diameter	Test Period
4 feet	60 seconds
5 feet	75 seconds
6 feet	90 seconds

- 2) Record vacuum drop during test period; when vacuum drop is greater than 1 inch of Hg during test period, repair and retest manhole; when vacuum drop of 1 inch of Hg does not occur during test period, discontinue test and accept manhole.
- 3) When vacuum test fails to meet 1 inch Hg drop in specified time after repair, repair and retest manhole.

END OF SECTION

00 00 01 - Cover - Bidding SECTION 33 14 12**WATER UTILITY TRANSMISSION & DISTRIBUTION PIPING**

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Water utility transmission mains.
 - 2. Water utility distribution system mains.
- B. Related Sections:
 - 1. Section 31 23 33 – Trenching and Backfilling
 - 2. Section 33 14 19 – Valves and Hydrants for Water Utility Service

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Pipe and Fittings (via Open Cut Construction)
 - 1. Measurement: By linear foot.
 - 2. Payment: Includes furnishing all labor, materials, tools, all necessary equipment, earth and pavement excavation, laying, jointing, bedding, haunching and initial backfill, thrust restraints, pipe, fittings, dewatering, removal of surplus excavated material off-site, all temporary and permanent plugs, testing and disinfection of the pipe and fittings, installation of tracer wire complete in place as indicated on the Contract Drawings, including all Work incidental thereto and not specifically included for payment under other Unit Price Items.
- B. Water Main Encasement
 - 1. Measurement: The length of Water Main Encasement to be paid for under this Unit Price Item shall be measured by the lineal foot along the horizontal projection of the centerline of the complete Water Main Encasement. If the length of the Water Main Encasement is increased for the Contractors benefit, it will be at Contractor's expense.
 - 2. Payment: The Water Main Encasement to be paid for under this Unit Price Item shall constitute full compensation for furnishing all labor, materials, (including carrier pipe, casing pipe and sand fill of casing pipe void), tools, excavation, backfill, additional bonds and equipment necessary for constructing the Watermain Encasement, complete, as indicated on the Contract Drawings, and as specified, including all Work incidental thereto and not specified included for payment under other Unit Price Items in the Schedule of Unit Prices.

C. Water Main Removal

1. Measurement: The length of water main removal to be paid for under this Unit Price Item shall be measured by the foot along the horizontal projection of the centerline of the water main removed.
2. Payment: The Unit Price for this Unit Price Item shall include full compensation for removal and disposal of water main piping at specified type and diameter, including all temporary and permanent plugs, earth and roadway excavation, dewatering, cleaning up; tree protection, but not tree protection fencing; expose existing utilities as necessary to verify appropriate clearance is maintained; site restoration including rough and finish grading but not seeding or pavement replacement; removal of surplus excavated material off-site including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices. Payment for this Unit Price Item will be for the exact amount of pipe removed.

D. Insertion Valve

1. Measurement: Insertion Valves will be measured for payment at the contract unit price per each.
2. Payment: The Unit Price per each of this contract item shall constitute full compensation for furnishing all labor, materials, tools, excavation, backfill, and equipment necessary for installing the insertion valve of specified size on the existing pressurized water main, complete, as indicated on the Contract Drawings, and as specified, including all Work incidental thereto and not specified included for payment under other Unit Price Items in the Schedule of Unit Prices.

The insertion valve shall be operational to isolate the water main within the work zone to perform the required shutdown(s) to complete the proposed work.

1.03 REFERENCES

- A. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- B. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- C. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
- D. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- E. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
- F. AWWA C651 - Disinfecting Water Mains
- G. AWWA C900 - Polyvinyl Chloride Pressure Pipe and Fabricated Fittings, 4 inch through 12 inch for Water Distribution

- H. AWWA C905 - Polyvinyl Chloride Pressure Pipe and Fabricated Fittings, 14 inch through 48 inch for Water Distribution

1.04 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures
- B. Shop Drawings: Submit shop drawings for pipe, fittings and accessories.
- C. Product Data: Submit data indicating pipe material used, pipe accessories, restrained joint details and materials.
- D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Do not place materials on private property without written permission of property owner.
- C. During loading, transporting and unloading, exercise care to prevent damage to materials.
- D. Do not drop pipe or fittings.
- E. Avoid shock or damage to pipe.
- F. Take measures to prevent damage to exterior surface or internal lining of pipe.
- G. Do not stack pipe higher than recommended by pipe manufacturer.
- H. Store gaskets for mechanical and push-on joints in cool, dry location out of direct sunlight and not in contact with petroleum products.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile Iron Pipe: AWWA C151; standard cement mortar lining, AWWA C104, outside coated.
 - 1. Pipe diameter 3" to 12 ": Pressure Class - 350 psi.
 - 2. Pipe diameter 14" and greater: Pressure Class – 250 psi.
- B. Ductile Iron Fittings (All Fittings):
 - 1. AWWA C110; - 250 psi pressure rating.
 - 2. Fitting to be cement mortar lined and outside coated as per ductile iron pipe.

3. Hardware shall be 304 or 316 stainless steel.
 - C. Joints: AWWA C111, where not specifically indicated on Drawings.
 1. Type: Mechanical joint or push-on joint.
 - D. Rubber Gaskets, Lubricants, Glands, Bolts and Nuts: AWWA C111.
- 2.02 POLYVINYL CHLORIDE (PVC) PIPE
- A. PVC Pipe – 4" though 12" Nominal Pipe Size:
 1. ASTM D2241; SDR 21.
 2. AWWA C900; DR 18.
 - B. PVC Pipe - 14" Nominal Pipe Size and Greater:
 1. AWWA C905; DR 18.
- 2.03 UNDERGROUND PIPE MARKERS
- A. Tracer Wire: #12 AWG HS-CCS, Blue HDPE, 380# break load (Copperhead HS-CCS HDPE 30 MIL) or approved equal. For all water main and water service lines up to meter.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Verify excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on plans.

3.02 PREPARATION

- A. Correct over excavation with aggregate.
- B. Remove large stones or other hard matter capable of damaging pipe or impeding consistent backfilling or compaction.

3.03 BEDDING

- A. Excavate pipe trench and place bedding in accordance with Section 31 23 33 – Trenching & Backfilling.

3.04 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with plans.
- B. Route piping in straight line.
- C. Refer to Section 31 23 33 for haunching, backfilling and compacting requirements. Do not displace or damage pipe when compacting.

- D. Connect to manholes/structures as shown on the plans.

3.05 INSTALLATION - THRUST RESTRAINT

- A. Provide pressure pipeline with restrained joints or concrete thrust blocking at bends, tees, and changes in direction. Refer to Section 31 23 33 and the Typical Details included in the plans.

3.06 FIELD QUALITY CONTROL

- A. Perform hydrostatic pressure and leakage tests.
1. Conform to AWWA C600 procedures.
 2. Perform after backfilling.
 3. Test separately in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs.
 - a. Select test segments such that adjustable seated valves are isolated for individual checking.
 - b. Contractor shall furnish and install test plugs, including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs, and be responsible for any damage to public or private property caused by failure of plugs
 4. Limit fill rate of line to available venting capacity. Fill rate shall be regulated to limit velocity in lines when flowing full to not more than 1.4 fps.
 5. Owner shall make water for testing available to Contractor at nearest source.
 6. Pressure and Leakage Test
 - a. Conduct at a hydrostatic pressure equal to 50% more than the maximum expected operating pressure at the lowest elevation of the pipe section, but not to exceed the pressure rating of the pipe being tested.
 - b. Be at least 2-hour duration. Maintain pressure throughout test \pm 5 psi of test pressure.
 - c. Leakage test shall be conducted concurrently with the pressure test.
 - d. Acceptable when leakage does not exceed that determined by the following formula.

$$L = \frac{SD(\sqrt{P})}{148,000}$$

Where:

L = allowable leakage, in gallons per hour

S = length of pipe tested in feet

D = nominal diameter of the pipe, in inches

P = average actual leakage test pressure in pounds per square inch

- e. Repeat test as necessary until satisfactory performance of test. After location of leaks, repair or replace defective joints, pipe, or fittings. All visible leaks are to be repaired regardless of the amount of leakage.
- f. Engineer will witness pressure and leakage test.

3.07 DISINFECTION

- A. Verify piping system has been cleaned, inspected, and pressure tested.
- B. Disinfect pipeline installation in accordance with AWWA C651 – Continuous Feed Method.
 - 1. The chlorine residual needs to be a minimum of 0.5 ppm for free and/or 1.0 ppm for total to comply with Illinois Admin. Code, Title 35, Section 602.310.
 - 2. Chlorine shall be applied by Method (2) - Chlorine-Bearing Compounds in Water. Tablet disinfection (Method (3)) is strictly prohibited.
- C. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
- D. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
- E. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

3.08 PROTECTION OF FINISHED WORK

- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 14 18
WATER SERVICE CONNECTIONS

PART 1 GENERAL

1.01 WORK SPECIFIED HEREIN

- A. Work under this Section includes water services.

1.02 MEASUREMENT AND PAYMENT

- A. Water Service Reconnection for 321 Main Street

1. Measurement: The water service reconnection at 321 Main Street will not be measured for payment but paid at the contract lump sum price.
2. Payment: The lump sum price shall constitute full compensation for furnishing and installing water service; earth and pavement excavation and backfill; removal of surplus excavated material off-site; service saddle, corporation stop, copper service, and curb stop and box as specified or as shown on the Contract Drawings, all necessary fittings and materials for water service; including all work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices.

Contractor shall coordinate with Business owner regarding the scheduling and execution of the proposed work.

- B. Abandonment of Service Tap for 321 Main Street

1. Measurement: The Abandonment of Service Tap for 321 Main Street will not be measured for payment but paid at the contract lump sum price.
2. Payment: The lump sum price shall constitute full compensation for abandonment of the old tap location; removal of existing corporation stop and saddle and installation of a repair sleeve over the tap; including earth and pavement excavation and backfill; removal of surplus excavated material off-site; repair sleeve and all necessary fittings and materials for abandonment of the water service; including all work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices.

Contractor shall coordinate with Business owner regarding the scheduling and execution of the proposed work.

1.03 RELATED WORK

- A. Section 33 14 12 – Water Utility Transmission & Distribution Piping

1.04 REFERENCE STANDARDS

- A. Illinois Plumbing Code (Illinois Administrative Code 890, Title 77: Public Health, Chapter I: Department of Public Health, Subchapter r: Water and Sewage, Part 890), 2014 or as latest revised.

1.05 DEFINITIONS

- A. The following definitions shall apply for use in this Section:

PLUMBING CONTRACTOR - Any licensed plumber who performs plumbing work for another person. All plumbing contractors shall be registered with the State of Illinois.

PLUMBING INSPECTOR – An employee or agent of State or local government who holds a valid Illinois Plumbing License and is authorized to inspect plumbing.

WATER SERVICE or WATER SERVICE PIPE – The pipe from the water main or source of potable water supply to the water distribution pipe of the building served.

WATER DISTRIBUTION PIPE – A pipe within the building or on the premises that conveys water from the water service to the point of usage.

1.06 QUALITY ASSURANCE

- A. Responsibility

1. In accordance with the Illinois Plumbing Code, water services shall be installed by a licensed plumbing contractor. Installation shall be in accordance with the Illinois Plumbing Code and the approved Owner's amendments as referenced herein.
2. In accordance with Section 890.1910 of Illinois Plumbing Code, a plumbing system or any part thereof shall not be enclosed, covered up or used until the system has been inspected and approved by a licensed plumbing inspector. It is the responsibility of the plumber or plumbing contractor to arrange for the required inspection by the by the Illinois Department of Public Health or a local plumbing inspector, as jurisdictionally appropriate.

Owner does not have a licensed plumbing inspector on staff. Contractor shall be responsible for providing and paying for a licensed plumbing inspector to perform the required initial inspection. Any costs for subsequent or re-inspection(s) shall be the responsibility of the Contractor and no additional compensation from the Owner will be provided.

3. Water services shall be inspected by a licensed plumbing inspector. The Owner shall be provided with a copy of the plumbing inspection report showing compliance with the Illinois Plumbing Code. The OWNER and its representatives may perform additional inspections and observations. Such inspections by the Owner are for general conformance of the work with the Contract Drawings and Owner's requirements, and do not substitute for or replace the requirement for inspection by a licensed plumbing inspector in accordance with the Illinois Plumbing Code.

- B. Reduction of Lead in Drinking Water Act Compliance

1. All Potable Water Distribution materials, devices and components installed on this project shall comply with the Reduction of Lead in Drinking Water Act.

1.07 SUBMITTALS

- A. A plumbing permit is required for water service installations.
- B. A plumbing contractor's letter of intent shall be provided to the Owner. The letter shall be written on the licensed plumber of record's business stationery and shall include the license holder's signature and, if the license holder is incorporated, the license holder's corporate seal. If the license holder is not incorporated, the letter must be notarized. (225 ILCS 320/37) (from Ch. 111, par. 1135) Refer to the Plumbing Contractor's Example Letter of Intent at the end of this Section.
- C. Copy of licensed plumbers Illinois License, including license expiration date.
- D. Submit product data as specified in Section 01 33 00. Indicate valve number, location, and service. Include installation instructions.

PART 2 PRODUCTS

2.01 WATER SERVICE CONNECTIONS

- A. Contractor shall provide a new service connection to each house, business, etc., along the proposed watermain and reconnect existing services as detailed on the Contract Drawings.
- B. Water service connections for PVC watermain shall consist of a stainless steel service saddle, corporation stop, curb stop, curb box, copper to copper unions, and copper service tube between the corporation stop and the curb stop and box. Owner's standard manufacturer's and model numbers shall be used for service connections (see Contract Drawings). Copper tubing shall be Type K copper suitable for direct burial. Tubing shall conform to ASTM Specifications B88 (latest edition) for seamless copper water tube. Fittings shall be flared fittings for copper water tubes conforming to ASA B16.26. All fittings shall be compression fitting style.

PART 3 EXECUTION

3.01 CURB BOXES AND STOPS

- A. Boxes shall be compatible with the curb stop (valve), shall rest on the curb stop, and shall be adjusted so that the cover may be set flush with finish grade. Boxes shall be set to allow equal movement above and below finish grade.
- B. The base of the box shall be centered over the valve, and the top of the base section shall be approximately on line with the nut on top of the valve stem. The entire assembly shall be plumb.

3.02 WATER SERVICE CONNECTIONS

- A. The corporation stops shall be set at right angles to the centerline of the water main and at approximately an angle of 45 degrees from the top center of the pipe. All taps for service lines shall be a minimum of 5-ft from a joint on the watermain.
- B. The service pipe shall be bent at the corporation stop in the form of a goose neck to provide for differential movement of the service pipe and watermain.

- C. Where the service connection is made under rigid street surfacing, the paving shall be cut only if necessary to make the connection to the main. The service pipe shall be run to the connection through a hole bored under the paving.
- D. Services under roadways or other hard surfaces shall be installed using horizontal directionally drilling or other Engineer approved methods.

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Before running lines, the Contractor shall carefully verify locations, depth, and type of joint needed and size of pipe to which connection is proposed. He shall then assure himself that the lines can be run as contemplated without interfering with footings, walls, other piping, fixtures, etc. Any necessary deviation shall be referred to the Owner for final adjustment before lines are run.
- B. All lengths of pipe shall be dimensioned accurately to measurements established at the site, and shall be worked into place without springing or forcing.
- C. The Contractor shall cut all pipe as may be necessary. Cut sections of pipe shall be reamed or filed to remove all burrs. The pipe interior and joints shall be thoroughly cleaned before being installed and kept clean during construction.
- D. Lubricants for gaskets shall be as per the pipe manufacturer's recommendations.
- E. Make adequate provision for expansion and contraction of piping. Blocking under the pipe shall not be permitted.
- F. Pipe embedment and backfilling shall closely follow the installation and jointing of pipe in the trench, to prevent floating of the pipe by water which may enter the trench, and to prevent longitudinal movement caused by thermal expansion or contraction of the pipe. Water services and building sewers (sanitary sewer services) shall not be covered up or used until the system has been inspected and approved, as specified above.
- G. Utmost care shall be exercised in loading, unloading and placing all pipe, fittings, etc., in order to avoid shock and/or damage. Lifting shall be by hoist or skids when hand lifting is not feasible. Dropping will not be permitted. Pipe handled on skidways must not be skidded or rolled against pipe already on the ground.
- H. All pipe fittings or other appurtenances, broken or damaged in transit from the cars, yard or shops to the site where they are to be used, or after they have been delivered to the site, shall be replaced by the Contractor at his own expense.
- I. All pipes and fittings shall be carefully examined for defects, and no pipe or fittings shall be laid which is known to be defective. If any such pipe or appurtenance shall be discovered to be defective after being laid, it shall be removed and replaced by the Contractor at his own expense.

3.04 INSTALLATION

- A. Water services shall be installed in accordance with the Illinois Plumbing Code, and approved amendments of the Owner.
- B. Pipe shall be installed in accordance with the instructions of the manufacturer, as shown on the Contract Drawings, and as specified herein.

- C. Contractor shall use care in handling, storing, and installing the pipe and fittings. Storage of pipe on the job site shall be done in accordance with the pipe manufacturer's recommendation. Under no circumstances shall pipe or fittings be dropped into the trench.
- D. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when laid, shall conform to the lines and grades shown on the Contract Drawings with bedding and backfill as shown on the Contract Drawings and as specified. Blocking under the pipe will not be permitted. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner by Contractor, at its own expense.
- E. All pipe shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means. Fittings, in addition to those shown on the Contract Drawings, shall be provided, if required, for crossing utilities which may be encountered upon opening the trench.

**PLUMBING CONTRACTOR'S
EXAMPLE LETTER OF INTENT**

Note:

- Letter must be on company letterhead.
- If company is incorporated, letter must have corporate seal.
- If company is not incorporated, letter must be notarized.

Date: _____

Project Address: _____

To Whom It May Concern:

It is the intent of _____
(Name of Company)

to perform the _____

(Description of Plumbing Work)

per the Owner's and State of Illinois Plumbing Codes at the above address in the **[insert name of Owner]** as a subcontractor for:

(Name of General Contractor)

Name of Company: _____

Company Address: _____

Contact Person: _____

Contact Number: _____

State of IL Plumbing Registration # (055): _____

Signature of Licensed Plumber: _____

(225 ILCS 320/37) (from Ch. 111, par. 1135): A letter of intent shall be included with all plumbing permit applications. The letter shall be written on the licensed plumber of record's business stationery and shall include the license holder's signature and, if the license holder is incorporated, the license holder's corporate seal. If the license holder is not incorporated, the letter must be notarized.

SECTION 33 31 11**SANITARY SEWERAGE GRAVITY PIPING**

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sanitary sewage pipe.

B. Related Sections:

1. Section 31 23 33 – Trenching and Backfilling
2. Section 33 05 62 – Precast Concrete Manholes & Utility Structures

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Pipe and Fittings:

1. Measurement: The length of sewer to be paid for under this Unit Price Item shall be measured by the foot along the horizontal projection of the centerline of the complete sewer, to the centerline of manholes.
2. Payment: The Unit Price for this Unit Price Item shall include full compensation for furnishing (sewer main and fittings), laying, jointing, and testing the pipe; sewer cleaning; sewer televising; deflection testing as applicable; all temporary and permanent plugs, earth and roadway excavation, dewatering, bedding and cover (as shown on the Contract Drawings and as specified) and select backfill; cleaning up; tree protection, but not tree protection fencing; expose existing utilities as necessary to verify appropriate clearance is maintained; site restoration including rough and finish grading but not seeding and roadway surface restoration Work; removal of surplus excavated material off-site, culvert removal and replacement if necessary, including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices. Payment for this Unit Price Item will be for the exact amount of pipe installed and measured.

B. Sewer Main Encasement

1. Measurement: The length of Sewer Main Encasement to be paid for under this Unit Price Item shall be measured by the lineal foot along the horizontal projection of the centerline of the complete Sewer Main Encasement. If the length of Sewer Main Encasement is increased for the Contractors benefit, it will be at Contractor's expense.
2. Payment: The Sewer Main Encasement to be paid for under this Unit Price Item shall constitute full compensation for furnishing all labor, materials, (including carrier pipe, casing pipe and sand fill of casing pipe void), tools, excavation, backfill, additional bonds and equipment necessary for constructing the sewer main encasement, complete, as indicated on the Contract Drawings, and as

specified, including all Work incidental thereto and not specified included for payment under other Unit Price Items in the Schedule of Unit Prices.

C. Sanitary Sewer Removal

1. Measurement: The length of sewer to be paid for under this Unit Price Item shall be measured by the foot along the horizontal projection of the centerline of the sanitary sewer removed.
2. Payment: The Unit Price for this Item shall include full compensation for removal and disposal of sanitary sewer piping at specified type and diameter, including all temporary and permanent plugs, earth and roadway excavation, dewatering, cleaning up; tree protection, but not tree protection fencing; expose existing utilities as necessary to verify appropriate clearance is maintained; site restoration including rough and finish grading but not seeding; removal of surplus excavated material off-site including all Work incidental thereto and not specifically included for payment under other Unit Price Items in the Schedule of Prices. Payment for this Unit Price Item will be for the exact amount of pipe removed.

1.03 REFERENCES

A. ASTM International:

1. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe.
2. ASTM C1173 – Standard Specification for Flexible Transition Couplings.
3. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
4. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
5. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
6. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
7. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

1.04 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures
- B. Shop Drawings: Submit shop drawings for pipe, fittings and accessories.
- C. Product Data: Submit data indicating pipe material used, pipe accessories, and materials.
- D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Do not place materials on private property without written permission of property owner.
- C. During loading, transporting and unloading, exercise care to prevent damage to materials.
- D. Do not drop pipe or fittings.
- E. Avoid shock or damage to pipe.
- F. Take measures to prevent damage to exterior surface or internal lining of pipe.
- G. Do not stack pipe higher than recommended by pipe manufacturer.
- H. Store gaskets for mechanical and push-on joints in cool, dry location out of direct sunlight and not in contact with petroleum products.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE

- A. ASTM A746 (inside nominal diameter 4" – 64"), Service type, bell and spigot ends.
 - 1. Fittings: Ductile iron.
 - 2. Joints: AWWA C111, rubber gasket joint devices.

2.2 POLYVINYL CHLORIDE (PVC) PIPE

- A. ASTM D3034 (inside nominal diameter 3"-15") or ASTM F679 (inside nominal diameter 18"-60"), Type PSM, Poly (Vinyl Chloride) (PVC) material; bell and spigot style rubber ring sealed gasket joint.
 - 1. Fittings: PVC.
 - 2. Joints: ASTM F477, elastomeric gaskets.

2.3 NON-SHEER COUPLING

- A. Non-shear coupling conforming to ASTM C1173 (flexible transition couplings); Ty 316 stainless steel clamps; 0.12" Thick stainless steel shear ring.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of existing conditions before starting work.

- B. Verify excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.02 PREPARATION

- A. Correct over excavation with aggregate.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.03 BEDDING

- A. Excavate pipe trench and place bedding in accordance with Section 31 23 33 – Trenching & Backfilling.

3.04 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with the plans.
- B. Lay pipe to slope gradients noted on the plans.
- C. Refer to Section 31 23 33 for bedding, haunching, backfilling and compacting requirements. Do not displace or damage pipe when compacting.
- D. Connect to manholes/structures as shown on the plans.
- E. Install site sanitary sewage system piping to 5 feet of building. Connect to building sanitary waste system.

3.05 FIELD QUALITY CONTROL

- A. Low Pressure Air Test
 - 1. Test each section of gravity sewer piping between manholes.
 - 2. Introduce air pressure slowly to approximately 4 psig.
 - a. Determine ground water elevation above spring line of pipe for every foot of ground water above spring line of pipe, increase starting air test pressure by 0.43 psig; do not increase pressure above 10 psig.
 - 3. Allow pressure to stabilize for at least five minutes. Adjust pressure to 3.5 psig or increased test pressure as determined above when ground water is present. Start test.
 - 4. Determine test duration for sewer section with single pipe size from the following table. Do not make allowance for laterals.

Nominal Pipe Size, Inches (mm)	Minimum Test Time, min/ 100 feet
3	0.2
4	0.3
6	0.7

8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6
27	4.2
30	4.8
33	5.4
36	6.0

- a. Record drop in pressure during test period; when air pressure has dropped more than 1.0 psig during test period, piping has failed; when 1.0 psig air pressure drop has not occurred during test period, discontinue test and piping is accepted.
 - b. When piping fails, determine source of air leakage, make corrections and retest; test section in incremental stages until leaks are isolated; after leaks are repaired, retest entire section between manholes.
5. Test pipe larger than 36 inches diameter with exfiltration test not exceeding 100 gallons for each inch of pipe diameter for each mile per day for each section under test. Perform test with minimum positive head of 2 feet.

B. Infiltration Test

- 1. Use only when gravity piping is submerged in ground water minimum of 4 feet above crown of pipe for entire length being tested.
- 2. Maximum Allowable Infiltration: 100 gallons per inch of pipe diameter for each mile per day for section under test, include allowances for leakage from manholes. Perform test with minimum positive head of 2 feet.

C. Deflection Test

- 1. Perform vertical ring deflection testing on PVC sewer piping, after backfilling has been in place for at least 30 days but not longer than 12 months.
- 2. Allowable maximum deflection for installed plastic sewer pipe limited to 5 percent of original vertical internal diameter.
- 3. Perform deflection testing using properly sized rigid ball or 'Go, No-Go' mandrel.
- 4. Furnish rigid ball or mandrel with diameter not less than 95 percent of base or average inside diameter of pipe as determined by ASTM standard to which pipe is manufactured. Measure pipe in compliance with ASTM D2122.
- 5. Perform test without mechanical pulling devices.

- 6. Locate, excavate, replace and retest pipe exceeding allowable deflection.
 - D. When tests indicate Work does not meet specified requirements, remove work, replace, and retest.
- 3.06 PROTECTION OF FINISHED WORK
- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 42 00
STORMWATER CONVEYANCE

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work includes all labor, materials, equipment, and incidentals required to install storm sewer, culverts, box culverts, fittings, and appurtenances including storm sewer removals, modifications and adjustments as shown on the Contract Drawings and as specified herein.

1.02 UNIT PRICE – MEASUREMENT AND PAYMENT

A. Storm Sewers

1. Measurement: In accordance with IDOT Standard Specifications, Section 550.
2. Payment: This work will be paid for at the contract unit price per foot in accordance with IDOT Standard Specifications, Section 550.

B. Precast Concrete Box Culvert

1. Measurement: In accordance with IDOT Standard Specifications, Section 540.
2. Payment: This work will be paid for at the contract unit price per foot in accordance with IDOT Standard Specifications, Section 540.

C. Precast Flared End Section

1. Measurement: This item will be measured per each.
2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 542.

D. Box Culvert End Section

1. Measurement: This item will be measured per each.
2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 540.

E. Storm Sewer Removal

1. Measurement: In accordance with IDOT Standard Specifications, Section 551.
2. Payment: This work will be paid for at the contract unit price per foot in accordance with IDOT Standard Specifications, Section 551.

F. Modifications to Headwall and Wingwall

1. Measurement: This item will not be measured for payment but paid at the lump sum contract price.

2. Payment: This work will be paid for at the contract lump sum price, of the type and sizes specified on the contract drawings. All materials shall be disposed of by the Contractor According to Article 202.03 of the Standard Specifications. Modifications shall be made to accommodate the proposed improvements. Dowel bars shall be pinned to existing concrete and No.4 reinforcing bar shall be placed at the perimeter of all openings. Concrete shall be patched around any pipe penetration and match the profile, size and shape, conforming to the existing structure.
- G. Storm Inlet
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 602.
- H. Storm Manhole
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 602.
- I. Catch Basin
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 602.
- J. Inlets to be Adjusted
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 602.
- K. Manholes to be Reconstructed
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 602 and as specified on the contract drawings.
- L. Storm Sewer Removal
1. Measurement: In accordance with IDOT Standard Specifications, Section 551.
 2. Payment: This work will be paid for at the contract unit price per foot in accordance with IDOT Standard Specifications, Section 551.
- M. Remove Manhole
1. Measurement: This item will be measured per each.

2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 605.
- N. Remove Inlet
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each in accordance with IDOT Standard Specifications, Section 605.
- O. Remove Flared End Section and Toe Block
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each, of the type and sizes specified on the contract drawings. All materials shall be disposed of by the Contractor According to Article 202.03 of the Standard Specifications.
- P. Remove Concrete End Section
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each, of the type and sizes specified on the contract drawings. All materials shall be disposed of by the Contractor According to Article 202.03 of the Standard Specifications.
- Q. Remove Frame and Grate
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each, of the type and sizes specified on the contract drawings. All materials shall be disposed of by the Contractor According to Article 202.03 of the Standard Specifications.
- R. Flared End Section Removed, Salvaged and Reinstalled.
1. Measurement: This item will be measured per each.
 2. Payment: This work will be paid for at the contract unit price per each, of the type and sizes specified on the contract drawings. All materials shall be removed, salvaged and reinstalled including toe blocks. Toe blocks shall be provided by the contractor if existing end sections do not have toe blocks.
- S. Remove and Replace Storm Sewer at Gravity Wall
1. Measurement: This item will be measured per foot.
 2. Payment: This work will be paid for at the contract unit price per foot, of the type and sizes specified on the contract drawings. All materials shall be removed, salvaged and reinstalled. The Gravity Wall shall be field modified to accommodate the storm sewer through wall and include grout backfill between the storm sewer and gravity wall.
- T. 6" Ductile Iron Pipe at Gravity Wall with Check Valve Including Yard Inlet

1. Measurement: This item will not be measured for payment.
 2. Payment: This work will be paid for at the contract lump sum price, of the pipe type and sizes specified on the contract drawings, including all materials furnished and installed and any necessary modifications to the gravity wall to accommodate the drain line including grouting between the gravity wall and the piping.
- U. Bangs Lake Intake Structure 1
1. Measurement: This item will not be measured for payment but paid at the lump sum contract price.
 2. Payment: This work will be paid for at the contract lump sum price, the work shall consist of furnishing and installing the structure, complete in place as shown on the contract drawings. This work shall include but is not limited to, concrete, structural reinforcement, steps, internal and external equipment, all electrical and controls equipment, gates, sensors, pipe connectors, excavation, porous granular base material, select and trench backfill, dewatering, removal of surplus excavated material off-site, site clearing and grading, support and maintenance of flows through existing piping or via bypass pumping, restoration as specified on the Contract Drawings, including all work incidental thereto and not specifically included for payment under other Items in the Bid Form.
- V. Bangs Lake Intake Structure 2
1. Measurement: This item will not be measured for payment but paid at the lump sum contract price.
 2. Payment: This work will be paid for at the contract lump sum price, the work shall consist of furnishing and installing the structure, complete in place as shown on the contract drawings. This work shall include but is not limited to, concrete, structural reinforcement, steps, brackets and grates, pipe connectors, excavation, porous granular base material, select and trench backfill, dewatering, removal of surplus excavated material off-site, site clearing and grading, support and maintenance of flows through existing piping or via bypass pumping, restoration as specified on the Contract Drawings, including all work incidental thereto and not specifically included for payment under other Items in the Bid Form.

PART 2 RELATED SECTIONS

- A. Section 31 22 00 - Grading
- B. Section 31 23 33 – Trenching and Backfilling
- C. Section 05 56 00 – Metal Castings
- D. Section 03 31 00 – Structural Concrete
- E. Section 03 20 00 – Concrete Reinforcement
- F. Section 03 39 00 – Concrete Curing

PART 3 REFERENCE STANDARDS

- A. IDOT Highway Standards and Standard Specifications for Road and Bridge Construction
- B. Standard Specifications for Water and Sewer Main Construction in Illinois (Standard Specifications)

PART 4 SUBMITTALS

- A. All submittals shall be made in accordance with Section 01 33 00.
- B. Submit manufacturer's certification that all pipe and manhole materials meet specification requirements.
- C. Submit shop drawings for trench drain components.

PART 5 PRODUCTS

2.01 PIPE AND FLARED END SECTIONS

- A. Precast Reinforced Concrete Flared End Section: IDOT Highway Standards, Sections 540, 542 and 550; size as shown on plans.
- B. Precast Reinforced Concrete Elliptical Flared End Sections: IDOT Highway Standards, Sections 540, 542 and 550; size as shown on plans.

2.02 MANHOLES AND INLETS

- A. Type A and C inlet manholes shall be constructed as detailed on the drawings and in conformance with the requirements of the Standard Specifications for Sanitary Sewers and Storm Drains, Manholes from Storm and Sanitary Sewers. IDOT Highway Standards, latest version.
- B. Trench drains shall be of an interlocking precast, modular design employing a factory built in slope of at least 0.6 percent and radii used inside bottom surfaces. The modular channel sections shall have an internal width of 4 inches and be constructed from polyester concrete made from polyester resins and quartz aggregate. Channel sections shall be capable of withstanding loads from heavy duty truck traffic. They shall be salt proof, frost proof, inert under most dilute acid and alkali conditions, and have less than 1 percent water absorption. They shall be manufactured to a close tolerance to eliminate rocking or rattling of grates. Trench units shall be provided with a locking device to hold down grates. They shall be as manufactured by ACO Grain Incorporated, Polycast, or equal.
- C. Castings shall conform to Section 05 53 00.

PART 6 EXECUTION

3.01 INSTALLATION

- A. Construct drainage improvements as shown on the drawings and as required by these specifications.

- B. Trenching, bedding, and backfill shall be done in accordance with Section 31 23 33.
- C. Install manholes and inlets in accordance with requirements of Standard Specifications.
- D. Install trench drains in accordance with manufacturer's recommendations.

3.02 DITCHING

- A. Construct ditches at locations and lines as shown on the drawings. Ditches shall be carefully cut, compacted, graded, and finished to the elevations and cross sections shown and as required to assure an uninterrupted flow of drainage water. Make smooth transition at tops of slopes and ends of construction.

END OF SECTION

SECTION 35 22 13
SPILLWAY CREST GATE

PART 1 GENERAL

1.01 SUMMARY

- A. This specification is for the design, manufacture, quality control, shop testing, delivery, installation and field testing, of spillway hinged crest gates with hydraulic operating system.
- B. This section includes requirements for providing the gate leafs, hinges brackets, sealing system, maintenance supports, anchors, hydraulic cylinders, cylinder supports, aeration piping, hydraulic power unit, hydraulic piping and hoses, local control panel, gate position indicators, transportation to site, design calculations and drawings, installation procedures, operation and maintenance manuals, and all other necessary appurtenances to provide complete operating crest gate systems.
- C. Each gate shall be operated by one hydraulic actuator located at one end of the gate atop the adjacent concrete pier. The operating system shall be operational with an ambient temperature from 10 degrees Fahrenheit to 100 degrees Fahrenheit. All electrical components shall operate from 480 volt, 3 phase power.
- D. The vendor shall submit to the Owner for review, shop drawings of all equipment including the gates, cylinders, seals, hydraulic power unit, control panel, and layout of all hydraulic piping, electrical conduit and wiring.
- E. The crest gate shall be as manufactured by Steel Fab, Inc. or preapproved equal who has been regularly engaged in the design and manufacture of hinged crest gates for a minimum of fifteen years with at least ten crest gate systems with a gate length of 40' and effective height of 8' in satisfactory use for over 5 years.

1.02 REFERENCES

- A. American Institute of Steel Construction, (AISC), Steel Construction Manual, 9th Edition.
- B. American Society of Testing and Materials, (ASTM).
- C. American Welding Society, (AWS).
- D. American Concrete Institute, (ACI).
- E. The Society for Protective Coatings/National Association of Corrosion Engineers, (SSPC/NACE).
- F. American Water Works Association
- G. American Society of Mechanical Engineers, (ASME)
- H. National Fluid Power Association, (NFPA)
- I. Society of Automotive Engineers, (SAE).
- J. American National Standards Institute, (ANSI)

1.03 GENERAL

- A. Hinged crest gates shall be supplied for the spillway sections shown on the drawings. The top edge of the gates will be fitted with nappe breakers to eliminate flow induced vibrations. When in fully raised position, the gate leafs shall lean downstream approximately 20 degrees. The gates will rotate approximately 70 degrees from the fully raised to fully lowered position as shown on the drawings. The gates shall be capable of extended use in any position without vibration.
- B. The upstream surface of the gate leafs shall be curved to a constant radius such as that when the leaf is in the fully lowered position the shape of the leaf shall approximate that of the spillway crest. The shape shall provide at the design head a minimum coefficient of discharge of $C=3.2$ in the weir equation $Q=CWH^{3/2}$ where Q is the flow in CFS; W is the length of the weir in feet and H is the total energy head above the fixed crest in feet. The radius shall be sufficiently great as to prevent negative pressure on the gate surfaces for any head up to the specified design head.

1.04 OPERATING REQUIREMENTS

- A. The crest gates shall be designed and manufactured to be safely operated under the following conditions.
- B. Gate Leaf Assemblies:
- | | |
|----------------------|----------------|
| Number: | 1 |
| Width of Gate: | 10 ft |
| Top of Raised Gate: | 774.53 |
| Nominal Gate Height: | 0.67 ft (8 in) |
- C. Hydraulic Conditions:
- | | |
|--------------------------|---------------|
| Normal Mean Water Level: | 773.86 |
| Low Flood Level: | 774.24 (4.5") |
| Moderate Flood Level: | 774.44 (7") |
| Major Flood Level: | 774.69 (10") |
| Lake Closed: | 774.86 (>12") |

1.05 DESIGN REQUIREMENTS

- A. Loading Conditions
1. The gate hoisting system shall have sufficient thrust capacity to raise the leaf from the fully lowered position to the fully raised position when the upstream water level is at elevation 774.86.
 2. The gates shall be structurally designed to withstand the worst combination of all axial, bending, shear, torsion and thermal loads and shall be subject to fatigue loading from the worst loading condition caused by static and dynamic loadings in any position with the upstream water surface at elevation 776.00. In the event of a power loss, it shall be possible to lower the gate leafs from the fully raised position to the fully lowered position by manually opening a bypass valve at the hydraulic power unit.
 3. The gate leafs and anchors shall be designed to withstand in an overloading condition the combined forces of a normal water level and a seismic acceleration of 0.15g. The gate manufacturer shall also detail, as needed, any special modifications to the concrete crest gate structure to assure the overall structural adequacy of the gate system.
 4. The gates shall be designed to withstand a horizontal ice load of 1500 pounds

per lineal foot of gate applied horizontally within 1' of the top of the gate.

5. Each gate shall take no more than 10 minutes to move from a fully open position to a fully closed position and no more than 10 minutes to move from a fully closed position to a fully open position.

B. Design Criteria

1. The gate leaf shall be designed as an integral torsion member subjected to fatigue loading.
2. A factor of safety applied to the material yield strength of 2.5 for normal loading conditions and 2.0 for overloading conditions shall be applied when considering the elastic instability of the gate structure.
3. The gate leaf shall be continuously welded. The welds connecting the upstream and the downstream skin plates to each other and to the vertical ribs shall develop the full strength of the plates. The weld joint shall be designed to consider fatigue.
4. Welds shall be proportioned as to not exceed 80% of the allowable loading of AWS D1.6, Section 9.

1.06 RELATED SECTIONS

- A. Division 3 – Concrete
- B. Division 26 – Electrical
- C. Division 40 – Process Interconnections

1.07 SUBMITTALS

- A. Submit shop drawings and O & M data per Specification 01 33 00 and 01 70 00 herein.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Spillway Crest Gates shall be manufactured by Steel-Fab, Inc..
 1. Bangs Lake Outfall: Model CRG-WSC-P01

2.02 GATE COMPONENTS

A. LEAF

1. The gate leaf shall consist of curved upstream and downstream skin plates and flat vertical diaphragm plates arranged to form an integral torsion member that will avoid negative pressure zones. The curved plates shall be A516 Grade 70. The remainder of the leaf structure shall be ASTM A36 steel.
2. A curved Type 304 stainless steel surface shall be provided directly above the gate hinges to mate with the horizontal seal. The top edge of the upstream skin plate shall form a discharge lip of a design which when in combination with air vent piping located downstream of the gate, will eliminate flow induced vibrations.
3. The space between the upstream and downstream skin plates shall be made airtight by welding hermetically and the welds checked for air tightness. The leaf

side seals shall be mounted so as not to penetrate the gate leaf thereby eliminating any access ports in the downstream skin compartments that would compromise water tightness.

4. The gate leaf shall transmit the forces from the hydraulic cylinders to the skin plates and bearings and, in turn, to the embedded anchors through the bearings.
5. When it is necessary to manufacture and ship the gate leaf in multiple sections, the joint between the sections shall be bolted together using high strength A325 fasteners and then field welded along the seams to avoid leakage.

B. HINGES

1. The gate leaf shall rotate on pin type hinges. The hinge pins shall be A564 Grade 17-4PH high strength stainless steel and fixed to the gate leaf. The pins will rotate in permanently lubricated bronze bearings, (Lubron or Lubrite type), which shall be retained in fabricated A36 steel bearing brackets. The brackets shall be anchored to the concrete structure in a manner to allow adjustment in all three planes during erection of the leaf sections. The hinge bracket anchor bolts shall be Type A325 Galvanized Steel and have a minimum diameter of 1 ½ inch.

C. SIDE SEALS

1. Side seal plates gates shall be manufactured from Type 304 Stainless Steel and allow for sealing in all gate positions. Leaf side seals shall be fluorocarbon clad neoprene and attached to the sealing ends of each leaf with Type 304 Stainless Steel retainers and fasteners. The seal attachment shall allow for replacement of the seal without removal of the leaf. Embedded side seal plates shall consist of the stainless steel seal plate surfaces with steel reinforcing on the backside. Double nutted L or J Type 304 Stainless Steel anchor bolts shall be provided for alignment of the embedded seal plates in secondary pour concrete. The sealing surface of the side seal plates shall have a surface finish smoother than 125 micro-inch RMS.

D. ERECTION AND MAINTENANCE SUPPORTS

1. Erection struts and associated brackets provided to support the leaf in the full up position with the operator detached from the leaf. Each strut and bracket shall be manufactured from A36 Steel and strong enough to support the leaf in the full up position with a normal water surface elevation to facilitate future maintenance work.

E. LEAF STOPS

1. When the leaf is in the fully lowered position the weight of the leaf shall be supported by adjustable gate stops contacting pads on the downstream surface of the channels. The pads shall be manufactured from A36 steel and anchored in place using Type 304 Stainless Steel anchor bolts.

F. AERATION PIPING

1. It shall be the responsibility of the gate manufacturer to determine the necessity of aeration piping and size, location and shape of the aeration piping system if needed. Aeration piping shall be sized to prevent excessive negative pressure under the gate with reasonable velocities in the aeration pipes. The aeration vent piping shall be galvanized steel and have protective screens on both the inlets and outlets.

G. HEATING

1. Provisions for heating embedded side seal plates shall be incorporated in the design of the side seal plates for future installation of immersion type heaters.

2.03 ELECTRICAL CONTROL AND HYDRAULIC OPERATING SYSTEM

A. HYDRAULIC POWER UNIT

1. One (1) hydraulic operating system shall be provided to operate the crest gate. The system shall be designed to operate smoothly and uniformly operate the gates and hold the gates in the desired position. The crest gates shall be operated manually via push buttons at the local control panel at the hydraulic power unit.
2. The hydraulic power unit shall be a nominal 2000 psi hydraulic fluid system of sufficient size and capacity to operate the crest gates. The hydraulic operating system shall be sized to operate each gate through a full close (raise) stroke in 10 minutes.
3. The system shall include dual automatically alternating motor/pumps. Manually operated valves and interconnections between each gate's hydraulic hoses shall be provided to allow one (1) of the motor/pumps to operate gates sequentially in the event that the other motor/pump fails.
4. A hand pump shall be provided to allow manual operation of the gates in the event there is not electric power. No downward movement of the crest gate shall occur in the event of a power outage unless manually overridden through means of a hand pump or portable generator, or by opening bypass valving. The hydraulic power unit will be designed to be placed in a non-heated, weather-tight area. A 500 watt thermostatically operated immersion heater shall be provided in the oil reservoir. Trouble indicating lights and a single general alarm dry contact shall be provided to signal a power unit fault for at least the following: low oil level, low temperature and motor/pump failure.
5. Simultaneous with the low oil level alarm, an automatic switch shall shut-off power to the pump and motor. Power shall continue to be supplied to other parts of the hydraulic power unit such as the heaters.
6. The hydraulic power unit shall be designed and manufactured in compliance with good engineering practice and shall include all necessary pressure relief valves, control valves, switches, filters, accumulators, etc., to provide a complete operating system. Stainless steel ball valve shutoffs shall be provided on each hydraulic line where it leaves the hydraulic power unit.
7. The hydraulic power unit shall be designed to operate using environmentally friendly hydraulic fluid.
8. Field hydraulic lines shall be stainless steel supplied and installed by the General Contractor. All field lines shall be properly supported, installed, flushed and pressure tested to 150% of the maximum system operating pressure prior to connection of the field piping to the hydraulic cylinders and power unit.

B. HYDRAULIC CYLINDER

1. The hydraulic cylinders shall be of the heavy duty industrial type suitable for immersion service and designed in accordance with AWWA C501 Section 3.16. Seals and glands shall be compatible with the hydraulic fluid used.
2. The hydraulic cylinders shall be single acting 3000 psi rated cylinders. Cylinder rods shall be chrome plated A564 Type 630 Condition H-1150 stainless steel.
3. Cylinder head, cap, body and tie rods shall be steel. The piston shall be equipped with lip seals. The rod end of the cylinder shall have rod wipers and ice scrapers. The cylinder design shall incorporate lifting lugs.
4. A velocity fuse shall be provided on the lower cylinder port to prevent inadvertent

gate lowering and loss of hydraulic fluid upon sudden breach of the interconnecting hydraulic lines.

5. Open/Close limit travel switches shall be integrally mounted in one cylinder for each gate.
6. A set of four (4) stainless steel ball valves and two (2) flexible hoses shall be installed at each cylinder to allow for removal of the cylinder without requiring the cylinder or the interconnecting hydraulic lines to be drained.
7. The hydraulic cylinders shall be provided with all necessary mounting brackets and anchor bolts for installation of the cylinders underneath each gate leaf on the dam crest. The support brackets shall be fabricated from A36 steel with A325 Galvanized Steel anchor bolts provided for mounting each cylinder.

C. CONTROLS

1. One (1) NEMA 4 local control panel shall be provided with and located at the hydraulic power unit. Solenoid valves shall be controlled by Open or Close pushbuttons for the gate. Solenoids shall be de-energized by the gate open/close limit switches when the corresponding gate reaches the fully open or fully closed position. It shall be possible to stop each gate at any intermediate position. Continuous position indication using a gate mounted Rittmeyer Rivert transducer shall be displayed at the local control panel.

2.04 MANUFACTURE

A. FABRICATION AND WORKMANSHIP

1. The fabrication of all structural steel parts shall conform to the requirements of the latest revisions of the AISC and AWS specifications or any other standards fully acceptable to the Owner that equal or exceed the standards stated above. Surface finishes shall be indicated on the manufacturer's shop drawings in accordance with ANSI requirements.
2. The gate and associated components shall be fabricated in sections that are convenient for shipment and field erection. All major components shall have lifting ears, eye and/or lug arranged to facilitate handling during site off-loading and erection.

B. CERTIFICATION OF MATERIALS

1. All materials shall be new. Certified material test reports shall be available in the manufacturer's project file for all steel materials. All materials shall be certified to the appropriate American Standards such as ASTM, AISI, ANSI, and AWS or any other standards fully acceptable to the Owner that equal or exceed the American Standards.

C. WELDING

1. All welding, welding procedures and qualifications, and welder qualifications shall be in accordance with the most recent revision of AWS D1.6. All welding shall be in strict accordance with these procedures and shall be made only by qualified welders. Procedures and qualifications shall be maintained in the manufacturer's project file.

D. INSPECTION

1. All welds shall be visually inspected to the requirements in Sections 6 and 9 of AWS DI.6. The welds joining the upstream and downstream skin plates to each other and to the vertical rib plates shall receive 100% magnetic particle inspection.
2. All steel surfaces that cannot be blast cleaned, such as electrical control cabinets, the hydraulic power unit, etc., shall be surface cleaned in accordance with SSPC-SP3 and receive a primer and two finish coats of an alkyd paint system.

E. PAINTING

1. All exposed steel surfaces of the crest gate equipment shall be blast cleaned to the requirements of SSPC-10 then coated with 12-14 mils of Tnemec N69 Epoxy Coating. Additionally, the downstream face of each gate and hydraulic cylinder mounting brackets will be top coated with Tnemec Enduroshield 74 for UV protection.
2. Steel surfaces embedded in concrete, stainless steel, bronze and other corrosion resistant materials, and machined surfaces for field assembly shall not be painted. However, machined steel surfaces shall receive a rust inhibiting grease coating

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install per manufacturers approved shop drawings.
- B. The gate manufacturer shall prepare a written, detailed procedure for the erection and installation of the gate equipment. The installation procedure shall include the sequence of steps necessary for installation, precautions to be taken, description of adjustments to be made and tolerances to be maintained.
- C. The gate manufacturer shall provide an erection advisor to advise the Vendor in matters of methods, procedures and precautions to be followed in the erection of the equipment. The erection advisor shall be available on site as a minimum for the following events:
 1. Construction planning meeting with the Vendor and Owner, to be held prior to shipment of the equipment.
 2. Placement of the embedments in the primary poured concrete and prior to assembly of the hinge brackets and leaf.
 3. Erection of the leaf.
 4. Trial "dry operation" of the assembled gate; prior to final "grouting in" of the fixed parts of the gate.
 5. Start-up of the hydraulic power unit.
 6. Final operational "wet" testing of the gate and control system.

3.02 OPERATIONAL TESTS

- A. After the installation is complete, the gate operating system shall be tested under the direction of the erection advisor. The gates shall be operated through all modes of operation, testing, all monitoring and control functions and all necessary adjustments made.
- B. The manufacturer shall have in effect at all times a QA program which clearly establishes the authority and responsibility of those responsible for the QA program. Persons performing quality functions shall have sufficient and well-defined responsibility and authority to enforce quality requirements, to identify, initiate, recommend and provide solutions to quality problems and to verify the effectiveness of the solutions.

3.03 SHOP ASSEMBLY AND TESTING

- A. The gate leaf shall be completely assembled in the shop. The gate pivot bores shall be sighted to assure correct alignment of the centers. Each hinge bracket shall be assembled to the leaf at its respective location and the bracket rotated through its full range of operating swing. All mating parts shall be trial fitted. During shop assembly, the gate shall be checked for dimensions, tolerances, accuracy of alignment and squareness. Before disassembly, each part shall be match-marked and identified in accordance with the erection drawings; such marking shall be done so as to retain its legibility until field erection is complete.
- B. The manufacturer shall make a record of the shop measurements of all critical dimensions which may affect the field erection and alignment or the operation and maintenance of the equipment. This record shall be included as part of the operation and service manual.
- C. The operational test of the hydraulic and electrical control system shall be made to demonstrate proper functioning of the system including the functioning and sequencing of all control and alarm devices.
- D. The hydraulic cylinders shall be hydrostatically tested in the cylinder manufacturer's shop at a pressure of 150% of the hydraulic power unit design pressure.

3.04 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Detailed operating and maintenance instructions, which shall include reduced-size copies of applicable drawings, applicable parts lists, and catalogs covering all equipment furnished and which may be needed or useful in the operation, maintenance, repairs, dismantling or assembling, and for repair and identification of parts for ordering replacements, shall be submitted. The liquid levels, flows, and pressure settings and settings of all auxiliary protective devices shall be identified in the maintenance instructions. All catalog pages shall be marked to show the model number selected for each item of equipment. The salient features of the equipment supplied shall be clearly stated and the operation of the hydraulic and electrical controls fully explained. A troubleshooting chart, maintenance timetable, lubrication diagrams, and disassembly, reassembly and adjustment procedures shall also be provided.

END OF SECTION

SECTION 40 05 89**GATE OPERATORS AND ACCESSORIES****PART 1 GENERAL****1.01 REFERENCE STANDARDS**

- A. ASTM A27 - Mild-to-Medium Strength Carbon-Steel Castings for General Application

1.02 SUBMITTALS

- A. Submit product data. Indicate gate number, location, and service. Include wiring diagrams and installation instructions.
- B. Submit O&M Manual via two CD copies.

1.03 RELATED SECTIONS

- A. Division 26 – Electrical
- B. Division 35 – Waterway and Marine Construction

1.04 GENERAL DESCRIPTION

- A. A hydraulic or electro-hydraulic actuator (referred to as hydraulic) is required for this service.
- B. Electric gear-based/ multi turn actuators will not be accepted.
- C. Centralized hydraulic actuator systems will not be accepted.
- D. Hydraulic Actuators that employ an active reservoir for fluid movement will not be accepted.
- E. Substitutions that do not meet the Hydraulic Specifications will not be accepted.

PART 2 PRODUCTS**2.01 COMPONENTS**

- A. Operator mounting arrangements and hand wheel positions shall be as shown on the drawings or as approved by the Engineer.
- B. Manual Operators:
 - 1. Unless otherwise shown on the drawings, indicated in the specifications, or indicated in the valve schedule, manual operators shall lower the gate when rotated in a counter-clockwise direction and shall raise the gate when rotated in a clockwise direction.
 - 2. Wrench nuts shall meet requirements of the AWWA C500.

3. Lever operators shall be designed to produce the required torque with a maximum pull of 80 pounds and shall have at least five intermediate locking positions between fully open and full closed.
 4. The hand wheel shall not rotate during motor operation. During hand wheel operation, the motor shall not turn. The operator shall be responsive to electrical power and control at all times; and when under electrical control, shall instantly disengage the hand wheel.
- C. Valves for throttling service shall be equipped with an infinitely variable locking device or a totally enclosed geared operator.
- D. Application Requirements:
1. The actuators shall be specifically designed for 100 percent continuous duty for modulating service. Actuators with any limitations on starts & stops will not be acceptable.
 2. The actuators shall be rated for outdoors service, being constructed of anodized aluminum & steel with a three-part epoxy or two part powder coating for maximum corrosion resistance.
 3. Minimum coating requirements for all carbon steel components:
 4. Prep: All painted surfaces to be prepared to bead blasted to white finish per NACE (1) SSPC-SP-5.
 5. Three part Epoxy systems shall meet the following minimum requirements:
 - a. Primer Coat: Zinc based 2-3Mils DFT
 - b. Mastic Coat: Epoxy 4-6Mils DFT
 - c. Top Coat: Polyurethane 2-3 Mils DFT
 - d. Total acceptable DFT 8 to 12 mils
 6. Two part powder systems shall meet the following minimums:
 - a. Primer Coat: Zinc Based with minimum 7,000 hour ASTM B117-97 hour salt spray rating.
 - b. To Coat: TGIC-Polyester
 - c. Total acceptable DFT >5mils
 7. The speed of the actuator shall be electronically adjustable via programming of the actuator electronics. Standard speed setting shall be approximately ~ 5 seconds per inch of linear travel minimum.
 8. Signal repeatability shall be a minimum of 0.10% of full travel.
 9. Actuators must be designed with sufficient force output capable to continuously meet the maximum required thrust for each gate.
- E. Design Features:
1. *Actuator Scope of Supply* – The actuators shall be supplied as a complete assembly that includes a hydraulic actuator, an electronics enclosure containing a

dedicated programmable microprocessor controller and electrical cables connecting the aforementioned components.

2. *Position Indication* – The valve actuators shall include electric limit switches and positions feedback, described further herewith.
3. *Manual Operation* – The actuators shall come equipped with mechanical means to operate the actuator when electrical supply power is not available. Said mechanical means should be independent of the actuator hydraulics and capable of being isolated during normal operation of the actuator. A declutchable manual hand-wheel that adapts to allow a cordless drill operation is required.
4. *Modes of Operation* – The actuators shall have at least two modes of operation, one for local control and the other for automatic control. Local control is defined as an operational state where the actuator can be controlled at the electronics of said actuator manually by an operator. Automatic mode is defined as the operational state where the actuator is controlled remotely by a SCADA, DCS etc. It is also required that the actuators have a third mode dedicated to set-up and calibration.
5. *Fail-Safe-Action* – As defined below
 - a. Upon loss of primary power, the actuators shall fail in last position, remaining hydraulically locked in place until power is restored or manual operation is engaged. Upon loss or discontinuation of control signal, the actuator shall be capable of failing and hydraulically locking fully open, fully closed or in last position.

F. Hydraulic Specifications:

1. The hydraulic actuators shall consist of a linear, double-acting, double-rod hydraulic cylinder connected to a weir crest gate.
2. The hydraulic actuator shall be capable of being mounted in any position.
3. The actuator hydraulics will employ oil for the hydraulic medium.
4. All internal oil shall be pressurized to a minimum of 15psi to ensure no external contamination of moisture can enter the system. Open reservoirs, vents or breathers are not allowed.
5. The actuator shall provide sufficient force throughout the entire stroke to overcome breakaway/seating friction and process dynamics. The hydraulic assembly shall be designed to operate at a standard internal hydraulic operating pressure of 2,000 psi, but will only generate the amount of internal psi required to transfer hydraulic volume into force capable of overcoming the thrust required to the gate as required at any given moment. In addition, the hydraulic actuators shall contain pressure limiting devices that allow the user to limit the internal pressure build-up of the hydraulics to 2,200-2,300 psi maximum, and field adjustable to lower values, in order to protect the internals of the hydraulics. Hydraulic actuators that operate at a constant, standard internal pressure greater than 2,000 psi will not be accepted.
6. The actuator hydraulics shall be supplied from the manufacturer containing at maximum 8 gallons of oil (16 gallons for fail-safe), completely purged of air and hermetically sealed off from the environment. Said actuator shall require no additional oil volume after it ships from the manufacturer. Actuators using hydraulics that require oil volume in excess of this limitation are not acceptable. Actuators requiring oil filtration, or containing any type of oil filtration means, will

not be acceptable: no oil filters are to be incorporated into the hydraulic design of the required actuators.

7. All hydraulic control valves used for modulating or normal operation shall be constructed of durable metal. Actuators that employ solenoids to meter fluid for position control will not be accepted, due to durability concerns posed by soft seats. Solenoids are only allowed in the hydraulic design for the use of isolating an accumulator fail-safe system, without exception.
8. The actuators shall employ a hydraulic circuit that is double-acting, transferring oil from one side of the operating cylinder to the other during normal operation. Oil shall not be transferred to or removed from a reservoir when the actuator makes a position change. Centralized hydraulics employing active reservoirs (used during normal operation) will not be acceptable. Accumulator-based hydraulic systems shall not be allowed. Spring-opposed based hydraulic systems will not be allowed.
9. The hydraulic power drive/module assembly shall consist of a drive train apparatus containing a bi-directional gear pump and a hydraulic circuit regulating equal volumes of oil flow into and out of the hydraulic cylinder. Said hydraulic circuit shall provide dual action, acting as a check valve in one direction and throttling valve for the hydraulic pump in the opposite direction. The valves shall direct flow from the pump to cause the actuator to stroke in the direction indicated by the controller.
10. The hydraulic power drive/module assembly shall also contain a motor that is directly coupled to the pump within the hydraulic manifold. The motor shall only operate when a valve position change is required. Continuously running motors are not acceptable. Motors shall be of a brushless servo or stepper motor design. Induction motors will not be acceptable.
11. During normal operation, when the motor/pump is stopped, the hydraulic circuit shall be closed, securely locking the actuator in place.
12. A 2 oz., pressurized oil expansion chamber integral to the hydraulic manifold with an indicator button to show oil level shall be provided as part of the hydraulic assembly. The expansion chamber shall be isolated from the normal hydraulic circuit by suction check valves and only be used for thermal expansion and contraction of oil in the closed-loop system. The expansion and contraction of oil in the closed-loop system. The expansion chamber shall be under a minimum of 20 psi positive pressure to eliminate atmospheric ingress. A thermostatically controlled cartridge heater shall be included in the hydraulic manifold assembly in order to maintain appropriate oil viscosity in the event ambient temperatures should fall below 40° F. Heaters supplied are only allowed for the purposes of maintaining oil viscosity and shall not be employed as condensation heaters. Condensation heaters are not allowed.
13. Hydraulic seals shall be rated for ~ 1 million full stroke cycles (~ 10 million “dither” cycles defined as <1.0% step changes) before recommended replacement for preventative maintenance. Hydraulic actuators designed for lower duty cycles with recommended seal upgrades for services less than 50,000 full stroke cycles are not allowed.
14. All tubing shall be 316SS stainless per ASTM A 269. All tube fittings shall be Swagelok 316SS.
15. All tube connections shall be straight thread with an O-ring seal.

16. Any hydraulic hoses will be supplied by the manufacturer as quick disconnect type that are prefilled with oil. Hoses will be supplied to lengths as directed by contractor prior to shipment to site.

G. Electrical Specifications:

1. The electric operators shall be REXA Actuators by REXA, Inc. fully manufactured in West Bridgewater, Massachusetts.
2. Actuator shall have no limitations on motor starts and stops per hour.
3. To realize municipal operations energy reduction goals the actuator shall be designed to have < 50 watts of power consumption while in standby not making position movements.
4. A separate control enclosure will be provided with each hydraulic actuator. A microprocessor controller shall be remote mounted and include the CPU board with a five (5) button keypad LED display, motor driver, internal power supply and wire terminations. The controller shall be mounted in the control enclosure. The Controller shall incorporate self-diagnostics. In the event of a system malfunction; an error code shall register on the LED display. The actuator shall be provided with an indoor / outdoor rated, external HMI screen with a flip up mechanical cover to ensure maximum protection and push button interface. The HMI shall have full features and at a minimum be able to perform the following functions:
 - a. Manually move the actuator up and down with keypad interface.
 - b. Display all fault codes.
 - c. Provide interface for calibration of span, analog input and output tuning, relay indication setpoint.
 - d. Provide a visual indication of the current position and the current mode of operation.
 - e. Provide touch buttons to change the mode of operation.
 - f. Provide a password feature to lock out all interface function to restrict access.
5. The electronics will be housed in a NEMA 4x control enclosure, supplied by the actuator manufacture. Electrical controls/apparatus responsible for interpreting incoming control signal demand and directing actuator movement shall be housed in enclosure separate from the hydraulic portion of the actuator, connected by electrical cables. Hydraulic actuators with "on-board/all-in-one" electronics will not be acceptable, due to the environmental conditions of the actuator installation and end-user preferences.
6. Local controls shall be included and shall be mounted on the inside door of the control enclosure. See section 40 69 53 2.02 for detailed information on the control panel. Local controls shall provide the user the ability to transfer between different modes of the supplied actuator, such as a "LOCAL", "AUTOMATIC" or "SET-UP" mode.
7. A LOCAL-REMOTE selector switch shall be mounted on the cover of the control enclosure.
 - a. In LOCAL, the operator can open and close the valve from a membrane keypad mounted on the front of the enclosure.
 - b. In REMOTE, the operator can open and close the valve from the MOCP.
8. The electronics will monitor the incoming 4-20 mA control signal from the SCADA, DCS, etc., while monitoring the real-time position of the hydraulic actuator,

ensuring both control signal demand and current actuator position are in accordance with each other, as programmed by the dead-band setting of the actuator electronics (programmable down to 0.05% dead-band). A change in control signal outside of the dead-band setting will trigger the electronics to make a position change response by signaling the motor of the hydraulic actuator to respond accordingly. Said response will be virtually instantaneous with no noticeable dead-time between demand and movement of the actuator.

9. The electronics shall provide discrete OPEN and CLOSED feedback signals for remote monitoring.
10. The electronics shall have a clock, used to timestamp and record any alarm or warning errors for diagnostics.
11. The valve actuators shall be designed for 230 volt, single-phase, 60 hertz, power supply. Transformers may be used to convert a power source of different supply to the required voltage.
12. Motors shall be designed in accordance with NEMA standards, have Class B insulation, and operate successfully at any voltage within 10 percent above or below rated voltage.
13. Electrical surge protection for the electronics of each valve actuator assembly will be supplied on both the incoming supply power and control signal connections.
14. A box mounted breaker switch shall be included inside of the control box.
15. The feedback potentiometer shall be directly mounted to the actuator output shaft for 1 to 1 ratio position readout. Geared feedback mechanism is not allowed.
16. A continuous position feedback system shall be provided between the valve actuator and the SCADA system. All valve actuators shall include the ability to transmit a 4-20 mA continuous position indication signal for remote monitoring by the SCADA system. The valve actuators shall be designed with passive position transmitters. The Contractor shall provide all power and wiring to the actuator local control panels as shown on the drawings.
17. The Contractor shall provide all power and wiring to the actuator local control panels as shown on the drawings.
18. All cables for connections between the electronics and the hydraulic portion of the actuator shall be supplied by the actuator manufacturer. The Contractor and manufacturer shall supply cables with quick connects based upon on-site measurements. Cables are to be bundled in cable trays overhead (no conduits will be required).
19. The electronics shall have two relays for remote fault monitoring. The first relay is a trouble or fault indicator highlighting the need for further investigation however the actuator is still working. The second is an alarm indicator when the actuator is no longer working.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install and adjust all items in accordance with manufacturer's instructions.
- B. Mechanical installation of the actuators shall be performed by the actuator manufacturer. Factory trained representatives, third parties are not acceptable in lieu of the manufacturer's technician directly employed by the actuator manufacturer.
- C. Electrical installation by the contractor, assisted by the factory technician.

3.02 QUALITY ASSURANCE

- A. The actuators specified under this Section shall be furnished by a single manufacturer with a minimum of 5 years of experience designing and manufacturing actuators in the North American municipal market. The manufacturer shall show evidence of satisfactory operation of 5 separate installations of the same model actuators similar in size & scope that have been operating for 5 years minimum in a wastewater treatment plant, without exception. Installations that do not meet the minimum duration or that are from other industries will not be accepted as experience. References shall be given, upon request.
- B. Actuators must be supplied as a complete assembly from a single manufacturer, whereby said supplier has a dedicated manufacturing space & process within their facility for providing said product to the field. Documentation to prove out a dedicated manufacturing process for said product that has existed for 5+ years shall be provided. Actuators made solely of buy-out sub-assemblies that are not regularly assembled as part of a standard product offering by said supplier will not be accepted.
- C. The actuator must adhere to ANSI/ISA-96.06.01-2014.
- D. The actuator supplier must be ISO 9001 certified and provide documentation to confirm.
- E. Product manuals shall be provided during the submittal phase to confirm said product is a regularly manufactured system.
- F. This section supersedes all others within this project when conflicts in spec language arise.

3.03 TRAINING

- A. One full day of user training will be provided by a trained REXA technician following the installation and commissioning of the REXA equipment covered under this specification.

3.04 WARRANTY

- A. 5 years from either the date of actuator installation (commissioning on-site by an actuator OEM technician).
- B. Any routine maintenance required during the warranty period, such as inspections, oil and filter changes, shall be performed by a technician employed by the manufacturer and included in the scope of supply.

END OF SECTION

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SECTION 40 66 33.01
INSTRUMENTATION CABLE

PART 1 GENERAL

1.01 SCOPE

- A. Furnish and install conductors and cable assemblies and field terminations for the instrumentation and process system as shown on the drawings and as specified.
- B. All materials shall be UL labeled.

1.02 REFERENCE STANDARDS

- A. NEC - Article 725.

1.03 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00.
- B. Materials to be submitted:
 - 1. Manufacturer's standard published catalog sheets and descriptive bulletins.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. General:
 - 1. Instrument cable shall be individual or multiple pair cable appropriate to the system used, and in accordance with the equipment manufacturer's recommendations.
 - 2. All instrument cables shall be color coded throughout the project. Cable manufacturer's standard color grouping may be used.
 - 3. Each cable and the individual conductors shall be identified with wire numbers as shown on the instrument schematics and control diagrams using PVC wire marking sleeves as manufactured by Brady, Electrovert or equal.
- B. Instrument Cable:
 - 1. Construction: Two-conductor No. 18 AWG stranded copper, PVC insulation, aluminum-polyester, aluminum Mylar taped shield, or braided copper shield and tinned copper drain wire, PVC overall jacket, 300 V working class. Belden Model 9318 or equivalent.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Cables shall be delivered in full reels or boxes and shall be properly tagged and protected against injury.
- B. Use proper pulling rigs and reel assemblies to minimize pulling tensions and damage to insulation.
- C. Lubrication: Commercial wire lubricants only. Soapsuds solutions shall not be used.

3.02 TERMINATIONS

- A. Depending on equipment supplied, use insulated crimped terminals for conductors and shield drains on screw type terminals and stripped conductor ends on box type terminals. All conductors shall be terminated in strict accordance with the equipment manufacturer's recommendations.
- B. Shields shall not be connected to analog instrument transmitters in the field. Shield shall be grounded at the receiver or analog controller within the building control panel.
- C. All instrument cable installations shall be continuous runs without any intermediate junction points.

END OF SECTION


SECTION 40 69 53
FLOOD GATE CONTROLS

PART 1 GENERAL

1.01 RELATED WORK

- A. Section 26 43 00 - Surge Protective Devices

1.02 SUBMITTALS

- A. Make submittals as specified  in Section 01 33 00.
- B. Materials to be Submitted:
1. Manufacturer's standard published catalog sheet and descriptive bulletins.
 2. Manufacturer's standard published installation, operation, and maintenance instructions.
 3. Physical layout drawings, showing overall dimensions and mounting details.
 4. Electrical connection schematics and wiring.
 5. List of equipment.
 6. Submit documentation demonstrating UL 508A listing.
- C. Markings: Each submittal shall be marked with the equipment number and location as shown on the drawings.

PART 2 PRODUCTS

2.01 GENERAL

- A. Control panel shall be manufactured by a UL 508A listed panel shop.
- B. This specification covers the provision and installation of controls for the flood gate intake structure.

2.02 FLOOD GATE CONTROLS

- A. The control equipment shall be mounted in a single stainless steel cabinet dead front enclosure. The cabinet shall be pad lockable. The cabinet shall be suitable for Unistrut or floor mounting. Entry to cabinet shall be via rotating quarter turn latch. For Bangs Lake Flood Gate, Hoffman Enclosure A72722OULP, w/ backpan A72P72 back panel, or equivalent, is to be used for design basis. Control Box to be Schaeffer STN4D306010SS for top cabinet, supply back pan and terminal blocks as detailed on plans.
- B. All control wiring within the control cabinet shall be flexible, stranded type and each conductor shall be tagged and numbered in accordance with the manufacturer's wiring diagram. All outgoing wires shall be connected to terminal strips. Solderless connectors

shall be used throughout to facilitate maintenance. All components shall be identified in accordance with the wiring diagram, and all operating controls and panel mounted components such as gauges, indicating lights, switches, etc., shall be identified by printed labels.

- C. The wiring shall comply with the National Electric Code and applicable state and local codes. Wiring shall be completely factory installed except for the wires that run to connection points external to the control panel.
- D. As part of the control cabinet, electrical power distribution consisting of thermal magnetic circuit breakers with a minimum capacity of 10 amps each, or as shown on the drawings shall be provided for each branch circuit including the following:
1. Surge suppression shall be provided for surge protection on each phase and mode as specified in Section 26 43 00.
 2. Thermal magnetic circuit breakers shall be provided for branch disconnect service and overcurrent protection of all auxiliary circuits. Provide auxiliary circuit breakers for:
 - 240V
 - a. Main breaker.
 - b. Surge protective device.
 - 120/240V
 - a. Gate Controls.
 - b. SCADA Panel / Equipment.
 - c. Spare.
 - d. Enclosure Heater.
 - e. Enclosure Light
 3. 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 printed labels.
- E. The enclosure door shall have the following indicators:
1. HMI Screen
 2. Vega Radar Display
 3. Override Switch to Operate Gate
- F. The enclosure door shall have the following industrial, oil tight 30 mm operators.
1. 3 Position Open-Off-Close selector switch for gate.

- G. To monitor the Bangs Lake water level, a VEGA (VEGAPULS C 21 (RA-222 FUV)) radar sensor with external display (VEGADIS82) for level monitoring shall be provided. The gate will not provide automatic adjustments, but will instead be adjusted by the Village per their Managing Water Level in Bangs Lake Standard Operating Procedure as follows:
1. The alert sequence shall be as follows with the Median Water Level being 773.86:
 - a. Level 1 Low Flood Level (774.24) (4.5" above MWL)
 - b. Level 2 Moderate Flood Level (774.44) (7" above MWL)
 - c. Level 3 Major Flood Level (774.69) (10" above MWL)
 - d. Level 4 Lake Closed Level (774.86) (12" above MWL)
- H. The controls shall be equipped with a weatherproof vandal resistant red LED flashing alarm light with protective guard mounted externally to the generator building and alarm horn with a silence pushbutton. The light shall be illuminated and flashing only under an alarm condition. Unit shall have a battery backup to allow operation of the strobe during a power outage for up to 8 hours. Unit shall maintain NEMA & UL4 rating of enclosure. The following alarms shall initiate the strobe and a form C contact wired to terminal blocks shall be provided for each alarm:
1. Gate fail.
 2. High water level.
 3. Low water level.
 4. Power failure.
- I. Spare Parts:
1. The following spare parts shall be provided for the intake structure:
 - a. (6) Fuses each type used.
 - b. (2) Relay each type used.
 - c. (1) Lamp each type used.

The spares shall be placed in "ziplock" type bags to seal against moisture.
- J. The enclosure shall be equipped with an LED lighting package.
- K. The control panel door shall include a pocket on the interior to hold one (1) laminated copy of the panel wiring diagram. The wiring diagram shall be corrected "as-wired" copy and contain individual wire numbers, circuit breaker numbers, switch designations and control function explanations.
- L. The intake structure has been classified as a Class 1, Group D, Division 1 location. All control equipment such as radar level sensor to be used within the intake structure, shall be designed and installed for intrinsically safe operation per Article 504 of the NEC.

- M. The intake structure shall be equipped with an appropriate hanger attachment for the radar sensor located in the stilling well.
- N. The gates' power and control cables shall be supported by Kellems type grip and attached in a convenient manner at the pump hatch.
- O. The following alarms at a minimum shall be wired to terminals for connection to the SCADA:
 - 1. Water Level = 775.00
 - 2. Water Level = 775.50
 - 3. Water Level = 776.00
 - 4. Power failure.
 - 5. Low Voltage / Phase Reversal.
- P. Space shall be provided for the new SCADA controls and new radio in the new control panel. Contractor shall contact Concentric Integration for the SCADA design and procurement of the new SCADA system. Contact info: Jim Gramhofer, (815) 444-4447 Work, (815) 355-5174 Mobile, or jgramhofer@goconcentric.com.
- Q. Contractor shall install the SCADA antenna as shown on the drawings/ coordinate with system integrator.

PART 3 EXECUTION

3.01 GENERAL

- A. Fabricate the panels as shown on the drawing and as specified. Panel shall be assembled and tested prior to shipment to the field.

3.02 INSPECTION AND TESTING OF CONTROL PANEL

- A. After final assembly, the manufacturer shall test all electrical circuits for proper connection, continuity, short circuits, and grounding. Corrections shall be made as required. Upon successful completion, the panel shall be energized and inputs and outputs simulated to verify proper operation of all instruments and devices.
- B. The Engineer reserves the right to inspect the panels at various stages of construction in the manufacturer's factory. Prior to shipping, manufacturer shall contact engineer, informing him of completion of system to allow for inspection prior to shipping.

3.03 INSTALLATION

- A. Provide stainless steel mounting channels and attaching hardware to properly balance and secure the control panel in strict accordance with the equipment manufacturer's recommendations.
- B. Make all field connections for power, telephone/communication, and control wiring to and from the terminal blocks of the control panel as required.

- C. Provide equipment grounding connection for pump control panel (See Section 26 05 26).

3.04 TESTING

- A. After final installation is complete, check and correct field wiring as required to ensure proper operation of equipment connected to the control panel.
- B. Furnish and install overload heaters for all motor starters to determine that the system functions as intended.
- C. The Contractor shall test the complete system to determine that the system functions as intended.
- D. The Contractor shall further take ampere readings on all equipment at full load and compare those readings with the full load rating of each motor and verify that the proper thermal overloads have been installed in the motor starter.
- E. The Contractor shall furnish to the Engineer a tabulated list indicating nameplate full load amperes vs. actual ampere readings at rated load.
- F. The Contractor shall supply the service of a factory trained technician to check out, start up, program and calibrate the flow meter. The technician shall also provide the owner with training regarding programming and calibration of units.

END OF SECTION

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SECTION 40 70 01
INSTRUMENTATION

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 40 71 13 - Magnetic Flow Meters
- B. Section 40 61 01 – Process Control System
- C. Section 40 66 33.01 - Instrumentation Cable

1.02 SUBMITTALS

- A. Make submittals as specified in Section 01 33 00 and Section 01 70 00.
- B. Materials to be submitted:
 - 1. Manufacturer's standard published catalog sheets and descriptive bulletins.
 - 2. Physical dimensions, mounting details, and electrical connection details for each instrument.
 - 3. Schedule of proposed name tags, scales, and ranges for each instrument.
 - 4. Manufacturer's standard published installation, operation, and maintenance instructions.
- C. Marking: Each submittal shall be identified with the equipment number and plant location as shown on the drawings.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. General: Furnish, install, calibrate, and place in operation all electric and electronic instrumentation as shown on the drawings and as specified. Field mounted units shall include primary elements; transmitters; power and signal wiring and connections; instrument mounting and support hardware; and instrument environmental enclosures as applicable and as shown on the drawings and as indicated in the specifications. Additional analog instrumentation such as receivers, recorders, controllers, totalizers, and back-of-panel instruments shall be furnished and factory installed in analog panels as specified.
- B. Meters and recorders:
 - 1. Supplier of meters and supplier of recorders shall be coordinated so that their signals are compatible.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Instrument and Device Connections: All equipment connections shall be made in accordance with the equipment manufacturer's recommendations. Shields on instrument cables shall be ungrounded at the transmitter and shall be grounded at the receiver termination only. Conductors left spare for future connection shall be trimmed to within 12 inches of the cable assembly and taped. All conductors shall be identified at each end with wire numbers as shown on the instrument schematics and control diagrams using PVC wire marking sleeves as manufactured by Brady, Electrovert, or equal.
- B. Installation and Calibration: After installation and connection of field instrumentation and control devices have been completed, the Contractor shall provide the services of factory-trained personnel to check, adjust and calibrate all instruments and devices to be operating parameters as shown in the schedules and as required in the loop of functional requirements. After calibration of each component, the factory representative shall calibrate and adjust the entire loop to achieve the performance as required by the systems integrator.
- C. The Contractor shall furnish to the Engineer a written certification of calibration performance check for each instrument and loop.
- D. Contractor shall be responsible for installing instrumentation in areas providing easy access. If a measuring element must be installed in a vault, system electronics shall be mounted above ground on strut a minimum of 36" above grade. Contractor shall also consider traffic areas and provide adequate protection and support.

END OF SECTION