



INVITATION FOR BID

Water Service Extension and Booster Station Installation

IFB #011718

Issue Date: December 8, 2017

IFB Response Deadline: January 16, 2018

McHenry County College
8900 US Highway 14
Crystal Lake, Illinois 60012-2761
Telephone: (815) 455-3700

Summary

McHenry County College requests proposals from companies to provide Water Main Service Extension and Installation of a Booster Station.

Date Issued:	December 8, 2017
Service Requested:	Water Service Extension and Booster Station Installation
IFB Closing Date/Time:	January 16, 2018 – 1:00 P.M.
IFB Contact:	Jennifer Jones, Director for Business Services JJONES@MCHENRY.EDU

Proposals must be sealed and delivered to the attention of Jennifer Jones, Director for Business Services, McHenry County College, 8900 US Highway 14, Crystal Lake, IL 60012 on or before January 16, 2018, 1:00 P.M.CST.

All late proposals will be rejected.

All proposals must be signed by a duly authorized representative of the firm.

All unsigned proposals will be automatically rejected.

SPECIAL NOTE: This Invitation for Bid (IFB) does not obligate McHenry County College (MCC) or its Board of Trustees to award a contract or complete the proposed project, and each reserves the right to cancel this IFB if it is considered to be in its best interest. Proposals must be clear and concise. Proposals that are difficult to follow or that do not conform to the IFB format or binding specifications may be rejected. Responding vendors must include the required information called for in this IFB. MCC reserves the right to reject a proposal if required information is not provided or is not organized as directed. MCC also reserves the right to change the evaluation criteria or any other provision in this IFB by posting notice of the change(s) on MCC's IFB website, www.mchenry.edu/bid. For this IFB, posting on the captioned website above constitutes written notification to each vendor. Vendors should check the site daily and are expected to review information on the site carefully before submitting a final proposal.

McHenry County College administration will evaluate all proposals. A recommendation to enter into an agreement with the successful bidder will be presented to the Board of Trustees at the January 25, 2018 board meeting.

We appreciate your interest in McHenry County College and look forward to your response.

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6.0 ATTACHMENTS

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- NOTICE TO PROCEED
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1.0 GENERAL REQUIREMENTS

- 1.1 Introduction:** McHenry County College (hereinafter "MCC") is inviting responsible Vendors (hereinafter "Bidder" or "Contractor") to submit bids for a Water Service Extension and Booster Station Installation. A more complete description of the supplies and/or services sought is provided in the Bid Specifications of the IFB. If you are interested and able to meet these requirements, we would appreciate and welcome a bid. This IFB will set forth any evaluation criteria to be used in determining product or service acceptability. It may require the submission of bid samples, descriptive literature, technical data, references, licenses, or other information or material.
- 1.2 Background:** McHenry County College (MCC) is a community college offering prebaccalaureate programs for students planning to transfer to a four-year university, occupational education leading directly to employment, adult education and literacy programs, work force and workplace development services, and support services to help students succeed. McHenry County College serves one of the fastest growing counties in Illinois. MCC is located forty-five miles northwest of downtown Chicago, the college is committed to providing high quality, need-based educational and training opportunities to adult residents of Community College District 528. Nearly 250,000 residents live within the MCC district boundaries. The college has one campus. The campus is located at 8900 U.S. Highway 14, Crystal Lake, IL 60012, with an additional corporate training facility at the Shah Center in McHenry, IL.
- 1.3 Contact Information/Bid Submission:** The contact, identified below, is the sole point of contact regarding the IFB from the date of issuance until selection of the successful vendor.
- Ms. Jennifer Jones
Director of Business Services
McHenry County College
8900 US Highway 14
Building A, Room 246
Crystal Lake, IL 60012
Email: jjones@mchenry.edu
- 1.4 Term of Contract:** Contract begins upon issuance of the notice of award.
- 1.5 Minimum Bidder Qualifications:** The following minimum qualifications must be met by each bidder: The Bidder shall have previous experience in installation of watermain and associated infrastructure and possess manpower and equipment, financial resources, and an organization as herein specified to perform the type, magnitude, and quality of work specified. The MCC reserves the right to disqualify the low bidder if their work experience is deemed inadequate.

- 1.6 Key Event Dates:** The following dates are set forth for information and planning purposes; however, MCC reserves the right to change the dates.

MCC Issues IFB	December 8, 2017
Last day to send question/clarifications to jjones@mchenry.edu	January 8, 2018 at 9:00 a.m.
Addendum posted to www.mchenry.edu/bid	January 10, 2018
Bids End Date/Location to Submit Bids	January 16, 2018 at 1:00 p.m. Jennifer Jones McHenry County College 8900 US Highway 14 Bldg A, Room 246 Crystal Lake, IL 60012
Bid Opening Date/Location	January 17, 2018 at 8:00 a.m. McHenry County College 8900 US Highway 14 Bldg A, Board Room #217 Crystal Lake, IL 60012
Recommendation to Board of Trustees	January 25, 2018
Notification of Award	February 1, 2018 (tentative)
Pre-Construction Meeting	February 15, 2018 (tentative)
Substantial Completion	June 1, 2018 (tentative)
Final Payment	July 18, 2018 (tentative)
Project Manager	Todd Wheeland, 815-455-8564

2.0 BID SUBMISSION

- 2.1 Examination of Solicitation Documents and Explanation to Bidders:** Bidders are responsible for examining the solicitation documents and any addenda issued, to become informed as to all conditions that might in any way affect the cost or performance of any work. Failure to do so will be at the sole risk of the bidder. Should the bidder find discrepancies in or omissions from the solicitation documents, or should their intent or meaning appear unclear or ambiguous, or should any other question arise relative to the solicitation documents, the bidder shall promptly notify the project contact via email. The bidder making such request will be solely responsible for its timely receipt by the project contact. Replies to such notice may be made in the form of an addendum to the solicitation.
- 2.2 Submission:** The submission of a response shall be *prima facie* evidence that the vendor has full knowledge of the scope and nature of the project requirements. Faxed and Email Bids ARE NOT acceptable. All Attachments in Section 6.0 must

be returned with the bid. All pricing should be included on the Bid Submission Form in Section 6.0.

- 2.3 Interpretation or Representations:** MCC assumes no responsibility for any interpretation or representations made by any of its officers or agents unless interpretations or representations are incorporated into a formal written addendum to the solicitation.
- 2.4 Addenda:** The only method by which any requirement of this solicitation may be modified is by written addendum. All addenda to the bid document will be emailed to the prospective bidders. MCC is not responsible if a vendor does not receive the proposal revision in time to include the information with the proposal submission. Addenda shall be acknowledged by signature and included with the bid submission.
- 2.5 Bid Preparation Costs:** The costs for developing and delivering responses to this IFB are entirely the responsibility of the bidder. The University is not liable for any expense incurred by the bidder in the preparation and presentation of their bid or any other costs incurred by the bidder prior to execution of a Purchase Order or Contract.
- 2.6 Cancellation of IFB:** If the Director of Business Services determines that it is in MCC's best interest, he/she reserves the right to do any of the following:
- Cancel this IFB
 - Modify this IFB in writing as needed
 - Reject any or all proposals received in bid to this IFB
- 2.8 Evaluation:** MCC intends to award this bid to the lowest, responsive, responsible bidder. In determining the responsibility of the bidder, MCC will include, but not be limited to, the following considerations:
1. The quality and range of services the firm proposes to provide.
 2. Prior, equivalent work experience within higher education.
 3. The ability to provide service in an expedient and efficient manner.
 4. The firm's overall experience, reputation, expertise, stability and financial responsibility.
 5. The extent to which the goods or services meet MCC needs.
 6. The experience and qualifications of the staff that will be assigned to service MCC's account.
 7. The provider's ability to assist MCC in meeting the overall goals of IFB.
 8. The firm/vendor's past relationship with MCC, if any.
 9. Any other relevant factor that a business entity would consider in selecting a firm/vendor.

2.9 Award of Contract: The successful bidder will be notified within three business days by email or telephone of their award of contract following the Board of Trustees meeting. The vendor may not assign, sell, or otherwise transfer its interest in the contract award or any part thereof without express written permission from MCC. This bid will be awarded in its entirety to one vendor.

3.0 INSTRUCTION TO BIDDERS: Read the following instructions carefully before submitting any bid. Failure to follow these instructions and the rules may result in the rejection of your bid. MCC reserves the right to reject any and all bids, to waive minor immaterial irregularities, informalities or technicalities, to advertise for new bids, or to request confirmation or clarification from any bidder regarding a bid.

3.1 Bid Format and Content: In order for MCC to evaluate bids fairly and completely, bidders must follow the format set forth herein and must provide all of the information requested. All items identified in the following list must be addressed as concisely as possible in order for a bid to be considered complete. Failure to conform to the stated requirements may necessitate rejection of the bid.

3.2 Cover Letter. The cover letter must confirm that the **bidder understands all the terms and conditions contained in this IFB and will comply with all the provisions of this IFB** and should the contract be awarded to your company, you would be prepared to begin services upon contract approval from MCC. The cover letter must include the full contact information of the person(s) MCC shall contact regarding the bid. A bidder representative authorized to make contractual obligations must sign the cover letter. The letter must also state whether or not subcontractors will be used.

3.3. Experience & Operational Plan. Bidders must describe their capabilities to provide the services requested in this IFB by providing the following:

- A description of Bidder's experience as required in this bid.
- Relevant samples/portfolio of related work, preferably in higher education.
- Staffing and operational plan for this contract.
- Staging of the project and a description of equipment to be used.
- The name, address, work and credentials of any subcontractors who will be performing work.

3.4 Biographies of the Account Team. Bidders must include the biographies of the account team who will be assigned to the project.

3.5 Pricing. All pricing should be inclusive of all related fees, costs, etc. The college is not responsible for, nor will the College pay, for any costs associated with the bid that are not included in the bid submission.

3.6 Packaging of Response: Please submit three (3) copies of the bid. Additionally please submit the bid electronically on a flash drive. The bid documents, must be

documents, must be submitted by mail, hand delivery, overnight carrier or certified mail in a package sealed and labeled showing the following information on the outside:

- Bidder's complete name and address
- Solicitation Number
- Bid Due Date and time
- Sealed Bid

- 3.7 Late Bids:** *Regardless of cause, late bids will not be accepted and will automatically be disqualified from further consideration.* It shall be the bidder's sole risk to assure delivery at the designated office by the designated time. Late bids will not be opened and may be returned to the bidder at the expense of the bidder or destroyed if requested.
- 3.8 Bidder's Signature:** The bid submission form must be signed in ink by an individual authorized to legally bind the business submitting the bid. The bidder's signature on a bid in response to this IFB guarantees that the offer has been established without collusion and without effort to preclude MCC from obtaining the best possible supply or service.
- 3.9 Bid Opening:** MCC will publicly open all bids that are submitted immediate after the official Bid closing time and will record the names and other information specified by law and rule. All bids become the property of MCC and will not be returned except in the case of a late submission.
- 3.10 Responders' Costs:** The cost of developing a bid for this IFB belongs solely to the bidder and may not be charged to MCC.
- 3.11 Specifications:** General specifications are attached hereto and the bidders are expected to meet these specifications. Competition is invited on this bid; however, bidders are advised that McHenry County College reserves the right to reject any or all bids.
- 3.12 Bid Price:** Bid prices shall include all labor (including any additional charges for overtime or off-hour work). Said work will be above and beyond the scope of this bid. Bid prices shall also include all material. No sales tax shall be included because McHenry County College is tax exempt and McHenry County College will present the winning bidder with the tax exempt certification after awarding the bid. McHenry County College requires the breakdown of the various costs enumerated in the bid form be made a part of this bid package. Any bidder that does not fully provide all required information may be deemed to be a non-responsive bid at the sole discretion of McHenry County College.
- 3.13 Withdrawal of Offer:** Bidders shall quote firm prices with prices not to be withdrawn for a period of 60 days from the date that the bids are due.

- 3.14 Rejection of Offers:** McHenry County College reserves the right to reject any or all bids and to waive minor irregularities.
- 3.15 Insurance:** Prior to commencing the project, the Contractor shall provide McHenry County College with a Certificate of Insurance, naming McHenry County College as additional insured, which shall evidence the coverage as required by the Project Manual.
- 3.16 Bid, Performance and Payment Bond:** Contractor shall submit with its bid a Bid Bond in the amount of ten (10%) of the contract price. Upon award, Contractor shall procure and submit a performance bond and payment bond for the full amount of the contract price. Prior to commencement of any work on the Project, Contractor shall submit insurance and bonds. Any provisions contained within the bonds creating a condition precedent for Owner, or abrogating Owner's rights or remedies otherwise available in contract or law, are void. Bond forms attached in Section 6.
- 3.17 Lien Waivers:** Upon completion of the work, Contractor shall provide McHenry County College with appropriate Lien Waivers to cover the total cost of the construction of the Water Main Service Extension and Booster Station Installation including all costs for work performed by any Sub-Contractors. A Verified Schedule of subcontractors and materialmen identifying the name, address, the amount due and to become due in accordance with the Illinois Mechanics Lien Act is required.
- 3.18 Labor:** Contractor must be the primary contractor for the work performed and shall provide owner a list of Ten (10) references of similar projects in the Illinois area that they have performed.
- 3.19 Liquidated Damages:** Provisions for liquidated damages, if any, are set forth in the Agreement.

4.0 GENERAL TERMS AND CONDITIONS

- 4.1 Applicability:** These general terms and conditions will be observed in preparing the proposal to be submitted.
- 4.2 Purchase:** After notice of the award, purchase will be put into effect by means of purchase orders or suitable contract documents executed by the Director of Business Services.
- 4.3 Recycled Materials:** McHenry County College is required to purchase products incorporating recycled materials whenever technically and economically feasible. Contractors are encouraged to offer products with recycled content which meet specifications conforming to Illinois State Statue 20/30.1 pertaining to public community colleges.

- 4.4 Right to Cancel:** MCC may cancel contracts resulting from this IFB at any time for a breach of any contractual obligation by providing the contractor with thirty-calendar day's written notice of such cancellation. Should MCC exercise its right to cancel, such cancellation shall become effective on the date as specified in the notice to cancel.
- 4.5 Taxes:** MCC is exempt from all federal excise, state and local taxes unless otherwise stated in this document. In the event taxes are imposed on the services purchased, MCC will not be responsible for payment of the taxes. The vendor shall absorb the taxes entirely. Upon request, MCC's Tax Exemption Certificate will be furnished.
- 4.6 Proprietary Information:** Bidder should be aware that the contents of all submitted bids are subject to public review and will be subject to the Illinois Freedom of Information Act ["FOIA"]. All information submitted with your bid will be considered public information unless bidder identifies all proprietary information in the proposal by clearly marking on the top of each page so considered, "Proprietary Information" or "Confidential." Should a FOIA request be received by MCC for "Proprietary Information" or "Confidential" information submitted in your bid proposal, MCC will promptly notify you. You shall then indicate in writing to MCC your intent to assume the defense, cost, expense of the defense including attorney fees as well as any penalty awarded arising out of any demand for "Proprietary Information" or "Confidential" information and provide adequate security to protect the financial interest of MCC for that undertaking as well as indemnify MCC should an adverse judgment be awarded. In the absence of such agreement, bidder waives any and all claims of "Proprietary Information" or "Confidential" information with the understanding that MCC will supply the requested information in accordance with the FOIA request.
- 4.7 Retention of Documentation:** All bid materials and supporting documentation that is submitted in response to this proposal becomes the permanent property of MCC.
- 4.8 Indemnification:** The Contractor shall protect, indemnify and hold MCC harmless against any liability claims and costs for injury to or death of any person or persons and for loss or damage to any property occurring in connection with or in any incident to or arising out of occupancy, use, service, operations or performance of work in connection with the contract, resulting in whole or in part from the negligent acts or omissions of the Contractor.
- 4.9 Successors and Assigns:** Contractor shall not assign any rights under or interest in the contract award without the prior written consent of the Owner. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

- 4.10 Substitutes to Specifications:** Consideration will be given to alternatives if they are a standard manufactured item as evidenced by literature and specifications enclosed with this bid document. A demonstration may be requested. Submit complete specifications for any substitute offered. A complete disqualification could result without these reference materials attached. Indicate warranty specifications that apply to the items included in your bid.
- 4.11 Disclosure:** Contractors shall note any and all relationships that might be a conflict of interest and include such information with the bid.
- 4.12 Terms of Payment:** MCC operates under terms of payment for work completed and product delivered within Net 30 days from date of invoice. All payments of invoices need to be approved on a monthly basis. In no case will MCC agree to late fees prior to 60 days before payment is received, this is based on State Statutes for State funded entities.
- 4.13** Contractor represents that it does not discriminate in its hiring practices based upon race, color, religion, sex, marital status, national origin or ancestry, age, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service. Contractor shall assure the Owner that Subcontractors shall not discriminate as set forth in this paragraph. 775 ILCS 5/2-1053; 44 Ill. Admin. Code Section 750 et seq. Contractor shall (1) refrain from unlawful discrimination and discrimination based on citizenship status in employment and undertake affirmative action to assure equality of employment opportunity and eliminate the effects of past discrimination; (2) Comply with the procedures and requirements of the Department's regulations concerning equal employment opportunities and affirmative action; (3) Provide such information, with respect to its employees and applicants for employment, and assistance as the Department may reasonably request.
- 4.14** Contractor represents that it has in place a Sexual Harassment Policy in accordance with the Illinois Human Rights Act and shall assure the Owner that Subcontractors shall have in place a Sexual Harassment Policy prior to commencement of work on the Project. 775 ILCS 5/1-105. The written sexual harassment policies shall include, at a minimum, the following information: (i) the illegality of sexual harassment; (ii) the definition of sexual harassment under State law; (iii) a description of sexual harassment, utilizing examples; (iv) the vendor's internal complaint process including penalties; (v) the legal recourse, investigative and complaint process available through the Department and the Commission; (vi) directions on how to contact the Department and Commission; and (vii) protection against retaliation as provided by Section 6-101 of this Act. A copy of the policies shall be provided to the Owner or Department of Human Rights upon request.
- 4.15** Contractor represents that it is in conformance with the Drug Free Workplace Act. 30 ILCS 580/1 et seq.

- 4.16** Contractor by execution of this Agreement certifies it is not barred from contracting as a result of bid rigging or bid rotation. 720 ILCS 5/33 E-11.
- 4.17** Contractor by execution of this Agreement agrees to provide Owner the name of each employee who may have directly daily contact with students, and such additional information as is necessary and authorizes Owner's to submit such information to the State Police and other state agencies. Such information will be submitted for a criminal history records check and a check of the Statewide Sex Offender Database. Such investigation shall be performed at the Owner expense. 105 ILCS 5/10-21.9(f).
- 4.18** Contractor agrees by the execution of this agreement to give preference in employment and appointment to persons who have been members of the armed forces of the United States or who, while citizens of the United States, were members of the armed forces of allies of the United States in time of hostilities with a foreign country in accordance with the Veterans Preference Act. 330 ILCS 55.
- 4.19 Prevailing Wage Law:** Contractor acknowledges that this is a public works project governed by the Illinois Prevailing Wage Act. Contractor shall pay its laborers if any and assure the Owner that Subcontractors shall pay its laborers not less than the established prevailing rate of wages. 820 ILCS 130/1 et seq. Contractor shall comply with all reporting requirements of the Illinois Prevailing Wage Act. Similarly, the Contractor shall assure owner that all Subcontractors and sub-tier subcontractors comply with the reporting requirements of the Illinois Prevailing Wage Act. Contractor and each sub-tier shall with each pay application submit certified payroll records as required by 820 ILCS 130/5.
- 4.20 Testing of Materials:** Refer to complete specification requirements contained in Section 5.0, Division 01-1400 Quality Requirements. The Owner will employ and pay for services of an independent testing agency to perform specified testing and inspection of geotechnical/soils related activities.
- 4.21 Construction Staking:** Refer to complete specification requirements contained in Section 5.0, Division 01-1710. The contractor should include with their bid construction staking services. Contractor may use HR Green or any other competent licensed land surveyor to complete this task.

5.0 SPECIFICATIONS

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01100
SUMMARY

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Type of Contracts.
 - 3. Work under other contracts.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification:
MCC Water Service Extension and Booster Station
- B. Project Location: 8900 U.S. Route 14, Crystal Lake, IL 60012
- C. Owner: (OWNER)
 - 1. McHenry County College
8900 U.S. Route 14
Crystal Lake, IL 60012-2761
Ph: (815) 455-8564
- D. Engineer: (ENGINEER)
 - 1. HR Green, Inc.
420 Front Street, Suite 100
McHenry, Illinois, 60050
Phone (815) 759-8363
Engineer's Representative: Joe Vavrina – Senior Project Manager
- E. CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work of this Contract is generally described as follows:

The project includes the installation of approximately +/- 990 lineal feet of 12" water main and approximately +/- 645 lineal feet of 8" water service including a booster station and associated valves and fire hydrants for McHenry County College. General construction for the water main/service extension and booster station project includes, but not limited to, installation of water main, water service, standby generator and booster station along with the other work associated with the project as outlined in the plans and specifications.

1.03 TYPE OF CONTRACT

- A. Project will be constructed under a Unit Price Contract with OWNER.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01140
WORK RESTRICTIONS

PART 1 – GENERAL

1.01 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated. Conduct operations to ensure least inconvenience to Owner and Students.
- B. Storage Space: Use of existing College owned land for storage of equipment and materials. The College will allow the Contractor to use the open space as identified in the plans. Obtain and pay for use of additional storage or Work areas needed for operations at no additional cost to Owner.
- C. Construction Hours: Limit construction operations to the following hours unless otherwise approved by the City of Crystal Lake: 7:00 a.m. to 7:00 p.m. on weekdays. Keep noise at a minimum during the early morning hours.
- D. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to owner, owner's employees, students, school buses, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Coordinate with college ahead of time when driveways/parking areas are to be temporarily out of service.
- E. Protection of Pavement: The traveled surfaces and structures on or adjacent to the work shall be protected, in a manner satisfactory to the Engineer, from damage by lugs or cleats on treads or wheels of equipments.
- G. Easements: Easements for the existing and proposed utilities, both public and private, and utilities within public rights-of-way are shown on the plan according to available records.

1.02 ILLINOIS DEPARTMENT OF TRANSPORTATION - Omitted

1.03 UTILITIES

- A. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
- B. The Contractor shall be responsible for notifying all utilities prior to construction and determining the exact location in the field of these utility lines and their protection from damage due to construction operations. If during construction the Contractor damages any existing utility lines, the Contractor shall be responsible for the expeditious repair of damages.
- C. ComEd, AT&T, Nicor Gas, Comcast, and others have underground and/or overhead service facilities in the vicinity of the proposed work. The Contractor shall call J.U.L.I.E. at (800) 892 – 0123 for utility locations.
- D. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
- E. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

- F. If existing utility lines of any nature are encountered which conflict in location with new construction, the Contractor shall notify the Engineer so that the conflict may be resolved. If the conflict requires a change to the Plans, construction shall not be undertaken until such changes are approved by the Engineer in writing.
- G. If drain tiles are encountered in the field, the Contractor shall notify the Engineer and Owner of the finding. The drain tiles shall be repaired such that it continues to drain as originally intended.
- H. The Contractor is responsible for stabilizing utility poles during construction without any interruption to service. All stabilization performed by the Contractor shall be considered incidental to the cost per linear foot of installing sanitary sewer.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01140

SECTION 01250
CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.02 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
1. Proposal Requests issued by Engineer are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

1.03 CONSTRUCTION CHANGE DIRECTIVE

- A. Work Change Directive: Engineer may issue a Work Change Directive on EJCDC Document 1910-8-F, which will be provided by Engineer separately. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01250

SECTION 01290
PAYMENT PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.02 UNIT PRICES

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of work required by the Contract Documents increase or decrease.
- B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- C. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- D. The quantities given in the Engineer's bid proposal are intended as a guide for the Contractor in determining the scope of the completed project. It is the Contractor's responsibility to determine all material quantities and apprise himself of all site conditions.

1.03 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use EJCDC Document C-620 as form for Applications for Payment. A copy of this is located in the appendix.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

- E. Transmittal: Submit signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 - 1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.
 - a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 - 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Contractor's Construction Schedule (preliminary if not final).
 - 3. Products list.
 - 4. Submittals Schedule (preliminary if not final).
 - 5. List of Contractor's staff assignments.
 - 6. List of Contractor's principal consultants.
 - 7. Initial progress report.
 - 8. Report of preconstruction conference.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100% completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. Evidence that claims have been settled.
 5. Final, liquidated damages settlement statement.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01320
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 –GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Preliminary Construction Schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Submittals Schedule.
 - 4. Field condition reports.
 - 5. Special reports.

1.02 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Milestone: A key or critical point in time for reference or measurement.

1.03 SUBMITTALS

- A. Submittals Schedule: Submit three (3) copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of subcontractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for Engineer's final release or approval.

- B. Preliminary Construction Schedule: Submit two (2) printed copies; one (1) single sheet of reproducible media, and one (1) print.
- C. Contractor's Construction Schedule: Submit two (2) printed copies of initial schedule, one (1) reproducible print and one (1) blue- or black-line print, large enough to show entire schedule for entire construction period.
 - 1. Submit an electronic copy (CDROM) of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- D. Field Condition Reports: Submit two (2) copies at time of discovery of differing conditions.
- E. Special Reports: Submit two (2) copies at time of unusual event.

1.04 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from parties involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 – PRODUCTS

2.01 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - a. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 2. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Engineer.
 - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 45 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 - 4. Startup and Testing Time: Include not less than five days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Submittals.
 - b. Deliveries.
 - c. Tests and inspections.
 - d. Adjusting.
 - e. Startup and placement into final use and operation.
 - 2. Other Constraints: Schedule work so that all asphalt pavement patching is complete on or before November 15, of the year that construction is started.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- F. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
 - 1. Refer to Division 1 Section "Payment Procedures" for cost reporting and payment procedures.

- G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

2.03 PRELIMINARY CONSTRUCTION SCHEDULE - Omitted

2.04 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 10 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.05 REPORTS

- A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a request for information on CSI Form 13.2A. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.06 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 – EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At two week intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate Actual Completion percentage for each activity.

- B. Distribution: Distribute copies of approved schedule to Engineer/Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01320

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.02 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Engineer's responsive action.
- B. Informational Submittals: Written information that does not require Engineer's approval. Submittals may be rejected for not complying with requirements.

1.03 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal.
 - 1. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Direct Transmittal to Engineer: Where the Contract Documents indicate that submittals may be transmitted directly to Engineer's consultants, provide duplicate copy of transmittal to Engineer. Submittal will be returned to Engineer before being returned to Contractor.
 - 3. Insert list of submittals below requiring direct transmittal to consultant or delete and identify submittals in the Sections where they are specified. Structural, mechanical, plumbing, and electrical components are examples of the Work that often require direct transmittal to consultants.

4. If intermediate submittal is necessary, process it in same manner as initial submittal.
 5. Allow 10 days for processing each resubmittal.
 6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Unique identifier, including revision number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Other necessary identification.
- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- G. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Engineer.
 2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will discard submittals received from sources other than Contractor.
1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

3. Submittal Transmittal Form: Available from Engineer with Notice of Award.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Engineer in connection with construction.

PART 2 – PRODUCTS

2.01 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
 1. Number of Copies: Submit copies of each submittal, as follows, unless otherwise indicated:
 - a. Initial Submittal: Submit a preliminary single copy of each submittal where selection of options, color, pattern, texture, or similar characteristics is required. Engineer will return submittal with options selected.
 - b. Final Submittal: Submit six copies, unless copies are required for operation and maintenance manuals. Engineer will retain four copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Document.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Wiring diagrams showing factory-installed wiring.
 - f. Printed performance curves.
 - g. Operational range diagrams.
 - h. Standard product operating and maintenance manuals.
 - i. Compliance with recognized testing agency standards.
 - j. Application of testing agency labels and seals.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Include the following information, as applicable:
 - a. Dimensions.

- b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - e. Design calculations.
 - f. Compliance with specified standards.
 - g. Notation of dimensions established by field measurement.
- 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
- 3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 24 by 36 inches.
- 4. Number of Copies: Submit copies of each submittal, as follows:
 - a. Initial Submittal: Submit two blue- or black-line prints. Engineer will return one print.
 - b. Final Submittal: Submit six blue- or black-line prints, unless prints are required for operation and maintenance manuals. Engineer will retain four prints; remainder will be returned. Mark up and retain one returned print as a Project Record Drawing.
- D. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."
- E. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."
- F. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

2.02 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit four copies of each submittal, unless otherwise indicated. Engineer will not return copies.
 - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."
- B. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

- C. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- D. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- E. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- F. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.

PART 3 – EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01330

SECTION 01400
QUALITY REQUIREMENTS

PART 1 –GENERAL

1.01 SECTION INCLUDES

- A. Field Samples.
- B. Mock-ups.
- C. Control of Installation.
- D. Tolerances.
- E. Testing Services.
- F. Manufacturers' Field Services

1.02 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants.
- B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- E. ASTM E329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing.

1.03 FIELD SAMPLES

- A. Install field samples at the site as required by individual specifications Sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Engineer.

1.04 TESTING SERVICES

- A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspection of asphalt paving, concrete and geotechnical/soils related activities.
- B. Owner may choose to have Engineer perform certain inspection and testing activities in addition to those specified as required by the Contractor. Payment for initial Owner/Engineer inspection and testing will be by Owner. Payment for Owner/Engineer retesting required because of non-conformance to specified requirements will be charged to the Contractor by deducting inspection and testing charges from the Contract Sum.
- C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.01 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. Should 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. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS – NOT USED

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place

3.04 TESTING AND INSPECTION

- A. See individual specification sections for testing required.
- B. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
 - 2. Perform inspections, sampling, testing, and other services specified in individual specification sections and as required by the Engineer.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 - 5. Perform additional tests and inspections required by Engineer.
 - 6. Submit reports of all tests/inspections specified to Engineer, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- C. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs, equipment, tools, storage, and assistance as requested.

2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 5. Make arrangements with testing agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Engineer. Payment for re-testing will be made by the Contractor.

SECTION 01420
REFERENCES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. "Standard Specifications for Road and Bridge Construction" prepared by the Illinois Department of Transportation and adopted by said department on January 1, 2012. The specification will be referred to throughout this project manual as the IDOT SSRBC.
- C. "Supplemental Specifications and Recurring Special Provisions" adopted by Illinois Department of Transportation on January 1, 2012.
- D. "Standard Specifications for Sewer and Water Main Construction in Illinois", Sixth Edition, July 2009. This specification will be referred to throughout this project manual as the ILLINOIS SEWER SPECS.
- E. "Standard Specifications for Soil Erosion and Sediment Control" adopted by the Illinois Environmental Protection Agency – Illinois Urban Manual.
- F. Subdivision Ordinance of the City of McHenry.
- G. Manual on Uniform Traffic Control Devices.

1.02 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": The term "approved," when used in conjunction with Engineer's action on Contractor's submittals, applications, and requests, is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Engineer, requested by Engineer, and similar phrases.
- D. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.
- E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

- G. "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
- I. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.
- J. The term "experienced," when used with the term "installer," means having successfully completed a minimum of three previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- K. "Project site" is the space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on the Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.03 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of the date of the Contract Documents, unless otherwise indicated.
- C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Engineer for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from the publication source and make them available on request.

- E. Abbreviations and Names: Abbreviations and acronyms are frequently used in the Specifications and other Contract Documents to represent the name of a trade association, standards-developing organization, authorities having jurisdiction, or other entity in the context of referencing a standard or publication. The following abbreviations and acronyms, as referenced in the Contract Documents, mean the associated names. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association	(202) 862-5100
AAN	American Association of Nurserymen (See ANLA)	
AASHTO	American Association of State Highway and Transportation Officials	(202) 624-5800
ABMA	American Bearing Manufacturers Association (Formerly: Anti-Friction Bearing Manufacturers Association)	(202) 429-5155
ACI	American Concrete Institute	(248) 848-3700
ACIL	ACIL: The Association of Independent Scientific, Engineering, & Testing Firms	(202) 887-5872
ACPA	American Concrete Pipe Association	(972) 506-7216
AEIC	Association of Edison Illuminating Companies	(205) 250-2530
AFBMA	Anti-Friction Bearing Manufacturers Association (See ABMA)	
AFPA	American Forest and Paper Association (Formerly: National Forest Products Association)	(800) 878-8878 (202) 463-2700
AGA	American Gas Association	(703) 841-8400
AI	Asphalt Institute	(606) 288-4960
AIA	The American Institute of Engineers	(202) 626-7300
AIA	American Insurance Association	(202) 828-7100
AISC	American Institute of Steel Construction	(800) 644-2400
AISI	American Iron and Steel Institute	(202) 452-7100
AITC	American Institute of Timber Construction	(303) 792-9559
ALA	American Laminators Association (See LMA)	
ALCA	Associated Landscape Contractors of America	(800) 395-2522
ALI	Associated Laboratories, Inc.	(214) 565-0593

ALSC	American Lumber Standards Committee	(301) 972-1700
ANLA	American Nursery and Landscape Association (Formerly: American Association of Nurserymen)	(202) 789-2900
ANSI	American National Standards Institute	(888) 267-4783
AOSA	Association of Official Seed Analysts	(402) 476-3852
APA	APA-The Engineered Wood Association (Formerly: American Plywood Association)	(253) 565-6600
APA	Architectural Precast Association	(941) 454-6989
API	American Petroleum Institute	(202) 682-8000
ASC	Adhesive and Sealant Council	(202) 452-1500
ASCE	American Society of Civil Engineers World Headquarters	(800) 548-2723 (703) 295-6000
ASLA	American Society of Landscape Engineers	(202) 898-2444
ASME	American Society of Mechanical Engineers	(800) 843-2763
ASPA	American Sod Producers Association (See TPI)	
ASPE	American Society of Plumbing Engineers	(805) 495-7120
ASSE	American Society of Sanitary Engineering	(440) 835-3040
ASTM	American Society for Testing and Materials	(610) 832-9500
AWPA	American Wood-Preservers' Association	(817) 326-6300
AWS	American Welding Society	(800) 443-9353
AWWA	American Water Works Association	(800) 926-7337
CISPI	Cast Iron Soil Pipe Institute	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute	(301) 596-2584
CPA	Composite Panel Association (Formerly: National Particleboard Association)	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association	(800) 510-2772
CRSI	Concrete Reinforcing Steel Institute	(847) 517-1200
DIPRA	Ductile Iron Pipe Research Association	(205) 402-8702
EIA	Electronic Industries Association	(703) 907-7500
FM	Factory Mutual System	(781) 762-4300

HI	Hydraulic Institute	(888) 786-7744
HMA	Hardwood Manufacturers Association (Formerly: Southern Hardwood Lumber Manufacturers Association)	(412) 829-0770
HPVA	Hardwood Plywood and Veneer Association	(703) 435-2900
ICEA	Insulated Cable Engineers Association	(508) 394-4424
IEC	International Electrotechnical Commission (Available from ANSI)	(888) 267-4783 (212) 642-4900
IEEE	Institute of Electrical and Electronics Engineers	(800) 678-4333
ISS	Iron and Steel Society	(412) 776-1535
LGSI	Light Gage Structural Institute	(972) 625-4560
NAA	National Arborist Association	(800) 733-2622
NACE	NACE International (Formerly: National Association of Corrosion Engineers)	(281) 492-0535 (281) 492-8254
NAPA	National Asphalt Pavement Association NAPA Building	(888) 468-6499 (301) 731-4748
NCSPA	National Corrugated Steel Pipe Association	(202) 452-1700
NEMA	National Electrical Manufacturers Association	(703) 841-3200
NFPA	National Fire Protection Association	(800) 344-3555
NRMCA	National Ready Mixed Concrete Association	(301) 587-1400
NSF	NSF International (Formerly: National Sanitation Foundation)	(734) 769-8010
PCA	Portland Cement Association	(847) 966-6200
PCI	Precast/Prestressed Concrete Institute	(312) 786-0300
PDI	Plumbing and Drainage Institute	(800) 589-8956
PPFA	Plastic Pipe and Fittings Association	(888) 314-6774
PPI	Plastics Pipe Institute (The Society of the Plastics Industry, Inc.)	(202) 974-5306
SSPC	SSPC: The Society for Protective Coatings	(800) 837-8303
SSPMA	Sump and Sewage Pump Manufacturers Association	(847) 559-9233
SWPA	Submersible Wastewater Pump Association	(847) 729-7972

UL	Underwriters Laboratories Inc.	(800) 704-4050
UNI	Uni-Bell PVC Pipe Association	(972) 243-3902
WASTEC	Waste Equipment Technology Association	(202) 244-4700
WEF	Water Environment Federation (Formerly: Water Pollution Control Federation)	(800) 666-0206 (703) 684-2400
WPCF	Water Pollution Control Federation (See WEF)	

- F. Federal Government Agencies: Names and titles of Federal Government standards- or specification-developing agencies are often abbreviated. The following abbreviations and acronyms referenced in the Contract Documents indicate names of standards- or specification-developing agencies of the Federal Government. Names and addresses are subject to change and are believed, but are not assured, to be accurate and up-to-date as of the date of the Contract Documents.

CE	Corps of Engineers (U.S. Department of the Army)	(202) 761-0660
CFR	Code of Federal Regulations	(202) 512-1800
CPSC	Consumer Product Safety Commission	(800) 638-2772
CS	Commercial Standard (U.S. Department of Commerce) Government Printing Office	(202) 512-1800
DOC	Department of Commerce	(202) 482-2000
DOT	Department of Transportation	(202) 366-4000
EPA	Environmental Protection Agency	(202) 260-2090
FAA	Federal Aviation Administration (U.S. Department of Transportation)	(202) 366-4000
FCC	Federal Communications Commission	(202) 418-0126
FDA	Food and Drug Administration	(301) 443-1544
FHA	Federal Housing Administration (U.S. Department of Housing and Urban Development)	(202) 401-0388
GSA	General Services Administration	(202) 708-5082
MIL	Military Standardization Documents (U.S. Department of Defense) Defense Automated Printing Service	(215) 697-2179
NIST	National Institute of Standards and Technology (U.S. Department of Commerce)	(301) 975-2000
OSHA	Occupational Safety and Health Administration	(202) 219-8148

	(U.S. Department of Labor)	
PS	Product Standard of NBS (U.S. Department of Commerce)	(202) 512-1800
TRB	Transportation Research Board, National Research Council	(202) 334-2934
USDA	U.S. Department of Agriculture	(202) 720-8732
USPS	U.S. Postal Service	(202) 268-2000

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01420

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 –GENERAL

1.01 SUMMARY

- A. Utilities including lighting and electricity, heat, telephone service, and water.
- B. Project identification and temporary signs.
- C. Temporary sanitary facilities.
- D. Cleaning
- E. Staking and Survey
- F. Temporary Pavement Surface
- G. Temporary Erosion Control Blanket

1.02 USE CHARGES

- A. General: Cost or use charges for temporary facilities are not chargeable to Owner or Engineer and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Owner's construction forces.
 - 2. Occupants of Project.
 - 3. Engineer.
 - 4. Testing agencies.
 - 5. Personnel of authorities having jurisdiction.

1.04 PROJECT CONDITIONS

- A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
 - 1. Keep temporary services and facilities clean and neat.
 - 2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Engineer. Provide materials suitable for use intended.

2.02 EQUIPMENT

- A. General: Provide equipment suitable for use intended.

2.03 TEMPORARY SANITARY FACILITIES

- A. Provide sanitary facilities in compliance with laws and regulations.
 - 1. Service, clean and maintain facilities and enclosures.
 - 2. Supply toilet tissue and dispenser at each toilet.

PART 3 – EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY SIGNS

- A. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.
 - 1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.
 - 2. Prepare temporary signs to provide directional information to construction personnel and visitors.
 - 3. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
 - 4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.
- B. This work shall not be paid for separately but included in the cost for Traffic Control & Protection.

3.04 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
- B. Site: Maintain Project site free of waste materials and debris. When construction operations take place adjacent to public roadways the Contractor shall be responsible for removal of all loose debris deposited on the pavement. Streets shall be
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Pavement: Clean pavement surfaces and protect as necessary to ensure freedom from damage and deterioration, and accumulation of dirt.
- F. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- I. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- J. Progress Cleaning, as directed by the College, shall be considered incidental to the Contract.

3.05 WATER FOR CONSTRUCTION AND TESTING

- A. Contractor shall supply any water required for construction. Water is available from the College.
 1. Secure permission from water utility, obtain necessary permits, and notify Engineer before obtaining water from fire hydrants. Make arrangements and pay costs for water, for connecting to hydrants, and for temporary piping required to transport water to point of use.
 2. Connection to hydrants shall prevent backflow to system. Use only special hydrant operating wrenches to open hydrants. Make certain hydrant valves are open full. If hydrants are damaged, Contractor shall be responsible and shall notify appropriate agency so damage can be repaired as quickly as possible. Fire hydrants shall be completely accessible to Fire Department at all times.

3.06 STAKING AND SURVEY

- A. Contractor shall supply construction survey and staking on the project.
 1. Digital drawing files will be provided to Contractor's surveyor by the ENGINEER.

3.07 TEMPORARY PAVEMENT

- A. This Work shall consist of furnishing the labor, material, and equipment to provide and maintain a two (2) inch thick hot-mix asphalt pavement patch over sanitary sewer trenches when final restoration cannot be completed prior to snow plowing activities. Temporary pavement patching, if necessary, shall be considered incidental to the item of work being performed.

- B. Hot-Mix Asphalt for temporary access shall meet N50 mix design requirements. The width of the asphalt for temporary access shall be equal to the width of the existing trench. The Engineer shall approve equipment for placing and compacting the temporary asphalt.
- C. During the course of the contract, the Contractor shall construct and maintain temporary access to the length and width determined by the Engineer. The Contractor shall remove the temporary aggregate surface to permit construction of the hot-mix asphalt pavement patch. Prior to removal, the Engineer shall classify the amount of temporary aggregate which is salvageable. If classified salvageable, the Contractor shall incorporate this material into an approved use. Otherwise, all unsalvageable material shall be disposed of at the Contractor's expense.
- D. This work shall be measured for payment in square yards. The Contractor shall provide individual load tickets to the Engineer clearly indicating that the delivery is for temporary use. The use of combination load tickets from other pay items shall not be permitted and those amounts not designed in writing for temporary access will not be measured for payment.
- E. In the event that the temporary pavement patch or the asphalt for temporary access is deemed deficient as noted the College or authorized individual, the Contractor will be notified of the deficiency. The Contractor had four (4) hours to repair the pavement patch to the satisfaction of the College or authorized individual. Failure to do so will result in a penalty on one hundred dollars per hour (\$100.00/hr) starting four (4) hours from the time of notification.

3.08 TEMPORARY EROSION CONTROL

- A. Erosion Control Blanket shall be used to stabilize the construction areas where the final grade has been reached but cannot be permanently stabilized due to planting season restrictions. Stabilization practices shall be implemented where construction activity has permanently or temporarily ceases as follows:
 - 1. Where the initiation of stabilization measures by the 7th day after construction activities temporarily or permanently ceased is precluded by snow cover, stabilization measures shall be initiated as soon as practical.
 - 2. Where construction activity will resume on a portion of the site within 14 days from when activities ceased. In this case, stabilization measures do not have to be initiated on that portion of the job site by the 7th day after construction activities temporarily ceased.
- B. Temporary Erosion Control, if necessary, shall be considered incidental to the item of work being performed.

END OF SECTION 01500

SECTION 01550
TRAFFIC CONTROL AND PROTECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes warning signs and devices, temporary traffic signals, guardrails, handrails, temporary fencing, flag persons, and other equipment and materials required to protect vehicular and pedestrian traffic from construction activities.
- B. The Contractor shall be responsible for the installation and maintenance of adequate signs, traffic control devices, and warning devices to inform and protect the public during all phases of construction.

1.02 SUBMITTALS

- A. Traffic Control Schedule:
 - 1. Schedule of lane closures, street closures, parking lot closures, and sidewalk closings, partial closings, and detours.
 - 2. Include procedures for pedestrian and vehicular traffic routing and protection in immediate construction area and surrounding area during working and non-working hours.
 - 3. Update as necessary to keep Owner and Maintaining Agency informed of traffic routing.
 - 4. Owners and Maintaining Agency review and acceptance shall not be construed as confirming adequacy of protection measures proposed.
 - 5. Contractor will notify Owner of construction schedules and traffic plans. Contractor shall be solely responsible for full protection of public and Contractor's own forces.

1.03 TRAFFIC CONTROL CONDITIONS

- A. Keep Work areas open to pedestrian and vehicular traffic to maximum extent practical.
- B. Provide minimum of 4-day notice before implementation of traffic restrictions.
- C. Provide safe passage to vehicular and pedestrian traffic at all times when traffic is allowed.
- D. Provide continuous access for emergency vehicles.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Traffic control materials shall conform to following reference documents:
 - 1. Illinois Manual on Uniform Traffic Control Devices for Streets and Highways

2. Section 701 -TRAFFIC CONTROL AND PROTECTION of the IDOT SSRBC

2.02 PERSONNEL

- A. Flag persons (if applicable) shall be trained in accordance with State of Illinois regulations.

PART 3 – EXECUTION

3.01 GENERAL VEHICULAR TRAFFIC CONTROL REQUIREMENTS

- A. At a minimum, provide traffic control in following general locations:
1. Streets, parking lots, or highways along or in which construction is occurring.
 2. Areas where construction vehicles are entering or leaving streets or highways.
 3. Roadways temporarily restricted to one-way travel.
 4. Unpaved trenches and other disturbed areas in pavement.
 5. When work is occurring adjacent to a traveled roadway.
- B. Provide traffic control devices in accordance with following general conditions:
1. Flashing light barricades, Type I or Type II, to channel traffic to undisturbed pavement. Lights with barricades shall be provided for over night traffic control and protection.
 2. Flashing light barricades, Type III, to screen off disturbed areas and trenches from oncoming traffic.
- C. Placement of signs and barricades shall proceed in direction of flow of traffic. Remove signs and barricades at end of construction area and proceed toward oncoming traffic.

3.02 SPECIFIC TRAFFIC CONTROL REQUIREMENTS

- A. Streets
1. One (1) lane open with flag persons.
 2. Detours must be approved by the Owner prior to implementation.
 3. The Contractor shall make every effort to keep construction traffic from delaying traffic entering/existing the College to U.S. Route 14.

3.03 PEDESTRIAN TRAFFIC CONTROL

- A. Protect pedestrians and students/faculty from construction operations and vehicular traffic traveling through construction area.
- B. Stockpiled materials shall not block streets, driveways, sidewalks, or crosswalks.
- C. Grade backfilled trenches uniformly and install temporary pavements as required to permit safe crossing by vehicles and pedestrians.

PART 4 – EXECUTION

- 4.01 TRAFFIC CONTROL AND PROTECTION is included as a Lump Sum unit price. A percentage of the Lump Sum shall be paid on each payment application in proportion total work completed as determined by the Engineer.

END OF SECTION 01550

SECTION 01560
ENVIRONMENT PROTECTION

PART 1 – GENERAL

1.01 SUMMARY

- A. General requirements pertaining to abatement and control of environmental pollution arising from activities of Contractor and Subcontractors in performance of the Work of the Contract.
- B. Contractor, in executing Work, shall maintain work areas free from environmental pollution that would be in violation of federal, state or local regulations.
- C. Items of work included under this section shall be paid for separately but included in the cost of the contract.
- D. Stormwater Pollution Prevention Plan (SWPPP)
 - 1. The project will require a stormwater discharge permit through the IEPA which will include a SWPPP. Engineer will provide the SWPPP for the contractor to use as a guide and working document. Contractor to modify SWPPP as appropriate to address erosion control issues and keep logs and inspection reports as required in the SWPPP. SWPPP will be required to be kept on-site at all times and available for review by City Inspectors and/or engineer. It is the contractor's responsibility to keep this plan updated at all times.

1.02 SUBMITTALS

- A. Storm Water Discharge Plan.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 GENERAL

- A. The land resources within boundaries of the Project, but outside the limits of permanent Work performed under this Contract, shall be preserved in their present condition or be restored to a condition after completion of construction that will appear to be natural and not detract from the appearance of the Project.
- B. Insofar as possible, confine activities to pertinent areas defined on the Drawings or elsewhere in the Contract Documents.
 - 1. Return construction areas to their preconstruction elevations except where surface elevations are otherwise noted to be changed.
 - 2. Maintain natural drainage patterns.
 - 3. Conduct construction activities in such a manner that ponding of stagnant water conducive to mosquito breeding habitat will not occur at any time.
- C. Land resources:
 - 1. Do not remove, cut, deface, injure, or destroy trees or other vegetation outside the Work area limits.

2. Do not remove, cut, deface, injure, or destroy trees or other vegetation inside the Work area limits, designated to be preserved, except as permitted by Engineer.
3. Land resources damaged by Contractor shall be promptly replaced or repaired to the approval of Engineer at Contractor's expense.

3.02 ARCHAEOLOGICAL FINDS DURING CONSTRUCTION

- A. There are no known archaeological remains at the Project site.
- B. Should skeletons, artifacts, or other archaeological remains be uncovered:
 1. Suspend operations of this Contract at the site of discovery.
 2. Notify Engineer immediately of the finding.
- C. Should the discovery site require archaeological studies resulting in delays and/or additional work, Contractor will be compensated by an adjustment under pertinent provisions of the Contract.

3.03 PROTECTION OF STORM SEWERS

- A. Prevent construction materials, concrete, earth or other debris from entering existing storm sewers or sewer construction.

3.04 PROTECTION OF WATERWAYS

- A. Observe rules and regulations of State of Illinois and agencies of U.S. government prohibiting pollution of lakes, streams, rivers or wetlands by dumping of refuse, rubbish, dredge material or debris. The Contractor shall comply with the requirements of the McHenry County Stormwater Ordinances.
- B. Disposal of materials into waters of state must conform to requirements of State of Illinois.
 1. Permits shall be obtained by Contractor.
- C. Provide approved method to divert flows, including storm flows and flows created by construction activity, to prevent excessive silting of waterways and flooding of Site.
- D. Comply with procedures outlined in U.S. EPA manuals entitled "Guidelines for Erosion and Sedimentation Control Planning and Implementation", Manual EPA-72-015 and "Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity", Manual EPA-43019-73-007.

3.05 STORMWATER DISCHARGE

- A. Contractor shall comply with State of Illinois requirements.
 1. Engineer will inspect construction site and Contractor shall make corrections or repairs required.
 2. Contractor shall keep plan on site during the construction, available for review.

3.06 DISPOSAL OF EXCESS EXCAVATED AND OTHER WASTE MATERIALS

- A. Excess excavated material not required or suitable for backfill and other waste material shall be disposed of in accordance with local regulations and at a location within the College Campus as identified on the plans. All stockpiles shall be maintained/stabilized per details shown in the plans and all applicable erosion control measures implemented.
- B. Provide watertight conveyance of liquid, semi-liquid or saturated materials which tend to bleed during transport. Liquid loss from transported materials is not permitted, whether being delivered to construction site or hauled away for disposal.

3.07 PROTECTION OF AIR QUALITY

- A. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment and encourage shutdown of motorized equipment not in use
- B. Do not burn trash on Site.
- C. If temporary heating devices are necessary for protection of Work, they shall not cause air pollution.

3.09 USE OF CHEMICALS

- A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall be approved by U.S. EPA or U.S. Department of Agriculture or any other applicable regulatory agency.
- B. Use and disposal of chemicals and residues shall comply with manufacture's instructions.

3.10 NOISE CONTROL

- A. Conduct operations to cause least annoyance to residents in vicinity of Work, and comply with applicable local ordinances.
- B. Equip construction equipment and other apparatus with mechanical devices necessary to minimize noise.
- C. Equip compressors with silencers on intake lines.
- D. Equip gasoline or oil-powered equipment with silencers or mufflers on exhaust lines.
- E. Line storage bins and hoppers with material that will deaden sounds.
- F. Route vehicles carrying rock, concrete, or other material over such streets as will cause least annoyance to public and do not operate on public streets between hours of 7:00 p.m. and 7:00 a.m., nor on Saturdays, Sundays or legal holidays, unless approved by Owner.

3.11 DUST CONTROL

- A. Take special care in providing and maintaining temporary roads, Owner's existing roads, and public roads used during construction operations in clean, dust free condition.

- B. Comply with local regulations for dust control. If Contractor's dust control measures are considered inadequate by Engineer, Engineer may require Contractor to take additional dust control measures.

3.12 FUELS AND LUBRICANTS

- A. Comply with local, state, and federal regulations concerning transportation and storage of fuels and lubricants.
- B. Fuel storage area location shall be approved by Owner prior to installation.
- C. Report spills or leaks from fueling equipment or construction equipment to Owner and cleanup as required.
- D. OWNER may require Contractor to remove damaged or leaking equipment from Site.

3.13 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways, and waterways according to the Illinois Urban Manual.
- B. Filter fabric shall be placed between the frame and grate of all storm sewers and maintained in a clean condition to allow proper drainage of the road and adjoining areas until permanent vegetation is established. Filter fabric shall be considered incidental to the item of work being performed.
- C. Whenever, during construction operations, any loose material is deposited in the flow line or gutters, drainage structures, ditches, etc. such that the natural flow line of water is obstructed, this loose material shall be removed at the close of each working day. At the conclusion of construction operations, all drainage structures and flow lines shall be free from dirt and debris. This work shall be considered incidental to the contract.

END OF SECTION 01560

SECTION 01710
CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the work including, but not limited to, the following:
 - 1. Construction surveying.
- B. This section covers construction surveying work required to construct the project in accordance with the Contract Documents subject to the terms and conditions of the Contract. Work covered by this section includes but is not limited to the following elements:
 - 1. Grading.
 - 2. Water Main / Service Infrastructure.
- C. Construction surveying applies to all work except site clearing, tree protection, pavement marking, site furnishings, signage, seeding, and temporary erosion and sedimentation control. The Contractor shall spot these items preliminarily. The College Representative shall verify locations prior to installation of any of these items.
- D. The Contractor is fully responsible for the methods to be used to achieve the requirements in this section.

1.02 RELATED SECTIONS

- A. Section 02300 – Earthwork

1.03 DEFINITIONS

- A. Licensed surveying: Specific surveying tasks that will be conducted by an independent Professional Licensed Surveyor (registered in Illinois).
- B. Non-licensed surveying: Specific surveying tasks that can be conducted by an individual that is not a registered Professional Licensed Surveyor.

1.04 SUBMITTALS

- A. Informational submittals: The following items shall be submitted to the College within fourteen (14) days after notice of Contract Award, and prior to starting any work.
 - 1. Qualification data: Contractor shall submit, to the College Representative, the credentials of the proposed licensed and non-licensed surveyors that will be utilized on the project.
 - 2. Equipment information: Contractor shall submit information regarding survey equipment to be utilized on the project, including manufacturer and model numbers.
 - 3. Contractor shall submit a description of construction survey work including methods and procedures to be utilized for construction survey and staking.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 CONSTRUCTION SURVEYING

A. General:

1. The Contractor shall engage a licensed surveyor to layout the work using accepted survey practices. The Contractor shall be responsible for all of the project surveying, including setting, maintaining, and resetting all alignment stakes, slope stakes, and grades necessary for the construction of the improvements. Except for the survey control data furnished by the College in the Contract Drawings, all calculations, surveying, and measuring required for setting and maintaining the necessary lines and grades shall be the Contractor's responsibility.
2. Before proceeding to lay out the work, verify layout information shown on Contract Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify the College Representative promptly.
3. The Contractor shall be responsible for collection of additional topographic data as needed to match into existing roadways such that the transition from the new to the existing is smooth and such that pavements drain properly.
4. The College Representative shall approve of Contractor-provided stakes prior to work beginning. Such approval shall not relieve the Contractor of responsibility for the accuracy of the stakes.
5. The College Representative may spot-check the Contractor's surveying. These spot checks shall not change the requirements for normal checking by the Contractor.
6. The Contractor shall inform the College when monuments are discovered that were not identified in the Contract Drawings and construction activity may disturb or damage the monuments.

- B. Qualifications: The licensed surveyor shall be independent and have a minimum of 10 years of experience as a registered professional surveyor. The non-licensed surveyor may be an employee of the Contractor, but shall have a minimum of five (5) years of experience operating appropriate survey equipment and performing field surveys.

- C. Survey log: The Contractor shall maintain detailed survey log, including a description of the work performed on each shift, the methods and equipment utilized, and the control points used.

The log shall include a list of layout control work and record deviations from required lines and levels. The log shall be available to the College Representative at any time. Daily logs shall be provided to the College Representative within three (3) working days, or as approved by the College Representative.

D. Construction Layout

1. Reference points and verification: Locate existing permanent benchmarks, control points, and similar reference points before beginning the work. Verify the primary horizontal and vertical control furnished by the College. If discrepancies are discovered or monuments not identified in the Contract Drawings are discovered, promptly notify the College Representative.
 - a. Do not change or relocate existing benchmarks or control points without prior written approval of the College Representative. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to the College Representative before proceeding.
 - b. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
2. General:
 - a. Establish temporary benchmarks and secondary control points necessary to set

lines and levels as needed to locate each element of project.

- 1) Record benchmark locations, with horizontal and vertical data, on Project Record Drawings.
 - 2) Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the work.
 - 3) Remove temporary reference points when no longer needed. Restore marked construction to its original condition
- b. Establish dimensions within tolerances indicated. Do not scale Contract Drawings to obtain required dimensions.
 - c. Inform installers of lines and levels to which they must comply.
 - d. Check the location, level and plumb, of every major element as the work progresses.
 - e. Notify the College Representative when deviations from required lines and levels exceed allowable tolerances.
 - f. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
 - g. For alignments the Contractor shall perform independent checks from different secondary control to ensure that the points staked are within specified survey tolerances.

3.02 Site Improvements

- a. Provide staking and layout information necessary to accomplish excavation, grading, and fill activities.
- b. Establish centerlines of alignments by placing hubs, stakes or marks on centerline or offsets to centerline at all curve points (Point of Curvature (PC), Point of Tangency (PT), and Point of Intersection (PI) and at points on the alignments, space no further than 50 feet.
- c. Establish the horizontal and vertical location of all drainage features.
- d. Provide staking and layout necessary to adequately locate, construct, and check other construction activities.

3.03 Tolerances: The Contractor shall ensure a surveying accuracy within the following tolerances:

	<u>Vertical</u>	<u>Horizontal</u>
Slope stakes	□ 0.1 feet	□ 0.1 feet
Subgrade grade stakes set 0.04 feet below grade	□ 0.01 feet	□ 0.5 feet (parallel to alignment) □ 0.1 feet (normal to alignment)
Surfacing grade stakes	□ 0.01 feet	□ 0.5 feet

END OF SECTION 01710

DIVISION 2

PROJECT CONSTRUCTION

**SECTION 02100
ASPHALT PAVEMENT REMOVAL**

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Furnish all labor, tools and equipment necessary to remove the existing pavement area as needed for the installation of the proposed resurfacing and any other items required to complete this Contract.

1.02 REFERENCES

- A. Except as modified herein, the work shall conform to the applicable portions of the Illinois DOT Standard Specification Section 440.

1.03 SPECIAL REQUIREMENTS

- A. Conduct site clearing operations to ensure minimum interference with roads, street, walks, or adjacent facilities. Do not close traveled ways without written permission from authorities having jurisdiction.
- B. Provide protection to prevent damage to existing structures, roadway, sidewalk or other improvements on or adjacent to the job site. Restore any damaged improvement to its original condition as acceptable to parties having jurisdiction.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 MISCELLANEOUS

- A. All obstructions interfering with the proposed work shall be removed and disposed of legally at the Contractor's expense.
- B. All material shall be disposed of legally at the Contractor's expense. The Engineer shall be informed in writing of the disposal site and shall be given a copy of whatever permit(s) are necessary. If the disposal site is on private property the Engineer shall be given a copy of written permission from the property owner allowing the disposal.
- C. The Contractor shall control dust on the site by spraying water or by other means satisfactory to the Engineer.

3.02 FULL DEPTH PAVEMENT REMOVAL

- A. This work shall consist of constructing butt joints for a satisfactory transition between pavement being resurfaced and pavement remaining at existing grade, and shall be accomplished in accordance with the applicable portions of Article 406.08 and Section 440 of the Standard Specifications and the detail included herein. Should any pavement be damaged by removal operations sufficient to warrant replacement, in the Engineer's judgment, the Contractor shall replace it in kind for no additional payment.

- B. The Contractor shall provide and maintain temporary asphalt ramps at both upstream and downstream ends of the pavement area removed. The temporary ramps shall be constructed immediately upon completion of the removal operation by leveling and filling with bituminous material, as necessary. Ramps shall have a minimum taper rate of three foot (3') per one inch (1") of thickness and shall be removed prior to placing the proposed surface course. Temporary ramps will not be paid for separately but shall be considered incidental to the bid price per square yard for Hot-Mix Asphalt Surface Removal.
- C. Pavement removal shall consist of either breaking apart the asphalt and hauling debris offsite or milling the existing asphalt pavement and reusing grindings onsite as shown on the plans pavement sections.
- D. Saw cutting shall be considered incidental.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. FULL DEPTH PAVEMENT REMOVAL, shall be measured for payment per SQUARE YARD removed.

4.02 PAYMENT

- A. FULL DEPTH PAVEMENT REMOVAL, shall be paid for at the contract unit price per SQUARE YARD as indicated on the Schedule of Prices.

END OF SECTION 02100

SECTION 02230
SITE CLEARING AND PREPARATION

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Protecting existing trees and vegetation to remain.
 - 2. Removing existing trees.
 - 3. Clearing and grubbing.
 - 4. Stripping and stockpiling topsoil.

1.02 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

1.03 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site

1.04 PROJECT CONDITIONS

- A. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 TREE PROTECTION

- A. Quality Assurance
 - 1. Tree Service Qualifications: An experienced tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site on a part-time basis during execution of the Work.
 - 2. Arborist Qualifications: An arborist certified by the International Society of Arboriculture or licensed in the jurisdiction where Project is located.
 - 3. Tree Pruning Standards: Comply with ANSI A300, "Trees, Shrubs, and Other Woody Plant Maintenance Standard Practices," unless more stringent requirements are indicated.

- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Erect and maintain temporary fencing around drip line of individual trees or around perimeter drip line of groups of trees to remain before starting site clearing. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within fenced area.
 - 2. Do not permit vehicles, equipment, or foot traffic within fenced area.
 - 3. Maintain fenced area free of weeds and trash.
- D. Do not excavate within tree protection zones, unless otherwise indicated.
- E. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Do not cut main lateral roots, or taproots; cut only smaller roots that interfere with installation. Cut roots with sharp pruning instruments; do not break or chop.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Coat cut faces of roots more than 1 ½ inches in diameter with emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 5. Backfill with soil as soon as possible.
- F. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Engineer.
 - 1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by qualified arborist.

3.02 TREE REMOVAL

- A. Trees to be removed are indicated on the Plans. Contractor shall completely remove tree above and below ground. This work shall be done as specified in Section 201 CLEARING, TREE REMOVAL AND PROTECTION, CARE, AND REPAIR OF EXISTING PLANT MATERIAL of the IDOT SSRBC.

3.03 CLEARING AND GRUBBING

- A. Remove and dispose of obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 4. Use only hand methods for grubbing within tree protection zone.
 5. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.04 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Limit height of topsoil stockpiles to 72 inches.
 2. Do not stockpile topsoil within tree protection zones.
 3. Dispose of excess topsoil as specified for waste material disposal.
 4. Stockpile surplus topsoil to allow for resspreading deeper topsoil.
 5. Maintain stockpile as not to obstruct the natural flow of drainage.
 6. Protect Stockpile from erosion
 7. Keep stockpile free from debris or trash.

3.05 DISPOSAL

- A. Disposal: Remove obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property. Surplus soil material and unsuitable topsoil will be allowed to be disposed of and stockpiled on Owner's property in the location shown on the plans. All stockpiles shall be stabilized as described above.
- B. Burning is not an acceptable method of disposal.
- C. Do not allow debris to accumulate on-site.

END OF SECTION 02230

SECTION 02300
EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Preparing subgrades for walks, pavements, lawns, and plantings.
 - 2. Rough and Finish Grading

1.02 DEFINITIONS

- A. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- B. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
- C. Fill: Soil materials used to raise existing grades.
- D. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

1.03 SUBMITTALS

- A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance.

1.04 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials testing, as documented according to ASTM D 3740 and ASTM E 548.
- B. Prior to the placement of any excavated or borrowed soils, each type of soil approved for fill or backfill shall have a Standard Proctor Curve developed to indicate the moisture-density relationship required to obtain maximum density
- C. All Density Tests and Proctor Curves required shall be obtained from the College's on-site Geotechnical Engineer. All density tests and Proctor Curve results shall be submitted to the Engineer.

PART 2 – PRODUCTS

2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Underground utilities shall be located and protected as specified in Division 1 Section "Temporary Facilities and Controls".
- C. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."
- D. Protect and maintain erosion and sedimentation controls, which are specified in Division 1 Section "Temporary Facilities and Controls," during earthwork operations.
- E. Perform dewatering operations as specified in Division 1 Section "Temporary Facilities and Controls".

3.02 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
- B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Engineer. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.
 - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

3.03 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.04 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.05 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2% of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2% and is too wet to compact to specified dry unit weight.

3.06 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698.
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95%.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92%.
 - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85%.
 - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85%.

3.07 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 2. Walks: Plus or minus 1 inch
 3. Pavements: Plus or minus ½ inch

3.08 FIELD QUALITY CONTROL

- A. Testing Agency: College will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2,000 square feet or less of paved area or building slab, but in no case fewer than 3 tests.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.09 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it on Owner's property. Location of disposal is shown on plans.
- B. Disposal shall not be paid for separately but shall be considered incidental to the item of Work being performed.
- C. If any surplus soil is determined it will need to be hauled and disposed of off-site, it will need to be certified that it is not contaminated as defined under 415 ILCS 5/3.160 and any fees, taxes, surcharge charged by or thorough the operator(s) of clean construction or demolition debris (CCDDE) or a contaminated soil fill operations for the acceptance of uncontaminated soil, shall be paid for by the contactor and those fees included in their bid price.

END OF SECTION 02300

SECTION 02350
TRENCHING AND BACKFILLING

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Trenching and Backfilling
2. Compaction of Trench Backfill

1.02 GENERAL

1. Where working conditions and the right-of-way is sufficient to accommodate traditional open cut construction methods, pipe line trenches with sloping sides may be used.
2. Safety and Protection: Shoring, sheeting, bracing shall be provided as required to protect the work and workmen from damage or injury by caving or sloughing. Laws and ordinances regulating health and safety measures shall be strictly observed.
3. Blasting: Blasting will not be permitted unless Owner provides written permission to do so.

1.03 SUBMITTALS

- A. Density Test Reports: The Contractor shall provide Engineer with all reports for nuclear density testing that is performed under the quality control program.

1.04 QUALITY ASSURANCE

- A. Nuclear Density Testing of Trench backfill shall be performed by a qualified testing agency during the installation of sanitary sewers.
- B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials testing, as documented according to ASTM D 3740 and ASTM E 548.
- C. Prior to the placement of any excavated or borrowed soils, each type of soil approved for fill or backfill shall have a Standard Proctor Curve developed to indicate the moisture-density relationship required to obtain maximum density.
- D. All Laboratory Density Tests and Proctor Curves required shall be obtained and paid for by the Contractor. All density tests and Proctor Curve results shall be submitted to the Engineer.
- E. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of applicable sections of the ILLINOIS SEWER SPECS. Measurement and payment provisions set forth in the ILLINOIS SEWER SPECS do not apply to this Section. The Schedule of Prices included in the bid form will govern payment.

PART 2 – PRODUCTS

2.01 SEWER PIPE AND SERVICE LINE AGGREGATE BEDDING MATERIAL

- A. Bedding material shall meet the gradation requirements of Coarse Aggregate Gradation CA-7, as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC.

2.02 SEWER PIPE AND SERVICE LINE AGGREGATE BACKFILLING MATERIALS

- A. Backfilling Materials shall meet one of the following gradation requirements:
 - 1. Coarse Aggregate Gradation CA-6 as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC.
 - 2. Fine Aggregate Gradation FA-6 as specified in Section 1003 FINE AGGREGATE of the IDOT SSRBC

2.03 SEWER PIPE AND SERVICE LINE SOIL BACKFILLING MATERIALS

- A. Satisfactory Soils: Satisfactory soils for backfilling trenches shall be approved selected material taken from the trench or other excavation, suitable for compaction and meeting the following requirements:
 - 1. ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- B. Unsatisfactory Soils: Unsatisfactory soils not suitable for backfilling trenches are defined as follows:
 - 1. Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.
 - 2. Unsatisfactory soils also include satisfactory soils not maintained within 2% of optimum moisture content at time of compaction.
 - 3. Material not suitable for embankment, fill, or backfill or in excess of requirements shall be disposed of off site at a location provided by the Contractor. Transportation of such material shall be provided by the Contractor. Disposal of such materials shall not be paid for separately but shall be considered incidental to the contract.

2.04 BORROW MATERIAL

- A. Where suitable soil backfilling materials are not available in sufficient quantity from all required excavations under this contract, approved materials shall be obtained from approved sources off site at the Contractor's responsibility and expense. Borrow materials must meet the requirements of satisfactory soils as defined above.

2.05 TEMPORARY AGGREGATE SURFACE

- A. This work consists of furnishing the labor, material, and equipment to fill in the area between the trench backfill limits and the existing pavement during installation of the sanitary sewer and storm sewer.

- B. Aggregate for Temporary Surface shall be Coarse Aggregate Gradation CA-6 as specified in Section 1004 COARSE AGGREGATES of the IDOT SSRBC. The width of the aggregate for temporary surface shall be equal to the width of the existing trench. The Engineer shall approve equipment for placing and compacting the Temporary Aggregate Surface.
- C. During the course of the contract, the Contractor shall construct and maintain the Temporary Aggregate Surface to the length and width determined by the Engineer.
- D. This work shall be measured for payment in cubic yards. The Contractor shall provide individual load tickets to the Engineer clearly indicating that the delivery is for Temporary Aggregate Surface. The use of combination load tickets from other pay items shall not be permitted and those amounts not designed in writing for Temporary Aggregate Surface will not be measured for payment.
- E. In the event that the Temporary Aggregate Surface is deemed deficient as noted by the Village or authorized individual, the Contractor will be notified of the deficiency. The Contractor has four (4) hours to repair or install aggregate to the satisfaction of the Village. Failure to do so will result in a penalty of one hundred dollars (\$100/hr) starting four (4) hours from the time of notification.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by trenching and backfilling operations.
- B. Underground utilities shall be located and protected as specified in Division 1 Section "Temporary Facilities and Controls".
- C. Preparation of subgrade for trenching operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."
- D. Protect and maintain erosion and sedimentation controls, which are specified in Division 1 Section "Environmental Protection," during earthwork operations.
- E. Perform dewatering operations as specified in Division 1 Section "Temporary Facilities and Controls".

3.02 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch if applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

3.03 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations necessary for proper laying of pipe.

- B. Excavate trench walls vertically from trench bottom to a point 12 inches higher than top of pipe or conduit, unless otherwise indicated. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit.
 - 1. Width of Trench: The width of the trench at the top of the pipe shall be as follows:
 - a. Minimum: Pipe Outside Diameter +24 Inches
 - b. Maximum: Pipe Outside Diameter + 36 Inches
- C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Remove projecting stones and sharp objects along trench subgrade. Where firm foundation is not encountered at the grade established due to unsuitable soil, all such unsuitable material shall be removed and replaced with approved compacted granular material.
- D. Sloping Sides: Where working conditions and the right-of-way is sufficient to accommodate traditional open cut construction methods, pipe line trenches with sloping sides may be used. The slopes shall extend to a point 12 inches above the top of the pipe, and trench excavations below this point shall be made with vertical sides with widths not exceeding those specified herein for the various sizes of pipe.

3.04 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Stockpile soil materials away from edge of excavations.

3.05 BEDDING AND INITIAL BACKFILL REQUIREMENTS

- A. Place bedding on subgrades free of mud, frost, snow, or ice.
- B. Place and compact CA-7 bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Place and compact initial backfill of CA-7, to a height of 12 inches over the utility pipe or conduit. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.

3.06 COMPACTION AND BACKFILLING OF TRENCHES

- A. Whenever the excavation is in or within 2 feet of an existing or proposed street, parking area, driveway, curb and gutter, sidewalk, or other paved area or specifically called for on plans, the entire trench shall be backfilled with approved selected granular material IDOT CA-6 or FA-6 and compacted in place. Trench Backfill shall be compacted to 95% of maximum density at optimum moisture as determined by the Standard Proctor Test.
- B. In all other areas, satisfactory native fill shall be used as backfill and shall be compacted in lifts. Suitable native fill shall be compacted to a minimum of 90% of maximum density at optimum moisture as determined by the Standard Proctor Test.

- C. Place all backfill materials in layers not more than 12 inches in loose depth and mechanically compact.
- D. All trenches are to be closed and backfilled at the end of each day. All surface drainage shall be restored to a like or better condition to that prior to starting construction.
- E. Wherever sewers are installed under traveled roadways, driveways, sidewalks, or other traveled surfaces, a temporary surface of 1' depth shall be placed over the top of the trench backfill as soon as possible after compaction has been satisfactorily completed. The temporary surface shall be IDOT CA-6 and shall be smooth and meet the grade of the adjacent undisturbed surface. The temporary surface shall be maintained by the Contractor until the final restoration of the surface is completed.

3.07 EXISTING UTILITY CROSSINGS

- A. Notify utility companies before excavating; utilize Illinois One Call (800-892-0123); conform to current utility notification requirements.
- B. Where new construction crosses or closely parallels existing utilities or utility services, excavate in advance of pipe laying to determine location and crossing arrangement, including exact construction line and grade.
- C. Utility mains shown on Drawings in conflict with new facilities: Perform relocation or make arrangements with utility to perform Work at no additional cost to Owner.
- D. Utility mains not shown on Drawings in conflict with new facility: Notify Engineer immediately.
- E. Provide compacted granular material under all existing utilities or service lines that are located above the new pipeline. Compact material to a minimum of 95% Standard Proctor Density.
- F. Repair any drainage tile interrupted during the course of construction according to details on Drawings and/or Typical Detail Drawings.
- G. Costs for exploratory excavation of existing utility crossings are incidental to the contract.

3.08 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent backfilling only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - 1. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 1 test between structures.
- D. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.09 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove trash and debris and legally dispose of it off Owner's property. Disposal of such materials shall not be paid for separately but shall be considered incidental to the contract. Surplus satisfactory soil, including unsatisfactory soil and dispose of it at a location identified on the Plan on the Owner's property.
- B. All surplus soil that will need to be hauled and disposed of off-site will need to be certified that it is not contaminated as defined under 415 ILCS 5/3.160 and any fees, taxes, surcharge charged by or thorough the operator(s) of clean construction or demolition debris (CCDDE) or a contaminated soil fill operations for the acceptance of uncontaminated soil, shall be paid for by the contactor and those fees included in their bid price.

END OF SECTION 02350

SECTION 02510
WATER DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and fittings for site water lines including domestic water lines and fire water lines.
- B. Resilient Seated Gate Valves and Accessories.
- C. Fire hydrants.
- F. Frost Proof Yard Hydrants.
- G. Thrust Restraint.
- H. Hydrostatic Testing.

1.02 REFERENCES

- A. Standard Specifications for Water and Sewer Construction in Illinois, latest edition.
- B. AWWA C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association; 2003 (ANSI/AWWA C104/A21.4).
- C. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 2005 (ANSI/AWWA C105/A21.5).
- D. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings, American Water Works Association; 2008 (ANSI/AWWA C110/A21.10).
- E. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; 2007 (ANSI/AWWA C111/A21.11).
- F. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; 2009 (ANSI/AWWA C151/A21.51).
- G. AWWA C153/A21.53 - Ductile-Iron Compact Fittings for Water Service; American Water Works Association; 2006 (ANSI/AWWA C153/A21.53).
- H. AWWA C500 - Gate Valves for Water and Sewerage Systems.
- I. AWWA C502 - Dry Barrel Fire Hydrants; American Water Works Association; 2005 (ANSI/AWWA C502/C502a).
- J. AWWA C509 - Resilient Seated Gate Valves for Water and Sewerage Systems.
- K. AWWA C550 - Protective Epoxy Interior Coatings for Valves and Hydrants.
- L. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances; American Water Works Association; 2010 (ANSI/AWWA C600).
- M. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water; American Water Works Association; 2005 (ANSI/AWWA C605).
- N. AWWA C651 - Disinfecting Water Mains.
- O. UL 246 - Hydrants for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01330 – Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents: Record actual locations of piping mains, fittings, valves, hydrants, connections, and depth of cover. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- E. Test Reports: Indicate results comparative to specified requirements.
- F. Submit the following as appropriate for each valve and hydrant provided:
 - 1. Outline and installation Drawings for equipment and fixtures furnished.
 - 2. Equipment performance data and operating characteristics.
 - 3. Manufacturer's catalog data, marked to indicate materials being furnished as standard equipment, fixtures, specialties, and accessories.
 - 4. Shop Drawings on shop-fabricated systems.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA C600 and C651 requirements.
- B. Pipe: Nominal pipe size, material code designation, standard dimension ratio, pressure rating, manufacturer's name or trade mark, National Sanitation Foundation seal, and appropriate ASTM designation numbers marked on pipe.
- C. Fittings and Valves: Manufacturer's name and pressure rating marked on body.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Arrange delivery of products in accordance with construction schedules and to allow inspection prior to installation.
- B. Coordinate deliveries to avoid conflict with conditions at site.
- C. Deliver products in undamaged condition in original containers or packaging, with identifying labels intact and legible.
- D. Clearly mark to identify partial deliveries of component parts to facilitate assembly.
- E. Store products immediately on delivery and protect until installed. Storage to be done according to manufacturer's instructions with seals and labels intact and legible.
- F. Provide platforms, blocking or skids, or coverings required to protect products from deterioration or damage.
- G. Arrange storage in a manner to provide easy access for inspection.
- H. Maintain storage conditions to prevent deterioration or damage.
- I. Protect products after installation to prevent damage from subsequent operations. Remove when no longer needed.
- J. Provide equipment and personnel necessary to handle products by methods to prevent damage to products or packaging.
- K. Handle products by methods to prevent bending or overstressing.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable Illinois Department of Natural Resources, State Health Department code or regulation, and Standard Specifications for Water and Sewer Construction in Illinois and City of Crystal Lake Standards for performing the work of this Section.

1.07 WARRANTY

- A. Full warranty against defects in materials and workmanship for two years after substantial completion, including all parts, labor, and expenses.

PART 2 PRODUCTS

2.01 WATER PIPE

- A. All buried pipe 4-inches and larger shall be ductile iron unless noted otherwise.
- B. Manufacturers:
 - 1. American.
 - 2. Clow.
 - 3. Griffin.
 - 4. US Pipe.
 - 5. Engineer approved equivalent.
 - 6. Approval does not relieve compliance with the technical and quality standards, requirements, and certifications outlined herein.
- C. Ductile Iron Pipe: AWWA C151: Thickness Class 52, inside nominal diameters as shown on Drawings.
 - 1. Exterior Coating: Asphaltic coating, 1-mil thickness.
 - 2. Interior Coating: AWWA C104 standard thickness cement lining with seal coat.
 - 3. Restrained Joint Ductile Iron Pipe:
 - a. Restrained joint design: Flexible type, capable of being deflected 3 degrees after assembly.
 - b. Restrained joint design: Boltless "lock ring" type for DIP.
 - c. Restraining gaskets not acceptable.
 - 4. Joints: AWWA C111, rubber gasket with rods, push-on or mechanical joint type.
 - 5. Jackets: AWWA C105 polyethylene jacket. Polyethylene encasement for ductile iron piping for water and other liquids.
 - 6. Bolts and Nuts: Fluorocarbon coated cor-ten steel t-bolts and nuts equal to NSS cor-blue or approved equal low allow corrosion-resistant high-strength steel in accordance with ANSI/AWWA C111/A21.11.
 - 7. All pipe shall be manufactured in the United States. The Material Supplier and/or Contractor shall furnish data certified by the Manufacturer that all pipe is of domestic manufacture.
- D. Restraining mechanisms, tie rods, clamps or other components of dissimilar metal shall be protected against corrosion by hand application of a suitable coating or by encasement of the entire assembly with 8-mil thick (0.2 mm) loose polyethylene film in accordance with AWWA C105/A21.5.

2.02 FITTINGS

- A. Manufacturers:
 - 1. American.
 - 2. Clow.
 - 3. Griffin.
 - 4. Sigma.
 - 5. Star.
 - 6. Tyler/Union.
 - 7. US Pipe.
 - 8. Engineer approved equivalent.
 - 9. Approval does not relieve compliance with the technical and quality standards, requirements, and certifications outlined herein.
- B. General:
 - 1. Ductile iron compact fittings, mechanical joint, AWWA C153, 250 psi minimum pressure rating in cases where compact fittings are available; ductile iron standard fittings, mechanical joint, AWWA C110, 250 psi minimum pressure rating, only when C153 fittings

are unavailable. Asphaltic exterior coating 1-mil thick, AWWA C104 standard thickness interior cement lining with seal coat.

- a. Fittings shall include gaskets, glands, bolts, and nuts.
2. Bolts and nuts as specified for ductile iron pipe.
3. Wrap fittings with polyethylene film, as specified for ductile iron pipe.
4. Restrained Joint Fittings - 4" through 48":
 - a. Restraining mechanisms shall provide wedges or full circle contact and support of the pipe wall. Restraint shall be accomplished by a series of ring wedge segments mechanically restrained inside the gland housing and designed to grip the pipe wall in an even and uniform manner. Restrained devices shall be actuated by bolts featuring twist off heads to ensure proper installation torque is applied. All components of the restrainer, including the gland, bolts, and restraint segments shall be of high strength ductile iron, ASTM A536.
 - b. Manufacturers:
 - 1) EBAA Iron Sales, Inc.: Series 1100 Mechanical Joint Restraint Gland.
 - 2) Engineer Approved Equivalent.
- C. Mechanical Joint Retainer Glands: Install on all joints on all fittings, valves, and hydrants. Megalug by EBAA Iron Sales, Inc., Uni-Flange Series 1400 and 1500 mechanical joint retainer glands by The Ford Meter Box Company will be allowed, or Engineer approved equivalent.
- D. Mechanical Joint Caps and Plugs: Install where indicated on the Drawings. MJ caps and plugs: F-1040 and F-1035 as manufactured by Clow Corporation, respectively, A-10800 by American Cast Iron Pipe Company, or Engineer approved equivalent.
- E. Anchoring Pipe and Couplings: Install where indicated on the Drawings. Utilized for hydrant leads, branch line stubs, and dead ends, in conjunction with mechanical joint pipe, fittings, valves, and hydrants. Clow MJ anchoring pipe, couplings, and fittings or Engineer approved equivalent.
 1. Quality standards for specialty fittings: Use the following Clow Corporation catalog numbers, or Engineer approved equivalent: Anchoring Couplings F-1211; Anchoring Tees F-1217; Anchoring Elbows F-1218; Anchoring Pipe F-1216; and Hydrant Tees F-1224.
- F. Mechanical Joint Tapping Sleeves and Crosses: Install where indicated on the Drawings. Ductile Iron or Cast iron two-section construction. Mechanical joint ends, flanged outlet for tapping valve. Ductile iron tapping sleeves are required on pipe 12" and larger, and for installations under pavement. Tapping sleeve and crosses: F-5205 as manufactured by Clow Corporation, H-615 & H-715 by Mueller Company, or Engineer approved equivalent.
- G. Stainless Steel Tapping Sleeves: Install where indicated on the Drawings. All stainless steel two-section construction with stainless steel flanged outlet for tapping valve. Stainless steel bolts and nuts. Tapping Sleeves: 665 as manufactured by Smith-Blair, Inc., FAST by Ford Meter Box Company, Inc., or Engineer approved equivalent.

2.03 POLYETHYLENE ENCASEMENT

- A. Polyethylene encasement, flat sheet or split tube, 8 mil (0.20mm) thickness, as per AWWA C105, for use with all buried ductile iron and steel pipe, fittings, valves and operators, and hydrants.
- B. Polyethylene shall be cut 2 feet longer than the pipe section and shall overlap the ends of the pipe by 1 foot.
- C. Gather and lap the polyethylene to provide a snug fit and secure at quarter points and each end with polyethylene tape.

2.04 VALVES

- A. Resilient Seated Gate Valves: AWWA C509. All valves shall be of the iron-body resilient-wedge type with non-rising stems, sizes 3" NPS through 24" NPS in diameter.
 1. All valves by the same manufacturer.
 2. Body, Bonnet, Stuffing Box: Cast iron or ductile iron.

3. Bolts and Nuts: Stainless steel.
4. Valve Ends: Flanged for above-ground or Mechanical joint for buried.
5. Wedge: Cast iron or ductile iron, resilient coated.
6. Stem: Manganese bronze, non-rising stem.
7. Seals: Synthetic rubber O-rings.
8. Stem Extensions: Steel, provide for buried valves with valve boxes; 2" square operating nut, if required.
9. Coating: Buried valves shall have manufacturer's standard exterior asphalt or epoxy coating.
10. Pressure Rating: 200 psi, bubble-tight closure.
11. Direction of Operation: Counterclockwise to open.
12. Smooth, unobstructed waterway with a diameter not less than the full nominal diameter of the valve.
13. Wrap all buried valves with polyethylene encasement in accordance with Section 33 1116.
14. Approved Manufacturers:
 - a. American Flow Control, Model: Series 2500.
 - e. Mueller, Model: Resilient Wedge 2360-23-9020 / Topping Model T-2360-1
 - h. Engineer approved equivalent.
- B. Buried Service Bolts: Fluorocarbon coated cor-ten steel t-bolts and nuts equal to NSS cor-blue or approved equal low alloy corrosion-resistant high-strength steel in accordance with ANSI/AWWA C111/A21.11
- C. Valve Boxes: Furnish valve boxes for all buried valves. Boxes shall include standard or oval base as required, center section(s) and top section with cover. Boxes cast iron with screw type adjustment. For valves on finished water system, the cover shall be marked WATER. Provide Tyler series 6855 for valves less than 12" diameter, and Tyler series 6860 for valves 12" diameter and larger, or Engineer approved equivalent.
 1. Adaptor: Furnish valve box adaptor for all buried valves. Provide Butterfly Valve Adaptor or Adaptor II by Adaptor Inc. or approved equal.
 - a. Furnish in lieu of hard wood blocking.
 - b. Adaptor shall be incidental to valve.

2.05 FIRE HYDRANTS

- A. Hydrants: AWWA C502
 1. All hydrants shall be Mueller Centurion Fire Hydrants A423 (5-1/4" Barrel) in accordance with the detail on the plans.
 2. Each hydrant shall include auxiliary valve, 6" gate valve No. A-2370-20 modified wedge resilient seat.
- B. Wrap hydrant base and barrel up to finish grade with polyethylene encasement. Slit film at hydrant base at drain-back opening.
- C. Approved manufacturers:
 1. Mueller Centurion.

2.06 THRUST RESTRAINT

- A. Mechanical Restraint:
 1. Mechanical joint retainer glands, Megalug by EBAA Iron Sales, Inc. or Engineer approved equivalent, shall be used on all joints on all fittings, valves, and hydrants.
- B. Concrete Restraint:
 1. Use concrete thrust blocks for all joints, even if joints include mechanical joint retainer glands.

2. Minimum compressive strength of 3000 psi.

2.07 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 02350.
- B. Cover: As specified in Section 02350.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that trench cut and excavation base are ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.
- B. Verify that piping system has been cleaned, inspected and pressure tested.
- C. Perform scheduling and disinfection activity with startup, testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.02 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.03 TRENCHING

- A. See Section 02350 for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling. Do not displace or damage pipe when compacting.

3.04 INSTALLATION - PIPE

- A. Install pipe to slope gradients noted on drawings.
- B. Install pipe and appurtenances in accordance with AWWA C600 or C605.
- C. Handling: Handle pipe and appurtenances in such a manner as to ensure delivery to the trench in a sound, undamaged condition. Use of web slings or end hooks not allowed.
- D. Inspection for Defects: Before installation, inspect pipe and appurtenances for defects and, when applicable, tap the pipe with a light hammer to detect cracks. Reject defective, damaged, or unsound pipe and appurtenances.
- E. Cutting: Cut pipe, when necessary, in a neat and workmanlike manner without damage to the pipe, interior lining, and exterior coating. Perform cutting with an approved mechanical cutter, using a wheel cutter when applicable and practicable.
- F. Beveling: Grind smooth and bevel cut ends and rough edges using methods recommended by the manufacturer and approved by Engineer.
- G. Pipe Joints: Pipe joints in accordance with AWWA C600 or C605 and as recommended by manufacturer; use minimum amount of gasket lubricant; apply to gasket only; do not apply lubricant to inside of bell.
- H. Cleaning and Protection: Thoroughly clean each piece of pipe, valve, and fitting before lowering into trench; keep clean at all times; when pipe laying is not in progress, including lunch breaks, nights, weekends, and other non-working periods, securely close open ends of pipe and fittings with watertight plugs.
- I. Pipe Deflections:
 1. Deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed the manufacturer's recommendations for the type and size of pipe and joint being used.

2. If the alignment requires deflections in excess of the manufacturer's limitations, then bend fittings or a sufficient number of shorter lengths of pipe shall be utilized to provide angular deflections within the limits set forth.
- J. Pipe Gradient:
1. In certain instances, it may be required that a positive gradient be maintained for pressure lines. All such locations are noted on the Drawings.
 2. Where changes from positive to negative grades occur, air release or combination air release and air/vacuum valves and manholes required as shown on the Drawings.
- K. Depth of Cover: The depth of cover over water mains from the top of the pipe to the ground surface shall be sufficient to prevent freezing. The minimum depth shall be 6'-0", or otherwise as shown on the Drawings.
- L. Polyethylene Encasement shall be utilized when ductile iron pipe and fittings are utilized in accordance with AWWA C105 / A21.5
- M. Install access fittings to permit disinfection of water system performed under Section 02540.
- 3.05 SEWER CONFLICT
- A. Water Supply Interconnection:
1. There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto, which would permit the passage of any sewage or polluted water into the potable water system. Water main bleeders into sanitary sewers are prohibited. No water pipe shall pass through or come in contact with any part of a sewer manhole.
- B. Relation to Water Works Structures:
1. While no general statement can be made to cover all conditions, sewers shall be at least 75 feet from shallow water supply wells, 50 feet from underground water reservoirs, and 30 feet from a well if the sewer is constructed per the special condition listed below.
- C. Horizontal separation:
1. Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge. Should local conditions prevent a lateral separation of 10 feet, a sewer may be laid closer than 10 feet to a water main if:
 - a. The sewer is laid in a separate trench.
 - b. The sewer is laid in the same trench with the water main located at one side on a bench of undisturbed earth.
 - c. In either case, the elevation of the crown of the sewer is at least 18 inches below the invert of the water main.
 2. Other regulating authorities may require more stringent limitations.
- D. Vertical Separation:
1. Sewers crossing under water mains: The sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. The crossing shall be arranged so the sewer joints will be equidistant and as far as possible from the water main joints.
 - a. When the elevation of the sewer cannot be buried to meet the above requirement, the water main shall be relocated to provide this separation and reconstructed with slip-on or mechanical joint cast iron pipe, asbestos-cement pressure pipe, or prestressed concrete cylinder pipe for a distance of 10 feet on each side of the sewer. One full length of water main shall be centered over the sewer so that both joints will be as far from the sewer as possible.
 2. Other regulating authorities may require more stringent limitations.
- E. Special Conditions: When it is impossible to obtain proper horizontal and vertical separation as stipulated above, the water main should be constructed of slip-on or mechanical joint cast-iron pipe, asbestos-cement pressure pipe or prestressed concrete cylinder pipe and the sewer constructed of mechanical joint cast iron pipe, schedule 40 ABS or PVC or equal and both

services should be pressure tested to assure water tightness in accordance with AWWA standard for leakage testing. following methods must be utilized:

1. As an alternative, it is permissible to encase either the water or the sewer main with 6 inches of concrete for a distance of 10 feet on each side of the crossing; or if PVC or cast iron is used as encasement material, the ends shall be adequately sealed with concrete as well as any joints within the 20 foot section.

3.06 INSTALLATION - VALVES AND HYDRANTS

- A. Set valves and hydrants on solid bearing and support independently or from piping.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Install all buried valves and operators and hydrants with polyethylene encasement, 8-mil (0.20 mm) thickness, as per AWWA C105.
- D. A. Install in accordance with manufacturer's instructions as shown on the plans by qualified craftsmen.
- E. Location, orientation, and quantities as shown on the plans.
- F. Include all required related items necessary for a complete installation.
- G. Install with stem between 9:00 and 3:00 position (stem shall not be inverted).
- H. Surface preparation shall follow the piping surface preparation specification. Contractor shall be responsible for compatibility of manufacturers shop coating and final finish.

3.07 PROTECTION

- A. Protect finished installation under provisions of Section 01500.

3.08 DISINFECTION

- A. Test in accordance with Section 02540.

3.09 HYDROSTATIC TEST

- A. Test all pressure lines for leakage after satisfactory completion of cleaning, flushing, and disinfection of piping and appurtenances.
- B. Test using Ashcroft Model 1082 with 4.5" dial face at 1 psi increments.
- C. Subject newly laid piping or any valved section of piping to a hydrostatic pressure test for at least two hours.
- D. Conduct pressure tests on individual piping sections between valves in order to test the integrity of the valves as well as the piping.
- E. The test pressure shall be 150 psi, or as directed by Engineer. The test pressure not less than 1.25 times the working pressure at the highest point along the test section and not less than 1.5 times the working pressure at the point of testing.
- F. Pressure shall be maintained for a minimum of 2 hours.
- G. Before applying the pressure, completely expel air from the system being tested.
- H. Install, at Contractor's expense, corporation cocks as required at all high points in the system if necessary to completely expel all air.
- I. After all the air has been expelled, remove corporation cocks and plug or close prior to testing. Owner to determine whether the corporation cocks are removed or left in place.
- J. Perform leakage test if requested in writing by Engineer. Leakage tests will be required after unsatisfactory hydrostatic pressure tests.
- K. Satisfactory hydrostatic pressure results are 1 psi or less of pressure loss over 2 hours.
- L. At the option of the Engineer, pressure and leakage tests may be conducted simultaneously.
- M. Determine amount of leakage by adding water to the system by means of a pump where pressure within the system is maintained within 5 psi of the test pressure.

- N. Allowable leakage shall not exceed 11.65 gallons per mile per inch diameter per 24 hours for pipe in 18 foot lengths, 10.5 gallons for pipe in 20' lengths, and proportionally varied for other lengths at a test pressure of 150 psi.
- O. When testing at pressures other than 150 psi, allowable leakage shall not exceed that computed as follows: $L = (ND \times \text{Square Root}[P]) / 7400$. Where L=Allowable leakage (gallons per hour), N=Number of joints in length being tested, D=Nominal diameter of the pipe (inches), and P=Average test pressure (psi gauge)
- P. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gallons per hour per inch of nominal valve size is allowed.
- Q. Perform the test against closed hydrant, with the auxiliary valve open.
- R. Determine acceptance on the basis of allowable leakage.
- S. If any test of pipe laid discloses leakage greater than that specified above, the Contractor shall, at his expense, locate and repair the defective material until the leakage is within the specified allowance.
- T. Repair all visible leaks regardless of the amount of leakage.
- U. Damaged or defective pipe, fittings, valves, hydrants, or joints discovered in the pressure test shall be replaced by the Contractor and the test repeated until the test results are satisfactory.

3.10 RESTRAINT

- A. Mechanical Restraint:
 - 1. Provide mechanical joint retainer glands, Megalug by EBAA Iron Sales, Inc. or Engineer approved equivalent, on all joints of all fittings, valves, and hydrants.
- B. Restrained Joint Ductile Iron Pipe:
 - 1. Provide restrained joint ductile iron pipe as indicated on the Drawings.
 - 2. Submit restrained joint styles and detailed designs by the pipe manufacturer to Engineer prior to manufacture. Include detailed laying schedules.
- C. Concrete Thrust Block:
 - 1. Provide concrete thrust blocks at bends, tees, and dead ends placed against undisturbed soil.
 - 2. See Thrust Block Details on the drawings.

3.11 CONSTRUCTION TESTING

- A. Perform field inspection and testing in accordance with Section 01400.
- B. The testing shall be done on a daily basis in a timely manner with the progress of the work to insure acceptable construction workmanship. Subsequent work shall not proceed without acceptable test results of the previous work. Testing of embankment or backfill shall occur at the time of placement and compaction. Coming back later to perform testing is unacceptable.
- C. Test reports shall include the following:
 - 1. Project name.
 - 2. HRG project number.
 - 3. Location/Client.
 - 4. Street name.
 - 5. Street location per plan stationing.
 - 6. Offset distance left or right of centerline.
 - 7. Depth below finish grade and/or elevation.
 - 8. Results of tests performed.
 - 9. Comparison of test results to the project specifications.
 - 10. Conclusion as to meeting or failing to meet the project specifications.
 - 11. If failing, retest results to confirm compliance with the project specifications.
 - 12. If failing, recommendations for corrective action.
- D. The following minimum testing shall be performed:
 - 1. Trench backfill (main line and services).

- a. Standard Proctor: One minimum.
 - b. In-place Density and Moisture: 1 per 8 inch lift per 400 LF.
- 2. Granular material:
 - a. Gradation: 1/2000 TN.
 - b. Standard Proctor: One minimum.
 - c. In-place Density and Moisture: 1/500 LF.

END OF SECTION

SECTION 02540
DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of site domestic water lines, site fire water lines, and potable water distribution system specified in Section 02510.
- C. Testing and reporting results.

1.02 REFERENCE STANDARDS

- A. AWWA B300 - Hypochlorites; American Water Works Association; 2010 (ANSI/AWWA B300).
- B. AWWA B301 - Liquid Chlorine; American Water Works Association; 2004 (ANSI/AWWA B301).
- C. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).
- D. Standard Specifications for Water and Sewer Construction in Illinois and city of Crystal Lake Standards.

1.03 SUBMITTALS

- A. See Section 01330 – Submittal Procedures, for submittal procedures.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Disinfection report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 - 5. Date and time of flushing start and completion.
 - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- D. Bacteriological report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Certification that water conforms, or fails to conform, to bacterial standards per Standard Specifications for Water and Sewer Construction in Illinois and City of Crystal Lake Standards.
 - 8. Bacteriologist's signature and authority.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA C651.
- B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State in which the Project is located.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

- A. Chemicals: AWWA B300, Hypochlorite and AWWA B301, Liquid Chlorine, as specified in Standard Specifications for Water and Sewer Construction in Illinois and City of Crystal Lake Standards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping system has been cleaned, inspected, and pressure tested.
- B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Inject treatment disinfectant into piping system.
- D. Maintain disinfectant in system for 24 hours.
- E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- F. Replace permanent system devices removed for disinfection.

3.03 DISINFECTION

- A. All new, cleaned or replaced water mains shall be disinfected in accordance with AWWA Standard C651 before being put into service.
- B. Continuous Feed Method:
 - 1. Continuous feed method shall be used to disinfect PVC pipe and may be used for iron, steel, or concrete pipe. Use of chlorine powder not acceptable.
 - 2. Flow water from the existing distribution system or other approved sources of supply into newly laid water line at a constant and measured rate.
 - 3. This water shall receive chlorine also at a constant and measured rate.
 - 4. Proportion two flows so chlorine concentration in the newly laid pipe is a minimum of 25 mg/l free chlorine.
 - 5. Apply chlorine solution to the water line with a pump suitable for feeding chlorine solutions.
 - 6. The point of application shall be through a tap in the new water line within 10" of the valve to be used for admitting water into the line.
 - 7. Manipulate valves during application of the chlorine to prevent the treatment dosage from flowing back into the line supplying the water.
 - 8. Chlorine application shall be continuous until the entire main is filled.
 - 9. Retain chlorinated water in the water line for at least 24 hours.
 - 10. As the chlorinated water flows past tees and crosses, related valves not used for isolating the water line, shall be operated to disinfect all appurtenances.
 - 11. At the end of this 24 hour period, the treated water shall contain not less than 10 mg/l chlorine throughout the length of the main.
 - 12. Chlorine Solution:
 - a. The chlorine water solution is prepared by using a vacuum-operated gas chlorinator and booster pump for chlorine-gas solution feed, by using a metering pump with liquid sodium hypochlorite, or by using a metering pump with a solution prepared by dissolving calcium hypochlorite in water in the proportion required for the desired concentration.

- b. A 1% chlorine solution requires approximately 1 pound of calcium hypochlorite (70% chlorine) in 8.5 gallons of water.
 - c. The minimum rate of chlorine solution feed for a 1% chlorine solution for various water flow rates to obtain a 25 mg/l available chlorine content are: 0.25 GPM of solution at a 100 GPM feed rate, 0.50 GPM of solution at a 200 GPM feed rate, 0.75 GPM of solution at a 300 GPM feed rate, 1.00 GPM of solution at a 400 GPM feed rate, and 1.25 GPM of solution at a 500 GPM feed rate.
- C. Tablet Method:
- 1. The Contractor may use the tablet method for disinfection only if written permission is given by Engineer
 - 2. HTH tablets to be used only on iron, steel or concrete pipe. Use of chlorine powder not acceptable.
 - 3. Place 5-gram tablets of HTH 70% free chlorine or other chlorine compound of equal strength, in each piece of piping installed, in accordance with the following schedule:
 - a. 4" Pipe: 1 tablet for lengths of 13, 18, 20 or 40 feet.
 - b. 6" Pipe: 1 tablet for lengths of 13, 18, and 20 feet; 2 tablets for 40 foot length.
 - c. 8" Pipe: 1 tablet for 13 foot length; 2 tablets for lengths of 18 and 20 feet; 4 tablets for 40 foot length.
 - d. 10" Pipe: 2 tablets for 13 foot length; 3 tablets for lengths of 18 or 20 feet; 5 tablets for 40 foot length.
 - e. 12" Pipe: 3 tablets for 13 foot length; 4 tablets for lengths of 18 and 20 feet; 7 tablets for 40 foot length.
 - f. 16" Pipe: 4 tablets for 13 foot length; 6 tablets for 18 foot length; 7 tablets for 20 foot lengths; 13 tablets for 40 foot lengths.
 - g. 20" Pipe: 7 tablets for 13 foot length; 9 tablets for 18 foot length; 10 tablets for 20 foot lengths; 20 tablets for 40 foot lengths.
 - h. 24" Pipe: 9 tablets for 13 foot length; 13 tablets for 18 foot length; 14 tablets for 20 foot lengths; 28 tablets for 40 foot lengths.
 - i. 30" Pipe: 15 tablets for 13 foot length; 20 tablets for 18 foot length; 22 tablets for 20 foot lengths; 44 tablets for 40 foot lengths.
 - j. 36" Pipe: 21 tablets for 13 foot length; 28 tablets for 18 foot length, 32 tablets for 20 foot lengths; 63 tablets for 40 foot lengths.
 - 4. Secure the tablets to the upper surface of pipe at each joint by means of a food-grade adhesive such as Permatex Form-A-Gasket No. 2 and Permatex Clear RTV Silicone Adhesive Sealant, by Loctite Corporation, Kansas City, KS. Do not apply excess adhesive.
 - 5. Fill the pipe slowly with water and allow to stand for 24 hours to effectively disinfect the piping system. If the water temperature is less than 41degrees Fahrenheit (5 degrees Celsius), the water shall be allowed to stand for 48 hours.
 - 6. Maintain minimum of 10 mg/l free residual chlorine concentration throughout the 24 hour (or 48 hour) disinfection period.

3.04 FINAL FLUSHING

- A. After the applicable retention period, flush heavily chlorinated water from the main until the chlorine concentration of the water leaving the line is no higher than that generally maintained in the system or less than 1 mg/l.
- B. Determine the chlorine residual to ascertain that the heavily chlorinated water has been removed from the water line.
- C. Do not discharge to waters of the State.

3.05 BACTERIOLOGICAL TESTS

- A. After final flushing and before the new water main is placed into service, collect two consecutive sets of acceptable samples at least 24 hours apart. Collect from the end of each test section and test for bacteriological quality to show the absence of coliform organisms.

- B. Collect at least one set of samples from every 1200 feet of new main, plus one set from the end of the line and at least one set from each branch.
- C. If trench water has entered the new main during construction or if, in the opinion of the Engineer, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 feet (61 m), and the location shall be identified. Samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing has been completed.
- D. Analyze samples after refilling the water line with potable water.
- E. Collect samples for bacteriological analysis in sterile bottles treated with sodium thiosulfate.
- F. Do not use hose or fire hydrant in collection of samples.
- G. Install a standard corporation cock installed in the main with a copper tube goose neck assembly, if necessary.
- H. Test Failure:
 - 1. If the initial disinfection fails to produce satisfactory samples, repeat flushing and disinfection until satisfactory samples are obtained.
 - 2. Use continuous feed method in these subsequent disinfections.
- I. When the samples are satisfactory, perform hydrostatic pressure test as described in Section 02510.

END OF SECTION 02540

SECTION 02577
PARKING LOT STRIPING

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. This work shall consist of furnishing all labor, materials, tools, and equipment necessary for surface preparation and application of paint pavement markings, including clean-up and restoration of the location. This work shall consist of installation of signage as indicated on plans.

1.02 REFERENCES

- A. Work under this item shall be performed in accordance with Sections 780 and 1095 of the Standard Specifications, except as herein modified, and the Manual of Uniform Traffic Control Devices (MUTCD).

1.03 STANDARDS

- A. Parking Lot Striping Plan, as shown in the Drawings.

1.04 SUBMITTALS

- A. The contractor shall submit to the Engineer a certificate from the supplier indicating compliance with Articles 1095.01 of the Standard Specifications.

PART 2 – PRODUCTS

2.01 PAINT

- A. Paint materials shall meet the requirements of Article 1095.02 of the Standard Specifications.

2.02 THERMOPLASTIC

- A. Thermoplastic materials shall meet the requirements of Article 1095.02 of the Standard Specifications.

PART 3 – EXECUTION

3.01 PAINT PAVEMENT MARKINGS

Work under this item shall be performed in accordance with Articles 780.01, 780.02, 780.03, 780.04, and 780.06 of the Standard Specifications, except as herein modified.

- A. Do not apply paint pavement markings until the layout and placement has been verified by the Engineer.
- B. The paint shall be applied with mechanical equipment to produce uniform straight line edges.
- C. Rate of application shall be as per manufacturer's recommended rate, but in no case shall the rate of application be less than that specified in Article 780.06.

3.02 THERMOPLSTIC PAVEMENT MARKINGS

Work under this item shall be performed in accordance with Articles 780 of the Standard Specifications, except as herein modified.

- A. Do not apply pavement markings until the layout and placement has been verified by the Engineer.
- B. The pavement markings shall be applied with mechanical equipment to produce uniform straight line edges.
- C. Rate of application shall be as per manufacturer's recommended rate, but in no case shall the rate of application be less than that specified in Article 780.05.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. No separate measurement shall be made for PARKING LOT STRIPING.
- B. Pavement Markings shall be measured in place as THERMOPLASTIC PAVEMENT MARKING, LINE of the width specified measured per linear foot (FOOT).

4.02 PAYMENT

- A. This work will be paid for at the contract unit prices per foot of applied line width, as specified, for PAINT PAVEMENT MARKING – LINE 4 INCHES (YELLOW), THERMOPLASTIC PAVEMENT MARKING LINE, and per square foot for PAINT PAVEMENT MARKING – LETTERS AND SYMBOLS AND PAINT PAVEMENT MARKING – PARKING STALL NUMBERING, as shown in the Schedule of Prices.

END OF SECTION 02577

SECTION 02740
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aggregate base course.

1.02 REFERENCE STANDARDS

- A. Illinois DOT Standard Specifications for Road and Bridge Construction, Latest Edition and Current Supplements thereto.
- B. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; American Association of State Highway and Transportation Officials.
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- D. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)).
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Materials Sources: Submit name of imported materials source.
- C. Aggregate Composition Test Reports: Results of laboratory tests on actual materials used.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Materials shall be in accordance with IDOT Article/Section 1004.04.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.
- B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

- B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

- A. Installed in accordance with IDOT Section 351.05.
- B. Spread aggregate over prepared substrate to a total compacted thickness as shown on the Drawings.
- C. Aggregate base coarse shall be used under Concrete Paving and Asphalt Paving as shown on the Drawings.
- D. Compact to 97 percent of maximum dry density, as determined by the standard proctor test.
- E. Place aggregate in maximum 4 inch layers and roller compact to specified density.
- F. Level and contour surfaces to elevations and gradients indicated.
- G. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- H. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- I. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

- A. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

- A. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556.
- B. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D 698 ("standard Proctor").
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.
- D. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade and paving.

END OF SECTION 02740

SECTION 02741
HOT-MIX ASPHALT PAVING

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes the following:
 - 1. Hot-mix Asphalt Pavement Patching
 - 2. Hot-mix Asphalt Pavement

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.
- B. Firm shall be a registered and approved paving mix manufacturer for IDOT.
- C. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- D. Testing Agency Qualifications: Demonstrate to the Engineer's satisfaction, based on Engineer's evaluation of criteria conforming to ASTM D 3666, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- E. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Section 406 Hot-mix Asphalt Binder and Surface Course and Section 442 PAVEMENT PATCHING and other applicable sections of the IDOT SSRBC. Measurement and payment provisions set forth in the IDOT SSRBC do not apply to this Section. The Schedule of Prices included in the Bid Form shall govern payment for furnishing the labor, material, and equipment for the construction of hot-mix asphalt surfaces and pavement patches.

1.04 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Prime Coat: Minimum surface temperature of 60° F
 - 2. Asphalt Surface Course: Minimum surface temperature of 45° F and rising in the shade at time of placement.
 - 3. Asphalt Binder Course: Minimum surface temperature of 40° F and rising into shade at time of placement.

PART 2 – PRODUCTS

2.01 BITUMINOUS MATERIALS

- A. Prime Coat: Prime shall be MC-30 as specified in the IDOT SSRBC.
- B. Hot-Mix Asphalt Surface Course: HMA N-50 as specified in the IDOT SSRBC. Use materials and gradations that have performed satisfactorily in previous installations. Coarse and Fine Aggregate shall be as specified in the IDOT SSRBC.
- C. Hot-Mix Asphalt Binder Course: HMA N-50 as specified in the IDOT SSRBC. Use materials and gradations that have performed satisfactorily in previous installations. Coarse and Fine Aggregate shall be as specified in the IDOT SSRBC.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.
- C. Notify Engineer in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily met. Proceed with paving only after unsatisfactory conditions have been corrected.
- D. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces.

3.02 HOT-MIX ASPHALT PAVEMENT PATCHING

- A. Preparation: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 6 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove temporary surface materials to the required depth, and remove excavated materials and legally dispose of them in an EPA-approved landfill. Recompact existing unbound-aggregate base course to form new subgrade. The new patch shall meet the thickness of the adjacent pavement.
- B. Prime Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.35 gallon/square yard.
 - 1. Allow prime coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

- C. Patching: Fill excavated pavements with hot-mix asphalt surface mix for full thickness of patch in the Access Drive as noted on the plans and, while still hot, compact flush with adjacent surface. The patch shall be Class D as specified in Section 442 PAVEMENT PATCHING of the IDOT SSRBC.
Fill excavated pavements with hot-mix asphalt surface mix at a thickness of two and one half (2 ½) inches of patch in the Parking Lot as noted on the plans and, while still hot, compact flush with adjacent surface. The patch shall be Class D as specified in Section 442 PAVEMENT PATCHING of the IDOT SSRBC.
- D. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
- E. The Schedule of Prices in the Bid Form shall govern payment for furnishing the labor, material and equipment for construction of pavement patches.

3.03 HOT-MIX ASPHALT PAVING

- A. This work shall consist of the placement of bituminous pavement. This work shall be constructed in compliance with Section 406 hot-mix asphalt surface course of the IDOT SSRBC and follow the pavement section thickness as depicted on the plans.

3.04 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers. Pavement shall be compacted in 2 lifts in compliance with Section 406 HOT MIX ASPHALT BINDER AND SURFACE COURSE of the IDOT SSRBC.
 - 1. Complete Compaction before mix temperature cools to 185° F.
 - 2. Pavement Density: 95% of reference laboratory density according to ASTM D 1559.
- B. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- C. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- D. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.
- B. In-Place Density: Testing Agency will perform density testing during paving operations by nuclear method.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.06 BASIS OF PAYMENT

- A. Asphalt will be paid for at the contract unit price per square yard for HOT MIX ASPHALT CLASS "D" PATCHES, 4" and HOT MIX ASPHALT CLASS "D" PATCHES, FULL DEPTH as shown on the Schedule of Prices
- B. Prime Coat will be paid at the contract unit prices per gallon for BITUMINOUS MATERIALS (PRIME COAT), as shown in the Schedule of Prices

END OF SECTION 02741

SECTION 02751
CEMENT CONCRETE PAVEMENT

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Driveways and roadways.
2. Curbs and gutters.
3. Walkways.

1.02 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.03 QUALITY ASSURANCE

- A. Hot weather placement: When hot weather conditions exist, that will impair the quality and strength of concrete, place concrete in full compliance with ACI 305.
- B. Cold weather placement: Protect all concrete work from physical damage or reduced strength, which could be caused by frost, freezing action, or low temperatures in full compliance with ACI 306.

PART 2 – PRODUCTS

2.01 CONCRETE MATERIALS

- A. Ready mix concrete conforming to ASTM C-94
- B. Portland Cement shall be ASTM C 150. Fly ash and Calcium chloride shall not be used.
- C. Curing Compound complying with ASTM C 903.
- D. Concrete mix to comply with IDOT SSRBC standards and the following strength: 3,500 PSI at 14 days

PART 3 – EXECUTION

3.01 CONCRETE CURB AND GUTTER

- A. Any City requirements regarding expansion and contraction joints shall govern construction. Where proposed curb connects to an existing curb, the existing curb shall be saw cut and then two (2) 18" long x $\frac{3}{4}$ " (#6) dowel bars shall be drilled and installed 9" into the existing and proposed curb, as well as preformed expansion joints. Curb and gutter cross-section shall match the adjacent curb and gutter. Concrete curb and gutter shall be installed on 4" CA-6 aggregate base. Comply with materials, workmanship, and other applicable requirements of Section 606 CONCRETE GUTTER, CURB, MEDIAN, AND PAVED DITCH and other applicable sections of the IDOT SSRBC. Measurement and payment provisions set forth in the IDOT SSRBC do not apply to this Section. The Schedule of Prices included in the Bid Form shall govern payment for furnishing the labor, material, and equipment for the removal and/or replacement of concrete curb and gutter. CA-6 aggregate base is included in concrete curb and gutter pay item.

3.02 CONCRETE SIDEWALKS

- A. Comply with materials, workmanship, and other applicable requirements of Section 424 PORTLAND CEMENT CONCRETE SIDEWALK and other applicable sections of the IDOT SSRBC. Measurement and payment provisions set forth in the IDOT SSRBC do not apply to this Section. Sidewalk width shall be match the existing sidewalk adjacent to pour. Newly installed sidewalk shall be pitched at $\frac{1}{4}$ "/ft to allow drainage. 2-#4 steel reinforcing bars 20' long shall be placed over all trenches. Sidewalk base shall be installed on subgrade that has been compacted to a least 90% of standard proctor density. Sidewalk shall be installed on 2" CA-6 aggregate base which has been compacted and rolled. PCC shall be finished with a light broomed surface. The Schedule of Prices included in the Bid Form shall govern payment for furnishing the labor, material, and equipment for the removal and/or replacement of concrete sidewalk. CA-6 aggregate base is included in concrete sidewalks pay item.

3.03 CONCRETE DRIVEWAYS (OMITTED)

3.04 CONCRETE DITCH (OMITTED)

END OF SECTION 02751

SECTION 02920
LANDSCAPING RESTORATION

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Topsoil Placement/Fine Grading
 - 2. Seeding/Hydromulch
 - 3. Fertilizer
 - 4. Mulch
 - 5. Erosion Control Blanket

1.2 SUBMITTALS

- A. Product Data and Certification: For each type of product indicated below. Submit to engineer prior to restoration work.
 - 1. Topsoil
 - 2. Seed
 - 3. Fertilizer
 - 4. Mulch
 - 5. Erosion Control Blanket
- B. Submit written instructions recommending procedures for maintenance of seeded areas after completion of job to Owner as part of the final inspection and acceptance. Instructions shall detail general requirements for maintenance of all seeded areas including, but not limited to, weeding, watering, mowing, fertilizing, herbicide applications, etc.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged materials in original sealed, labeled, and undamaged containers.
- B. Deliver, handle and store all materials according to product recommendations and protect from loss, damage and deterioration.
- C. Materials not meeting these requirements will be rejected.

1.5 PROJECT CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods.
 - 1. Spring Planting: May 15th through June 1st
 - 2. Fall Planting: August 1st to September 15th

- B. Seeding shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.
- C. Planting season may be extended only with the written permission of the Owners representative.

PART 2 – PRODUCTS

2.1 TOPSOIL

- A. Topsoil:
 - 1. ASTM D 5268, pH range of 5.5 to 7, a minimum of 6% organic material content; free of stones 1 inch or larger in any dimension and other extraneous undesirable materials harmful to plant growth. Contractor is responsible for testing topsoil and submitting test results to Engineer for review and approval prior to use and placement.
 - 2. Reuse surface soil stockpiled on-site, if available and suitable.
 - 3. Verify suitability of stockpiled surface soil to produce topsoil.
 - 4. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - 5. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient.
 - 6. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

2.2 SEED

- A. Seed shall be fresh, clean, of the previous year's crop with 0.5% or less weed seed, and 1.75% or less crop seed, by weight. Seed shall be dry and free of mold and noxious weed seed. Seed shall meet the following requirements:
 - 1. Turf Seed Mix: IDOT Class 2A Salt Tolerant Roadside Mixture

2.3 FERTILIZER

- A. Type A
6-24-24 Clesen Starter as available from ACI or approved equal.
- B. Type C
12-26-12 Clesen with 50% Nitroform with minor elements .02% B, .05% Cu, 4.0% S, 1.0% Fe, .1% Mn, .006% Mo, as available from ACI or approved equal.
- C. Type D
10-20-30 Nutriculture soluble fertilizer as available from ACI or approved equal.

2.4 HYDROMULCH

- A. ENVIROBLEND all recycled fiber. 70% wood and 30% paper as available from ACI or approved equal.

2.5 TACKLIFIER

- A. CONTACT 10 by Conwed organic tackifier as available from ACI or approved equal.

2.6 EROSION CONTROL BLANKETS

- A. Erosion control blankets shall be biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended biodegradable staples of a minimum length of 6 inches. Erosion Control Blanket shall be in accordance with Article 251.04 of the IDOT SSRBC.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LAWN PREPARATION

- A. Limit lawn subgrade preparation to areas to be planted.
- B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply fertilizer directly to subgrade before loosening.
 - 2. Spread topsoil to at least a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus ½ inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Before planting, restore areas if eroded or otherwise disturbed after finish grading.

3.4 TWO STEP APPLICATION FOR SLOPES 4:1 AND STEEPER

- A. Seed shall be incorporated to provide the specified rate of seed coverage per 1,000 square feet (or 1 acre) for the specified seed mix.
- B. Coverage shall be the responsibility of the Landscape Contractor and reapplication to areas not providing acceptable coverage shall be at no cost to the Owner.
- C. The ENVIROBLEND hydromulch shall be applied at a rate of 1,800 lbs per acre of lawn area.
- D. The Type D fertilizer shall be applied at a rate to equal 1/2 lbs N per 1,000 sf of lawn area.
- E. Upon the fine graded lawn area, the thoroughly combined mixture of seed, fertilizer, and mulch shall be spread by means of a stream or spray of water under pressure operated from an approved type of machine described as a "hydroseeder". The selected seed mix, water, fertilizer, mulch and plaster shall be placed into a tank provided within the machine, in sufficient quantities to provide uniform distribution of seed at the given rate of application. During the process the contents of the tank shall be kept stirred or agitated to provide uniform distribution of the seed.
- F. Mix and apply AIRTROL for erosion control per manufacturer specifications. Slopes greater than 4 to 1 at the bottom of swales shall be stabilized with erosion control blanket material as specified. Secure blanket with staples 3' o.c.

3.5 ONE STEP APPLICATION FOR SLOPES LESS THAN 4:1

- A. Seed shall be incorporated to provide the specified rate of seed coverage per 1,000 square feet (or 1 acre) for the specified seed mix.
- B. Coverage shall be the responsibility of the Landscape Contractor and reapplication to areas not providing acceptable coverage shall be at no cost to the Owner.
- C. The ENVIROBLEND hydromulch shall be applied at a rate of 1,800 lbs per acre of lawn area.
- D. The CONTACK 10 tackifier shall be applied at a rate to equal 40 lbs per acre of lawn area.
- E. The Type D fertilizer shall be applied at a rate to equal 1/2 lbs N per 1,000 sf of lawn area.
- F. Upon the fine graded lawn area, the thoroughly combined mixture of seed, fertilizer, mulch, and tackifier shall be spread by means of a stream or spray of water under pressure operated from an approved type of machine designed for that purpose. The selected seed mix, water, fertilizer, mulch and tackifier shall be placed into a tank provided within the machine, in sufficient quantities to give a uniform distribution of seed at the application rate indicated. During the process the contents of the tank shall be kept stirred or agitated to provide uniform distribution of the seed.

3.6 SATISFACTORY LAWNS

- A. Lawn installations shall meet the following criteria as determined by Engineer:
 - 1. Satisfactory Seeded Lawn: At end of warranty period, a live, healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities.

3.7 LAWN RENOVATION

- A. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles at no additional cost to Owner.
 - 1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.
- B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.
- C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- D. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
- E. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
- F. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.
- G. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades.
- H. Apply seed and protect with straw mulch as required for new lawns.
- I. Water newly planted areas and keep moist until new lawn is established.

3.8 CLEANUP AND PROTECTION

- A. Promptly remove excess materials, equipment, hydraulic slurry, soil and debris, created by lawn work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
- B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after lawn is established.
- C. Remove non-degradable erosion-control measures after grass establishment period. Remove any non-degradable staples used to secure erosion control blanket.

3.9 LAWN MAINTENANCE

- A. Begin maintenance immediately after each area is planted and continues until acceptable lawn is established, but for not less than the following periods:
 - 1. Seeded Lawns: Three (3) weeks or two (2) mowings, whichever occurs first.
- B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth lawn.
 - 1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.
 - 1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - 2. Water lawn at a minimum rate of 1 inch per week.
- D. Lawn Post-fertilization: Apply fertilization after initial mowing and when grass is dry.
 - 1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1,000 square feet to lawn area.

3.10 WARRANTY

- A. The warranty is to guarantee completed seeding areas for a maximum period of twenty-four months.
- B. During the warranty period, correct and reseed any defects in the seeded areas and grass stand, such as weedy areas, eroded areas, and bare spots. All repair work must be accepted by Engineer.
- C. Replace or repair to original condition, all damages to property resulting from the seeding operation or from the remedying of defects, at the Contractor's expense.
- D. Replacement costs are the Contractor's responsibility, except for those resulting from loss or damage due to occupancy of the project in any part, vandalism, civil disobedience, acts of neglect on the part of others, physical damage by animals, vehicles, fire, or losses due to curtailment of water by local authority, or by "Acts of God".

END OF SECTION 02920

SECTION 02923
LANDSCAPE GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. This part of the Specifications includes all labor, materials, equipment, and supervision required to accomplish the landscape grading for plant beds (tree, shrub, ornamental grass, herbaceous perennial, groundcover and annual beds), and lawn areas.
2. The material and work specified in this section includes: topsoil, amended topsoil, topsoil and amended topsoil placement, and finish grading.

1.2 MEASUREMENT AND PAYMENT – TOPSOIL AND FINISH GRADE

- A. The Topsoil and Finish Grade for seeded lawn areas as indicated on the plans, complete-in-place and accepted, will be measured as a unit cubic yard quantity for all work necessary.
- B. The Topsoil and Finish Grade for seeded lawn areas measured as provided above will be paid for at the contract cubic yard price bid, which shall be full compensation for furnishing all equipment, materials, and all other work necessary or incidental to the construction of the complete Topsoil and Finish Grade for seeded lawn areas and for all equipment, tools, labor, and incidentals necessary to complete the work.

1.3 MEASUREMENT AND PAYMENT – AMENDED TOPSOIL AND FINISH GRADE

- A. The Amended Topsoil and Finish Grade for plant beds (tree, shrub, ornamental grass, herbaceous perennial, groundcover and annual beds) as indicated on the plans, complete-in-place and accepted, will be measured as a unit cubic yard quantity for all work necessary.
- B. The Amended Topsoil and Finish Grade for plant beds (tree, shrub, ornamental grass, herbaceous perennial, groundcover and annual beds) measured as provided above will be paid for at the contract cubic yard price bid, which shall be full compensation for furnishing all equipment, materials, and all other work necessary or incidental to the construction of the complete Amended Topsoil and Finish Grade for plant beds (tree, shrub, ornamental grass, herbaceous perennial, groundcover and annual beds) and for all equipment, tools, labor, and incidentals necessary to complete the work.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Perform work in accordance with applicable requirements of local and state codes and ordinances.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. On-site topsoil shall be used if available and suitable per the specifications, otherwise it shall be imported.
- B. Stockpiled topsoil should be pliable loam, typical of cultivated topsoils of the locality. Secure from naturally well drained areas. Use satisfactory soil materials with highly organic content capable of sustaining turf grass growth.
- C. Stockpiled topsoil shall be free of admixture of subsoil, free from clay lumps, stone, or other debris greater than 1" in diameter. Topsoil to have pH value of minimum 5.5 and maximum 7.0. Contractor is responsible for testing topsoil and submitting test results to Engineer for review and approval prior to use and placement.

2.2 AMENDED TOPSOIL MATERIALS

- A. Topsoil as specified above.
- B. Organic matter: A product of peat moss, compost, or locally available organic waste. Organic matter should be free from debris, weed seeds, and insects or diseases which may be harmful to the intended planting.
- C. Sand: Concrete sand, having a fineness modulus (FM) between 1.8 and 2.5.

PART 3 - EXECUTION

3.1 SEED AREA PREPARATION

- A. Loosen surface of subgrade to minimum two inch (2") depth to ensure a positive bond between subgrade and topsoil.
- B. Do not place finish topsoil until after clean-up and removal of construction debris, trash, surplus materials, and equipment from project site.
- C. Spread topsoil to uniform four inch (4") settled depth.
- D. Where topsoil is spread, use a cultipacker, pulverizer, or similar tool to pulverize the soil and eliminate all lumps. Do not compact topsoil.

3.2 PLANT BED PREPARATION – IN PLACE MIXING OF AMENDED TOPSOIL

- A. Loosen surface of subgrade to minimum two inch (2") depth to insure a positive bond between subgrade and topsoil.
- B. Do not place finish topsoil until after clean-up and removal of construction debris, trash, surplus materials, and equipment from project site.
- C. In plant beds (tree, shrub, ornamental grass, herbaceous perennial, groundcover and annual beds), place and spread topsoil to a uniform depth as specified in the planting details.

- D. Where topsoil is spread, use a cultipacker, pulverizer, or similar tool to pulverize the soil and eliminate all lumps. Do not compact topsoil.
- E. On a clean topsoil surface, add one part organic matter and one part sand for every two parts of topsoil and till the amendments to a depth as specified in the planting details.
- F. Provide a settled depth of amended soil in all plant beds per the planting details.
- G. Finish grade plant bed areas as shown on the Drawings.

3.3 FINISH GRADING

- A. Prepare finish grade for planting, seeding with only light raking or scarifying required.
- B. Round finished surfaces at abrupt changes in slope.
- C. Should spot elevations for finished grades conflict with finished contours, the spot elevations shall govern.
- D. Finish grades to uniform levels or slopes between points where levels are given or between such point and existing grades.
- E. Positively drain all lawn areas to designated surface water collection points, streets, and/or waterways.
- F. Repair irregularities in lawn surface drainage at no cost to Owner.
- G. Protect paving, sidewalks, utilities, and plants during finish grading; repair or replace any items damaged by construction operations at no cost to Owner.
- H. After placement, maintain surfaces to indicated finished grades; deposit additional topsoil or amended topsoil to repair settlement or erosion up to the date of final acceptance. Scarify surfaces upon which additional topsoil is to be deposited. Additional quantities of topsoil and/or amended topsoil to correct settlement or erosion have not been accounted for, but are incidental to the bid item.

3.4 MAINTENANCE

- A. Protection of graded areas:
 - 1. Protect newly graded areas from traffic and erosion.
 - 2. Keep free of trash and debris.
 - 3. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
 - 4. Keep public streets clean from soil, soil tracking, and debris at all times.
- B. Reconditioning Compacted Areas: Where completed graded areas are disturbed by subsequent construction operations, erosion or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction at no cost to the Owner.
- C. Settling: Where settling is measurable or observable during general project warranty period, add topsoil or amended topsoil, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration at no cost to the Owner.

3.5 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Remove waste materials, including unacceptable excavated material, trash, and debris from the job site.

END OF SECTION 02923

SECTION 02925
PLANT MATERIAL

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Furnish and install all plant material, soil amendments, and incidental products.
- B. Guarantee and maintenance of plant material.

1.2 DEFINITIONS

- A. AAN: American Association of Nurserymen

1.3 QUALITY ASSURANCE

- A. Contractor Qualifications: Minimum of three years' experience on projects of similar characteristics and size.
- B. Reference Standards
 - 1. American Joint Committee of Horticultural Nomenclature: Standardized Plant Names, Second Edition, 1942.
 - 2. American Nursery and Landscape Association (ANLA). American Standard for Nursery Stock, Latest Edition.
- C. Substitution
 - 1. Install substitutions only upon written approval of the Owner.
 - 2. Submit substitutions possessing same characteristics as plant material indicated.
 - 3. Do not substitute plants of less cost than plant indicated.
 - 4. Where larger plants are substituted by Contractor, substitute plants of greater value without any additional cost to Owner.
- D. Quality Control
 - 1. Contractor shall be responsible for all material shown on plans. Submit documentation to the Owner with bid that all plant material is available. Any and all substitutions due to unavailability must be requested in writing and submitted with bid. All plants shall be subject to inspection and approval by the Owner at place of growth or upon delivery to the site for conformity to the specifications. Such approval shall not impair the right of inspection and rejection during progress of the work.
 - 2. The Contractor shall submit specifications of any item being used on-site upon the request of the Owner.
 - 3. At least one plant of each species delivered to the site will have an identification tag from the supply nursery showing common and botanical plant names. Do not remove tag until after final inspection.
 - 4. One-sided branching plants from tightly planted nursery rows will be rejected.
 - 5. All plants shall be normal specimens without objectionable deformities, voids, and open spaces, with well-developed branch and root systems; true to height, shape, and character of growth of the species or varieties. Plants shall show appearance of good health and vigor.
 - 6. All plants shall be free of injurious insects, insect eggs, bores, and all forms of infestation, plant diseases, moldy or dried roots, or damage to trunk, bark, branches, leaders or root

systems, or cut-leaders. All plants shall be free of defects, disfiguring knots, sunscald injuries, and frost cracks. All plants to be free of rodent damage to bark and buds.

7. A planting list of all plants including a schedule with sizes, quantities, and other requirements is shown on the plans. In the event that quantity requirements or material omissions occur in the planting material list, the planting plan shall govern.
8. All plant materials designated in the planting schedule as matched shall be of uniform size, color, branching height, form, etc. Plants which do not match will be rejected.
9. Landscape work for this project shall be subcontracted to, or completed by a single landscape firm.

1.4 SUBMITTALS

A. Certificates

1. Submit manufacturer's certification of the inoculants, root stimulator, fertilizers, and/or soil amendment analysis.
2. File certificates with Owner prior to material acceptance.

B. Maintenance Instructions: Submit written maintenance schedule for watering and maintaining plant material after completion of job to Owner as part of the final inspection and acceptance. Instructions shall detail general requirements for maintenance of all plant material on the project including, but not limited to, weeding, watering, pruning, fertilizing, pesticide and herbicide applications, mowing, etc.

C. Provide certification to Owner's Representative stating that container grown material has been grown in the container for not less than one year.

D. Upon Owner's request, the Contractor will provide Material Certifications for all materials.

E. Contractor shall submit a sample of the mulch proposed for this project for approval prior to installation.

F. Contractor shall submit a sample of the staking straps and the staking design proposed for this project.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Preparation for Delivery

1. Balled and Burlapped (BB) Plants

- a. Dig and prepare for shipment in manner that will not damage roots, branches, shape, and future development after planting.
- b. Ball with firm, natural ball of soil.
- c. Wrap ball firmly with burlap.
- d. Ball size and ratios.
 1. Conform to AAN standard sizes and plant list.
 2. If conflict occurs, notify the Owner.
- e. Plant root systems of balled and burlapped plant material shall be protected with wet straw, moss, or other suitable material which will assure arrival at destination, and during temporary storage with root systems in a moist, healthy condition. Bare root plant material is not acceptable for this project.

2. Pack plant material to protect against climatic, seasonal, and breakage injuries during transit.
3. Securely cover plant tops with tarpaulin or canvas to minimize wind-whipping and drying. Use anti-desiccant only upon approval of Owner.
4. Pack and ventilate to prevent sweating of plants during transit by rail. Give special attention to insure prompt delivery and careful handling to point of delivery at planting job site.

B. Delivery

1. Deliver fertilizer and soil amendments to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trademark and conformance to State law.
2. The Contractor shall furnish the Owner with two (2) copies of receipts for all amendments specified herein.
3. Deliver all plants with legible identification labels.
4. Protect plant material during delivery to prevent damage to root ball or desiccation of leaves.
5. The Contractor shall notify the Owner ten (10) days in advance of delivery of all plant materials and shall submit an itemized list of the plants in each delivery.

C. Storage

1. If planting is delayed more than 6 hours following the arrival of plant material at the site, contractor shall heel-in plants and maintain during temporary storage by providing moist straw, moss, or other suitable material to protect root systems, watering, and protection from excessive sun, wind, and inclement weather conditions; providing a healthy vigorous plant when planted.
2. Store plant material in an area which is shaded and protected from the weather.
3. Maintain and protect plant material not to be planted immediately upon delivery in a healthy, vigorous condition.
4. Erect temporary fence and store material inside in manner approved by Owner.

D. Handling

1. The Contractor is cautioned to exercise care in handling, loading, unloading and storing of plant materials. Plant materials that have been damaged in any way will be discarded and if installed, shall be replaced with undamaged materials at the Contractor's expense.
2. Do not drop plants.
3. Do not pick up container or balled plants by stem or trunks.
4. Lift and handle balled plants from bottom of ball.

1.6 JOB CONDITIONS

- A. Protection: Before excavations are made, take precautionary measures to protect lawn areas driven over by vehicles and where soil is temporarily stacked.
- B. Scheduling: Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.

1.7 SAMPLES AND TEST

- A. Owner reserves the right to take and analyze samples of materials for conformity to specifications at any time.

- B. Contractor shall furnish samples upon request by Owner. Rejected materials shall be immediately removed from the site at Contractor's expense. Cost of testing of materials not meeting specifications shall be paid by Contractor.

1.8 GUARANTEE AND MAINTENANCE

A. Final Acceptance

- 1. Any plant required under this contract that is dead, or injured, diseased, or not true to its name or size as determined by the Owner shall be immediately removed from the site and replaced at no additional cost to the Owner.

B. Guarantee and Replacement

- 1. Guarantee all plant materials to be in a healthy, vigorous and attractive growing condition for a period of 2 year for all plant material. Guarantee shall begin immediately upon final acceptance by the Owner.
- 2. During the guarantee period, replace plants which die, become diseased or unhealthy, or are otherwise found to be in a poor condition, as determined by the Owner, at no additional expense to the Owner.
- 3. The guarantee will not apply to damage or injury to plant materials caused by vandalism, vehicles and storms.
- 4. The warranty period for all plants shall begin upon date of final acceptance for completed installations.

C. Maintenance Period

- 1. Maintain all planting areas until receipt of written final acceptance by the Owner.
- 2. All replacement of plant material during maintenance and guarantee period shall be with original size and species as shown on the plans.
- 3. Repair all damages to plants and/or lawns at no additional expense to the Owner.
- 4. Maintenance shall consist of but not be limited to:
 - a. Weeding.
 - b. Watering.
 - c. Pruning (as directed by the Owner).
 - d. Spraying.
 - e. Fertilizing.
- 5. Water at the minimum rate of 1 inch per week or as needed to maintain plant health.
- 6. Re-set settled plants to proper grades and position. Restore planting saucer and mulch; adding planting soil and mulch as may be required.

- D. Final Inspection: At this inspection, all plants must be in a healthy growing condition, weed free, pruning complete and staking and guying secure. Acceptance shall follow upon meeting these requirements.

1.9 SITE OR FIELD VISITS BY THE OWNER'S REPRESENTATIVE

- A. The Owner's representative or landscape architect will visit the site once to examine plant materials for type, size and character specified. Staked locations of the plant material will be inspected and approved prior to plan installation. The landscape architect will also visit the site once to examine installed plant materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plant Material (See Plans for Type and Size)

1. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free of insect infestations, plant diseases, sunscalds, windburn, knots, injuries, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and have well "hardened" systems and vigorous and fibrous root systems which are not root or pot-bound. In the event of disagreement as to condition of root system, the root conditions of the plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than two plants nor more than two percent of the total number of plants of each species or variety. Where container-grown plants are from several sources, the roots of not less than two plants of each species or variety from each source will be inspected. In case the sample plants inspected are found to be defective, the Owner reserves the right to reject the entire lot or lots of plants represented by the defective samples. The Owner is the sole judge as to acceptability. Any plants rendered unsuitable for planting because of this inspection will be considered as samples and will be provided at the expense of the Contractor.
2. The size and shape of the plants will correspond with that normally expected for species and variety of commercially available nursery stock or as specified on plans. The overall shape and the minimum acceptable size of all plants measured before pruning with the branches in normal position shall conform to the AAN Standards. Plants larger in size than specified may be used with the approval of the Owner, but the use of larger plants will cause no change in contract price. If the use of larger plants is approved, the ball of earth or spread of roots for each plant will be increased proportionately.
3. All plants not conforming to the requirements herein specified shall be considered defective and such plants, whether in place or not, shall be marked as rejected and immediately removed from the site and replaced with new plants at the Contractor's expense.
4. Pruning: Trees or plant materials shall be pruned or trimmed prior to delivery. Any alteration of their shape shall be conducted only with the approval of the Owner. In no case will the removal of branch leaders (TIPS) be permitted.
5. Plant material shall be true to botanical and common name and variety.
6. Nursery Grown and Collected Stock.
 - a. All plant material shall be nursery grown stock except as noted on the drawings or as approved in writing by the Owner.
 - b. Grown under climatic conditions similar to those in locality of project.
 - c. Container-grown stock in vigorous, healthy condition, not root-bound or with root system hardened off.
 - d. Use only liner stock plant material which is well established in removable containers or formed homogeneous soil sections.
 - e. If required, provide proof that material was nursery grown. All rejected stock shall be replaced at Contractor's expense.
7. Trees
 - a. Single straight trunks unless indicated otherwise.
 - b. Trees with weak, thin trunks not capable of support will not be accepted.
 - c. Tree caliper for trees 4" caliper or less shall be measured 6" above ground. Trees larger than 4" caliper will be measured 1'-0" above ground.
8. Method Options
 - a. Balled and burlapped in lieu of container-grown.

B. Commercial Fertilizer

1. Uniform composition.
2. Pelletized.
3. Containing following minimum percentage of plant food by weight:

- a. Available Nitrogen: 10% or 12%
 - b. Available Phosphoric Acid: 10% or 12%
 - c. Available Potash: 10% or 12%
- C. Sharp Sand: Clean, washed sand, fine to coarse sizes, free of clay lumps or other objectionable materials.
- D. Water: Water shall be free of substances harmful to plant growth. Contractor to provide water, equipment, methods of transportation, water tanker, hoses, sprinklers, and the application of water.
- E. Pre-Emergence Herbicide: EPTAM or an approved equal.
- F. Guying and Staking Materials: Refer to Drawings.
- G. Mulch: Twice-shredded hardwood mulch graded to ¼ inch to ½ diameter free of insects, debris, trash, weeds, seeds, and other noxious materials. Green or freshly chipped or shredded mulch will be rejected.
- H. Peat Moss: Canadian, Dutch or German Sphagnum peat moss. Peat moss shall be delivered in original, unopened and unbroken packages.
- I. Planting Soil
 1. Excavated soil from the planting pit, if suitable and similar to topsoil, may be used in preparation of planting soil for backfilling around root system of planted material. Clay, gumbo, gravel, contaminated soils, or other soil injurious to plants is not acceptable. Unacceptable soil excavated from the planting pits shall be disposed of off-site.
 2. If soil excavated from planting pits is insufficient or unacceptable, Contractor shall supply planting soil suitable for backfill. Soil shall be black, free of weed seed, mildly acidic, and fertile. Soil should be free of rocks, wood material, and trash.
 3. See Specification 02923 for Amended Soil specifications.
 4. Do not use frozen or muddy mixtures for backfilling.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Contractor shall verify that established grades are correct and determine locations of all utilities prior to beginning planting.
- B. Contractor shall see that all planting areas are free of all weed and foreign material prior to beginning planting.
- C. Contractor shall inspect plant material for injury, insect infestation, and improper size and shape.
- D. Contractor shall not begin planting until deficiencies are corrected, or plants replaced. To begin work indicates acceptance of site conditions.

3.2 PLANT LOCATIONS AND MEASUREMENTS

- A. Stake locations of plant material.

- B. Notify Owner of discrepancies between plants indicated on the plans and the actual conditions prior to planting.
- C. Plant locations will be approved by Owner prior to planting.

3.3 FINAL GRADES

- A. Minor modification to grade may be required to establish the final grade.
- B. Fine grading shall insure proper drainage of the site as determined by the Landscape Architect.
- C. All erosion scars shall be filled and compacted prior to planting installation.
- D. Disposal of any unacceptable or excess soil shall be done at location approved by Owner at the expense of the Contractor.

3.4 EXCAVATION FOR PLANTING

- A. Pits
 - 1. Shape
 - a. Vertical scarified sides and crowned bottom as shown on drawings.
 - b. Plant pits to be circular.
 - 2. Size for Trees: 2 times the width of the root ball and 6" deeper than root ball.
- B. Obstructions Below Ground
 - 1. Remove rock or underground obstructions to depth of 6" below bottom of plant ball or root, measured when plant is properly set at the required grade.
 - 2. If underground obstructions cannot be removed, notify Owner for new instructions.
 - 3. Avoid damaging underground utility lines.
 - 4. Repair damage to existing utilities at no additional expense to Owner.
- C. Disposal of Excess Soil
 - 1. Use acceptable excess excavated topsoil for filling holes, pits, eroded areas as directed by the Owner.
 - 2. Dispose of unacceptable or unused excess soil at an off-site location as directed by the Owner at the expense of the Contractor.

3.5 SOIL PREPARATION

- A. Prepared Backfill for plants. Planting mixture for plants shall consist of the following materials:
 - 1. Topsoil - 2 parts
 - 2. Peat Moss - 1 part
 - 3. Sharp sand - 1 part

3.6 PLANTING INSTALLATION

- A. General
 - 1. Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice, or as approved by the Owner. Allowable planting dates are as follows:
 - a. Evergreen Plants: September 1 to October 15 and prior to June 1, but not after candles

- exceed 1 inch.
 - b. Deciduous Plants (Balled and Burlapped and Container): August 15 to November 15 and in the spring prior to June 1.
 - c. Weather Restrictions: Planting may be conducted under unseasonable conditions, except in weather below 32°F or above 90°F. No variance from plant warranty or other requirements will be given for plants installed outside the specified periods.
2. Only as many plants as can be planted and watered on that same day shall be distributed in a planting area.
 3. If container grown plants are accepted, they shall be opened and plants shall be removed in such a manner that the ball of earth surrounding the roots is not broken and they shall be planted and watered as herein specified immediately after removal from the containers. Containers shall not be opened prior to placing the plants in the planting area.
 4. Set plants in pits at level shown on the details.
 5. Set plants plumb and rigidly braced in position until planting mixture has been tamped solidly around plant ball.
 6. Thoroughly settle plant by watering and tamping planting mixture.
 7. Thoroughly water plants.
 8. Stake and guy all trees according to the details.
- B. Balled Plants
1. Place in pit on planting mixture that has been hand-tamped.
 2. Place with burlap intact so location of root ball is approximately 2" above surrounding finish grade.
 3. Remove binding at top of ball and lay top third of burlap back.
 4. Remove any wire and twine from upper 1½ of root ball.
 5. Do not pull wrapping from under ball.
 6. Do not plant if ball is cracked or broken before or during planting process or if stem is loose.
 7. Backfill with planting mixture.
- C. Container-Grown Plants
1. Cut cans on two sides with an acceptable can cutter.
 2. Do not injure root ball.
 3. Carefully remove plants without injury or damage to root balls.
 4. After removing plant, superficially cut edge roots with knife on three sides.
 5. Place in pit on planting mixture that has been hand-tamped prior to placing plant.
 6. Backfill with planting mixture.
- D. Mulching
1. Mulch shall consist of premium finely shredded or processed hardwood bark graded to ¼ inch to ½ inch diameter and maximum of 3 inches in length. Green or freshly chipped or shredded mulch will be rejected. Mulch to be free of weeds, weed seed, chaff, diseases, or other foreign material.
 2. Cover watering basins or planting beds evenly with a layer of mulch a minimum of 3" deep, after settlement.
 3. Water immediately after mulching.
 4. Clear mulch away from direct contact with tree and shrub trunks.
 5. Rake mulch to a smooth finish.
- E. Pruning
1. Prune minimum necessary to remove injured twigs and branches, deadwood, suckers.
 2. Pruning shall not exceed 1/3 branching structure.
 3. Make cuts flush leaving no stubs.

- F. Staking and Guying: Staking of all trees shall be completed immediately after planting as indicated in details. Staking shall be removed at the end of the 1-year warranty period by the contractor.
- G. Controlled Release Fertilizer: Provide controlled release fertilizer tablets in accordance with the manufacturer's instructions at the following rates:
 - 1. Trees - 1 tablet per 112" of trunk caliper, measured 1 ft. above the top of root ball.
- H. Watering
 - 1. Water as required when soil moisture is below optimum level for best plant growth.
 - 2. Coordinate watering with Owner and recommend watering schedule.

3.7 CLEANUP

- A. After planting operations have been completed, remove all trash, excess soil, empty plant containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site. Contractor shall pick up all trash resulting from this work daily. All trash shall be completely removed from the site to an approved location.
- B. The Contractor shall wash down all paved areas, leaving the premises in a clean condition.

3.8 WARRANTY INSPECTION

- A. Inspection of plants will be made by the Owner or Landscape Architect at the expiration of the one-year warranty period, and following a written request by the Contractor. Contractor shall request inspection a minimum of 7 days prior to proposed inspection date.
- B. All plants that are missing or not in a live, healthy growing condition shall be removed from the site by the Contractor. Missing and rejected plant material shall be replaced by the contractor once after the warranty period at no expense to the Owner and as soon as possible during the specified planting season.
- C. Upon notice from the Owner or Landscape Architect, the removal from site of rejected plants and the replacement of plant material of the same species and size and installed as originally specified shall be completed by the Contractor with no additional compensation.
- D. All replacement plants shall be inspected by the Owner or Landscape Architect prior to planting.
- E. Maintain replacement plants as specified for original plants until accepted by the Owner or Landscape Architect. Contractor shall notify the Owner or Landscape Architect when all replacements and repairs are complete, and schedule the inspection 7 days prior to the proposed inspection date.

END OF SECTION 02925

DIVISION 3

CONCRETE

SECTION 03100
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.
- E. Design of Forms, Shores, and Reshores by Contractor.
 - 1. For certain tall pours, design of forms, shores and reshores by Contractor-employed specialty engineer, or use of pre-engineered forms.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.
- B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- C. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- D. ACI 347R - Guide to Formwork for Concrete; 2014.
- E. ACI 350/350R - Code Requirements for Environmental Engineering Concrete Structures and Commentary; 2001.

1.04 DEFINITIONS

- A. "Formwork Specialty Engineer" ("FSE"): Professional Engineer employed by Contractor to be in responsible charge of the design of formwork, falsework, shoring, reshoring, etc. FSE shall be a registered Professional Engineer currently licensed in good standing in the state of Illinois.

1.05 DESIGN REQUIREMENTS

- A. Design and engineering of formwork shall be the sole responsibility of the Contractor.
- B. For wet concrete vertical lifts of over 10 feet, or for falsework below slabs where slab is over 10 ft above ground, formwork/falsework shall be either:
 - 1. A pre-engineered standard design from a formwork specialty vendor.
 - 2. Custom-designed and PE-certified by FSE.
- C. Design and erect formwork in accordance with the requirements of ACI 318 and ACI 350 and as recommended in ACI 347.

1.06 SUBMITTALS

- A. See Section 01330 – Submittal Procedures, for submittal procedures.
- B. Submit name and Illinois Professional Engineer license number of FSE, and letter of acknowledgement that FSE is in responsible charge of design for items specified.
- C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.
 - 1. Proposed method of sealing form tie holes.
 - 2. The review, approval, or both of the formwork drawings does not relieve the Contractor of the responsibility for adequately constructing and maintaining the forms so that they will function properly.

1.07 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301, ACI 318, and ACI 347.

1. Maintain one copy of each listed standard on project site. Make documents available to workers and construction observers at all times.
- B. Formwork, falsework, and shoring designs shall be prepared by FSE.
- C. FSE shall be responsible for providing Contractor with maximum allowable rate of fill for forms, in light of actual concrete mix designs. Contractor shall furnish FSE with concrete mix design information, and shall keep FSE apprised of any changes to mix designs.

PART 2 PRODUCTS

2.01 FORM MATERIAL

- A. Rigid and substantial forms shall be constructed in all cases to produce required dimensions and finish of the concrete, and to support the wet concrete adequately.
- B. Whenever flowing liquids are to come in contact with concrete surfaces and the concrete is to be exposed above grade, smooth metal or approved manufacturer's forms shall be used.

2.02 FORMWORK ACCESSORIES

- A. Form Ties: Snap-off type, galvanized metal, fixed length, cone type, with waterproofing washer, 1.5 inch (38.1 mm) back break dimension, free of defects that could leave holes larger than 1 inch (25 mm) in concrete surface.
- B. All forms shall be equipped with adequate devices for spreading and tying formwork and for supporting the steel reinforcing.
- C. Through-bolt ties shall not leave holes in concrete larger than 1.25 inch diameter. Ties shall be commercially manufactured. Wire and band iron will not be accepted.
- D. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
 1. Composition: Colorless mineral oil-based compound.
 2. Product must be non-toxic beyond 30 days after application.
 3. Product must not impair the bond of paint, sealant, epoxy coating, dampproofing or other coatings.
- E. Filler Strips for Hardwood Chamfered Corners: Wood strip type; 3/4 x 3/4 inch (19.05 x 19.05 mm) size; maximum possible lengths. Surface in contact with concrete shall be planed smooth.
- F. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 1200.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

- A. Earth forms are not permitted without prior written approval from the Engineer.

3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301 and recommendations of ACI 347.
- B. Align joints and make watertight. Keep form joints to a minimum.
- C. Obtain approval before framing openings in structural members that are not indicated on drawings.
- D. Provide chamfer strips on external corners of beams, and columns exposed to view and 1 foot below finished grade, and on all exterior corners of water-containing channels.
 1. Chamfer strips are required whether specifically indicated on Drawings or not.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Waterstops shall be securely held in position so that they will not be displaced during concreting and care shall be taken in placing and consolidating the concrete so that no voids or honeycombing occurs adjacent to the waterstops. Avoid contamination of the waterstop surfaces.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
 - 1. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter. The method of snow and ice removal shall not involve extreme heat or impact and shall not damage the existing concrete.

3.07 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.08 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
 - 1. Formwork not supporting weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 48 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained as specified in Section 03 3900.
 - 2. Leave forms and shoring for elevated structural slabs or beams in place, in accordance with ACI 318, and until concrete has reached compressive strength equal to 100 percent of the specified 28 day compressive strength as determined by test cylinders. Do not apply loads to concrete until concrete has reached 100 percent of specified compressive strength.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

END OF SECTION

SECTION 03200
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Reinforcing steel used in the construction of utility structures, sidewalks, and miscellaneous structures.
- C. Deformed reinforcing steel for concrete masonry (CMU) construction.
- D. Supports and accessories for steel reinforcement.
- E. Adhesive rebar anchors
- F. Mechanical connectors

1.02 REFERENCE STANDARDS

- A. IDOT "Standard Specifications for Highway and Bridge Construction", latest edition and current supplements thereto.
- B. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; American Concrete Institute International; 1990 (Reapproved 2002).
- C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- D. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- E. ACI 350/350R - Code Requirements for Environmental Engineering Concrete Structures and Commentary; 2001
- F. ACI SP-66 - ACI Detailing Manual; 2004.
- G. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- H. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.
- I. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2007b (Reapproved 2014).
- J. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.
- K. CRSI (DA4) - Manual of Standard Practice; 2009.
- L. CRSI (P1) - Placing Reinforcing Bars; 2011.
- M. ICC Evaluation Service, Inc. (ICC): Evaluation Reports.

1.03 SUBMITTALS

- A. See Section 01330 – Submittal Procedures, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices. Shop drawings must also comply with additional specific requirements below:
 - 1. Placing drawings (applies to reinforced concrete and reinforced masonry) shall have sufficient detail to permit installation of reinforcing without reference to the Contract Documents.
 - 2. Do not reproduce Contract Documents, but redraw plans, sections, elevations and details as necessary to show all bars and supports.
 - 3. Show required clear cover on all section views for each face of concrete or masonry.
 - a. Reinforcing drawings that do not show clear cover will be rejected without review.
 - 4. Bar supports: call out type and size of applicable bar support(s) on each reinforcing drawing.

- C. Reports: Submit certified copies of mill test report of reinforcement materials analysis, if requested by Engineer.
- D. Product Data:
 - 1. Mechanical connectors and adhesive rebar anchors:
 - a. Current ICC evaluation report or equivalent code agency report listing findings to include installation instructions, acceptance, special inspection requirements and restrictions.
 - b. Manufacturer's published installation instructions.
 - c. Test data for each size of bar to be used.
 - 1) Mechanical Connectors: Verification that connector is capable of developing 125 percent of bar yield strength.
 - 2) Adhesive Rebar Anchors: Embedment depth required to develop ultimate bond strength equal to or greater than 125 percent of bar yield strength in 3,000 psi concrete. Embedment depth may be based on interpolation but not extrapolation of published test data.
- E. Conduits or pipes passing through columns, beams or joists: Submit all such proposed cases, indicating material to be used for pipe or conduit and indicating all proposed dimensional information, additional reinforcing, clear distances, etc.
- F. Mechanical splices not shown on Drawings: Submit all proposed locations.
- G. Adhesive rebar anchors not shown on Drawings: Submit all proposed locations.

1.04 QUALITY ASSURANCE

- A. Certify that reinforcing steel meets applicable specifications.
- B. Perform work of this section in accordance with CRSI (P1), ACI 301, and ACI SP-66.
 - 1. Maintain one copy of each document on project site. Make documents available to workers and inspectors at all times.
- C. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver reinforcing to site free of rust and in an undamaged condition. Store in a manner to protect from rusting and contact with injurious materials.
 - 1. Store all bars on blocking above the ground.
 - 2. Handle epoxy-coated bars with non-metallic equipment, and store under shelter from sunlight

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Deformed Billet-Steel Reinforcing Bars; including stirrups, ties, and spirals: Grade 60 (420).
 - 1. Deformed billet-steel bars including stirrups, ties, and spirals.
 - 2. Uncoated - to be used for all reinforcing unless noted otherwise: ASTM A615, Grade 60, including Supplemental Requirements S1.
 - 3. Bars to be welded: ASTM A 706, Grade 60.
 - 4. Epoxy coated (where indicated): ASTM A 775/A 775M, Grade 60.
- B. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.
 - 1. Flat Sheets.
 - 2. Mesh Size and Wire Gage: As indicated on drawings.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage (___ mm).
 - a. Use coated wire (nylon, plastic or epoxy) for epoxy-coated bars.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

- a. Precast concrete bar supports, cementitious fiber-reinforced bar supports, or all-plastic bar supports and side form spacers consistent with CRSI Manual of Standard Practice.
 - b. In Beams, Walls, and Slabs Exposed to View After Stripping: Small rectangular concrete blocks made up of same color and strength as concrete being placed around them or all-plastic bar supports and side form spacers.
 - c. Precast concrete supports of same strength as concrete for reinforcing in concrete placed on grade.
 - d. For slabs on grade, use 6"x6" concrete bricks or supports with sand plates where base material will not firmly support chair legs.
 - e. For chairs, bolsters, bar supports, and spacers sitting on grade, load bearing pads on bottom are required to prevent vapor barrier puncture.
3. Provide stainless steel components for placement within 1-1/2 inches (38 mm) of weathering surfaces.

2.02 CONNECTORS

- A. Mechanical Connections:
 1. Mechanical Threaded Connections: Metal coupling sleeve for splicing reinforcing with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
- B. Adhesive Rebar Anchors:
 1. "Capsule" system or "nozzle-mixed" system as specified herein:
 - a. Capsule System": Polyester or vinyl ester resin and hardener premeasured and separately encased in a manufactured capsule. Manufacturer's standard aggregate may also be included in capsule.
 - b. "Nozzle-Mixed" System: Two-component structural epoxy in premanufactured double cartridge (or co-axial cartridge). Mixing of components shall occur within the cartridge or in the manufacturer's specially fabricated mixing nozzle. Manufacturer's standard aggregate may also be included in cartridge.
 2. Adhesive shall be specifically designed and manufactured for use in structurally bonding reinforcing bars to hardened concrete
 3. Bars shall be embedded to a depth sufficient to develop an ultimate bond strength equal to 125 percent of the yield strength of the bar, assuming embedment in 3,000 psi concrete.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice, ACI SP-66 - ACI Detailing Manual, and ACI 318.
- B. Welding of reinforcement is permitted only where shown, or with the specific written approval of Engineer. Perform welding in accordance with AWS D1.4.
- C. Bend cold to conform with required details; bend bars in fabricating shop before delivery to site.
- D. Bar fabrication tolerances: ACI 117.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement using preformed wire bar bolsters and spacers. Do not deviate from required position.
- B. Place concrete only after reinforcing system is in place and approved by Engineer; install reinforcing system plumb and true; tie securely; reinforcing must remain in proper position without distortion or displacement of individual bars or system during pour.
- C. Do not displace or damage vapor barrier.
- D. Accommodate placement of formed openings.
- E. Maintain concrete cover around reinforcing as indicated on Drawings.

- F. All joints or splices shall be made by using approved mechanical connectors or by lapping the ends of the bars according to ACI 318. Joints in longitudinal bars shall be staggered where indicated. Splicing top bars over supports and bottom bars at center span shall be avoided. Lap splices for all reinforcing bars are shown on the Drawings.
- G. Splicing shall be consistent with ACI 318 and ACI 350.
- H. Field bending of reinforcing bars will not be permitted.
- I. Where parallel horizontal reinforcement in beams is indicated to be placed in two or more layers, rebars in the upper layer shall be placed directly above rebars in the bottom layer with clear distance between the layers to be 1 inch (unless noted otherwise). Place spacer rebars at 3 FT maximum centers to maintain the required 1 inch clear distance between layers.
- J. Maximum size of single conduit or pipes shall be limited in placement as follows:
 - 1. None above top reinforcing layer or below bottom reinforcing layer.
 - 2. None closer than 3 conduit diameters to each other or one conduit diameter to nearest reinforcing.
 - 3. None through columns, beams or joists without review of Engineer.
 - a. Submit proposed penetrations through columns, beams and joists per Paragraph 1.03.E.
- K. Location Tolerances: In accordance with CRSI publication, "Placing Reinforcing Bars".
 - 1. Contractor must have one copy of publication on-site and available to workers and inspectors at all times.
- L. Mechanical Splices and Connections:
 - 1. Use only in areas specifically indicated or approved in writing by the Engineer.
 - a. Submit proposed connection locations (other than those shown on Drawings) per Paragraph 1.03.F.
 - 2. Install as required by manufacturer and in accordance with ICC Report.
 - a. If manufacturer's instructions differ from installation instructions of ICC Report, the more stringent requirements shall govern.
 - 3. Maintain minimum edge distance and concrete cover.
 - 4. Inspect each mechanical splice/connector as required by ICC Report.
- M. Tying Deformed Reinforcing Bars:
 - 1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars.
 - 2. For larger bars, tie every intersection.
 - 3. Bend all noncoated tie wire to prevent tie wire from being closer than 1 inch from the surface of concrete.
- N. Reinforcement Around Openings: Place an equivalent area of steel bars around pipe or opening as shown and extend reinforcement on each side sufficiently to develop bond with each bar (per detail on Drawings).
- O. Do not weld or tack weld any reinforcement other than ASTM A 706 bars specifically indicated to be welded.
- P. Cleaning: Clean metal reinforcement of loose mill scale, oil, earth, concrete splatter (laitance), and other contaminants.

3.02 ADHESIVE REBAR ANCHORS

- A. Install anchors using only materials, equipment and procedures recommended by manufacturer and in accordance with ICC Report. Follow all installation and curing instructions exactly.
 - 1. If manufacturer's instructions differ from installation instructions of ICC Report, the more stringent requirements shall govern.
- B. Use anchors only at locations specifically indicated on Contract Drawings or approved by Engineer.
 - 1. Submit proposed anchor locations (other than those shown on Drawings) per Paragraph 1.03.G.

- C. Install in holes drilled with carbide tipped drill bits. Do not cut reinforcing steel.
- D. All adhesive anchors must be inspected twice - once at conclusion of hole drilling/cleaning, and once during adhesive/bar insertion.

3.03 FIELD QUALITY CONTROL

- A. Inspect all reinforcement for compliance with Contract Documents. If deficiencies are not corrected, or if an interpretation of the Contract Documents is required, notify the Engineer immediately.
- B. Notify Engineer when reinforcing is fully placed, tied and ready for inspection and allow 24 hours for Engineer's inspection prior to placing concrete.
- C. Adhesive rebar anchors:
 - 1. Notify Engineer when adhesive rebar anchors are ready for each of two separate inspections. Allow 24 hours for Engineer's inspection.
 - 2. Any adhesive rebar anchor completed without inspection is subject to rejection by Engineer, and subject to replacement by an additional adhesive rebar anchor at no additional expense to Owner

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete building frame members.
- B. Elevated concrete slabs.
- C. Floors and slabs on grade.
- D. Concrete foundation walls.
- E. Concrete foundations for water storage tank(s).
- F. Anchors and Inserts.
- G. Waterstops.
- H. Joint devices associated with concrete work.
- I. Grout.
- J. Testing concrete, including watertightness testing.
- K. Miscellaneous concrete elements, including equipment pads and thrust blocks.

1.02 REFERENCE STANDARDS

- A. IDOT "Standard Specifications for Highway and Bridge Construction", latest edition and current supplements thereto.
- B. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 1990.
- C. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- D. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- E. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).
- F. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- G. ACI 305R - Hot Weather Concreting; 2010.
- H. ACI 306R - Cold Weather Concreting; 2010.
- I. ACI 309R - Guide for Consolidation of Concrete; American Concrete Institute International
- J. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.
- K. ACI 350R - Code Requirements for Environmental Engineering Concrete Structures and Commentary, 2006.
- L. ACI 350.1R - Tightness Testing of Environmental Engineering Concrete Structures; 2001.
- M. ACI SP-15 - Field Reference Manual; American Concrete Institute International.
- N. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- O. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- P. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.
- Q. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- R. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
- S. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- T. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- U. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

- V. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.
- W. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- X. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2014.
- Y. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
- Z. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.
- AA. ASTM C 1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete; 1995.
- AB. ASTM D994/D994M - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type); 2011.
- AC. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- AD. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.03 DEFINITIONS

- A. Defective Areas: Surface defects that include honeycomb, rock pockets, cracks 0.005 inch wide and larger, cracks that leak in water-holding basins, spalls, chips, embedded debris, sand lines, bleed lines, leakage from form joints, fins and other projections, and form popouts.
- B. New Concrete: Less than 60 days old.

1.04 SUBMITTALS

- A. See Section 01330 – Submittal Procedures, for submittal procedures.
- B. Shop Drawing:
 - 1. Product Data:
 - a. Admixtures.
 - b. Neoprene Bearing Pad.
 - c. Bonding agent.
 - d. Patching materials.
 - e. PVC Waterstop, including splicing details and procedures.
 - f. Special Waterstop (adhered).
 - g. Portland Cement.
 - h. Fly Ash.
 - 2. Design Data: Concrete mix designs signed by qualified mix designer.
 - 3. Placement Drawings: Concrete placement, identifying location of each type of construction joint.
 - 4. Gradation for coarse and fine aggregates, and combined together. List gradings, percent passing through each sieve size.
 - 5. Curing methods proposed.
 - 6. Detailed plan for cold weather curing and protection of concrete placed and cured in weather below 40 degrees F.
 - 7. Detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over 80 degrees F.
 - 8. Detailed plan for repair and patching of defective concrete areas.
- C. Quality Control:
 - 1. Manufacturer's application instructions for bonding agent.
 - 2. Proposed application schedule and instructions for patching materials.
 - 3. Manufacturers' Certificate of Compliance:

- a. Portland cement.
- b. Admixtures.
- c. Fly ash.
- d. Aggregates.
- e. Bonding agent.
- f. Patching materials.
- g. PVC Waterstop.
- 4. Admixtures: Manufacturers' Certificate of Proper Usage and certification that all admixtures are compatible with each other and the aggregates.
- 5. Statements of Qualification:
 - a. Mix designer.
 - b. Batch plant.
- 6. Test Reports:
 - a. Admixtures, test reports showing chemical ingredients and percentage of chloride in each admixture and fly ash and cement.
 - b. Source test analysis report for fly ash.
 - c. Statement identifying aggregates reactivity and aggregate effects on concrete finish and appearance.
 - d. For each trial mix design and signed by qualified mix designer.
 - e. Concrete mix for each formulation of concrete proposed for use including constituent quantities per cubic yard, water cementitious ratio, concrete slump, type and manufacturer of cement and fly ash.
 - f. All laboratory tests for concrete mixes shall be made a minimum of 30 days prior to the concrete mix submittal.
 - g. Water cementitious ratio curve for concrete mixes based on laboratory tests. Provide average cylinder strength test results at 7 and 28 days for laboratory concrete mix designs. Provide results of 14 day tests if available.
- 7. Concrete Delivery Tickets. Submit certified copy of ticket for each load of concrete delivered to site. Hand to Owner's representative immediately upon arriving at job site. Include on ticket:
 - a. For each batch of concrete before unloading at site.
 - b. Record of drum revolution counter, type, brand, test certification, and amount of fly ash if used in accordance with ASTM C94, Section 16.
- D. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301, ACI 318, and ACI 117.
 - 1. Maintain one copy of each document on site.
- B. Acquire cement from same source and aggregate from same source for entire project.
- C. Follow recommendations of ACI 305R when concreting during hot weather.
- D. Follow recommendations of ACI 306R when concreting during cold weather.
- E. Mix Designer: Licensed professional ENGINEER registered in the state of Illinois.
- F. Batch Plant:
 - 1. Currently certified by the National Ready Mixed Concrete Association.
 - 2. Batch Plant Inspection:
 - a. Engineer shall have access to and have the right to inspect batch plants, cement mills, and supply facilities of Suppliers, manufacturers, and Subcontractors, providing products included in these Specifications.
 - b. Weighing Scales: Tested and certified within tolerances set forth in the National Bureau of Standards Handbook No. 44.

- c. Batch Plant Equipment: Either semiautomatic or fully automatic in accordance with ASTM C94.
- G. Preinstallation Meetings:
 - 1. Required Meeting Attendees:
 - a. Contractor.
 - b. Ready-mix producer.
 - c. Admixture representative.
 - d. Engineer.
 - 2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer of location and time.
 - 3. Agenda shall include:
 - a. Admixture types, dosage, performance, and redosing at site.
 - b. Mix designs, test of mixes, and Submittals.
 - c. Placement methods, techniques, equipment, consolidation, and form pressures.
 - d. Slump and placement time to maintain slump.
 - e. Finish, curing, and water retention.
 - f. Other specified requirements requiring coordination.
 - 4. Provide meeting minutes as specified in Division 1.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Comply with requirements of Section 03100.

2.02 REINFORCEMENT

- A. Comply with requirements of Section 03200.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type I - Normal or Type II - Moderate Portland type. Tricalcium aluminate content of Type I Cement shall not exceed 12 percent.
 - 1. Acquire all cement for entire project from same source.
 - 2. Hydraulic and Below grade Structures and Sewers: Type I or II cement mixed with fly ash.
- B. Fine and Coarse Aggregates: ASTM C 33.
 - 1. Acquire all aggregates for entire project from same source.
 - 2. Natural Aggregates:
 - a. Free from deleterious coatings and substances in accordance with ASTM C33, except as modified herein.
 - b. Free of materials and aggregate types causing popouts, discoloration, staining, or other defects on surface of concrete.
 - 3. Nonpotentially Reactive: In accordance with ASTM C33, Appendix XI, paragraph X1.1.
 - 4. Aggregate Soundness: Test for fine and coarse aggregates in accordance with ASTM C33 and ASTM C88 using sodium sulfate solution.
 - 5. Fine Aggregates:
 - a. Clean, sharp, natural sand.
 - b. ASTM C33.
 - c. Materials Passing 200 Sieve: 4 percent maximum.
 - d. Limit deleterious substances in accordance with ASTM C33, Table 1 with material finer than 200 sieve limited to 3 percent, coal and lignite limited to 0.5 percent.
 - 6. Coarse Aggregate:
 - a. Natural gravels, combination of gravels and crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles (long dimension more than five times the short dimension).
 - b. Materials Passing 200 Sieve: 0.5 percent maximum.

- c. Limit deleterious substances in accordance with ASTM C33, Table 3 for exposed architectural concrete.
- C. Water: Potable, fresh, clean and not detrimental to concrete.
- D. Synthetic fibers: fibrillated nylon or polypropylene.
 - 1. Manufacturers:
 - a. Propex - Fibermesh 300
 - b. Grace - Grace Fibers
 - c. Euclid Chemical Co. - Fiberstrand F

2.04 CHEMICAL ADMIXTURES

- A. Characteristics: Compatible with each other and free of chlorides or other corrosive chemicals.
- B. All admixtures shall be supplied from the same manufacturer and used in accordance with the manufacturer's recommendations.
- C. Air Entrainment Admixture: ASTM C 260; contain no chlorides.
- D. Water-Reducing Admixtures: ASTM C 494, Type A - Water Reducing and Type D - Water Reducing and Retarding.
 - 1. Manufacturers:
 - a. BASF.
 - b. Grace.
 - c. Euclid Chemical Co.
 - d. GRT.
- E. Superplasticizers:
 - 1. ASTM C494.
 - 2. Hold slump of 5 inches or greater for time required for placement into structure with maximum water-cement ratio specified.
 - 3. Furnish type as recommended by manufacturer for allowed temperature ranges.
 - 4. Type F.
 - 5. Manufacturers:
 - a. BASF.
 - b. Grace.
 - c. Euclid Chemical Co.
 - d. GRT.

2.05 ACCESSORY MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II acrylic non-redispersable type.
 - 1. Furnish as recommended by manufacturer for surface finish, pot life, set time, vertical or horizontal application, and forming restrictions.
 - a. Manufacturers:
 - 1) BASF.
 - 2) W.R. Meadows.
 - 3) L&M Construction Chemicals.
 - 4) Sika Chemical Corp.
 - 5) Euclid Chemical Co.
- B. Patching Material:
 - 1. Contains no chlorides or other chemicals causing steel corrosion. Cement-based, suitable for vertical and overhead applications with a compressive strength at 28 days of 6,500 psi minimum.
 - 2. Manufacturers:
 - a. BASF.
 - b. L&M Construction Chemicals.
 - c. Sika Chemical Corp.
 - d. Euclid Chemical Co.

- C. Plastic Water Stop:
 - 1. Extruded from an elastomeric plastic compound of which the basic resin shall be polyvinyl chloride (PVC). Reclaimed PVC in the compound is not acceptable.
 - 2. Shore Durometer Type A Hardness: Approximately 80.
 - 3. Performance Requirements: Corps of Engineers' Specification CRD C572.
 - 4. Type: Center bulb with a number of parallel ribs or protrusions on each side of strip center.
 - 5. Corrugated or tapered type water stops are not acceptable.
 - 6. Physical size (unless noted otherwise):
 - a. Thickness = 3/8", constant from bulb edge to the outside stop edge.
 - b. Width: 6 inches unless noted otherwise.
 - 7. Manufacturers:
 - a. Vinylex Corp.
 - b. Greenstreak Plastic Products.
 - c. Paul Murphy Plastics Co.
- D. Special Waterstop:
 - 1. Adhered waterstop: hydrophilic, non-bentonite product.
 - 2. Specifically engineered as a concrete joint waterstop device
 - 3. Delay coating to protect fresh concrete.
 - 4. Manufacturers:
 - a. Greenstreak "Hydrotite".
 - b. DeNeef "Swellseal 8".
 - c. Engineer approved equivalent.
- E. Expansion Joint Filler: Neoprene, closed-cell, expanded, in accordance with ASTM D1056, Type 2C5 with compression deflection, 25 percent deflection (limits), 17 to 24 psi minimum.
- F. Chemical Hardener: Magnesium Fluorosilicate solution designed for densification of cured concrete slabs. Hardener shall be compatible with other specified floor treatments and curing compounds. Apply to all slabs unless noted otherwise.
- G. Water Repellent:
 - 1. Clear non-staining silane/siloxane, breathable sealer and water repellent, intended for horizontal and vertical surfaces.
 - 2. Manufacturers:
 - a. L&M Construction Chemicals - Aquapel.
 - b. BASF - HYDROZO Silane 40 VOC.

2.06 CONCRETE MIX DESIGNS

- A. Design: Select and proportion ingredients using trial batches; sample, cure, and test concrete mix through an approved independent testing laboratory in accordance with ACI 309 per ACI 211.1.
 - 1. Concrete Compressive Strength, F'c:
 - a. See schedule on Drawings
 - b. Design lab-cured trial mix cylinders.
 - c. Use additional cement or cement plus fly ash above minimum specified if required to meet average compressive strength, F'cr.
 - d. Use F'cr as basis for selection of concrete proportions as set forth in Chapter 5 of ACI 318 and commentary ACI 318R.
 - e. F'cr: Equal to F'c plus 1,200.
 - f. For concrete mixes developed by laboratory testing, base cementitious content of the concrete on a curve showing the relation between water cementitious ratio and 7 and 28 day compressive strengths of concrete made using the proposed materials. Determine curves by four or more points, each representing an average value of at least three test specimens at each age. Provide curves with a range of values sufficient to yield the desired data, including the compressive strengths specified,

without extrapolation. The cementitious content of the concrete mixes to be used, as determined from the curve, shall correspond to strengths 1,200 psi greater than the specified design strengths. The resulting mix shall not conflict with the limiting values for maximum water cementitious ratio and net minimum cementitious content specified.

2. Proportions
 - a. Design mix to meet aesthetic and structural concrete requirements.
 - b. In accordance with ACI 211.1, unless specified otherwise.
 - c. Water-cementitious (W/C) ratio shall control amount of total water added to concrete per schedule on Drawings
3. Admixtures:
 - a. Air Content: per schedule on Drawings.
 - b. Fly Ash: per schedule on Drawings
 - c. Superplasticizers: Use on all water holding structures, below grade structures and tunnels.
4. Slump Range at Site (Maintain Until Consolidated in Form)
 - a. After adding superplasticizers: 5 to 9 inches
 - b. Before adding superplasticizers: 1 to 3 inches

2.07 MIXING

- A. General: In accordance with ACI 304R.
- B. Truck Mixers:
 1. Equip with electrically actuated counters to readily verify number of revolutions of drum or blades.
 2. Counter:
 - a. Resettable, recording type, mounted in driver's cab.
 - b. Actuated at time of starting mixers at mixing speeds.
 3. Truck mixer operation shall furnish a concrete batch as discharged, that is homogeneous with respect to consistency, mix, and grading.
 4. Before attempting to reuse unit, check mechanical details of mixer, such as water measuring, and discharge apparatus, condition of blades, speed of rotation, general mechanical condition of unit, admixture dispensing equipment, and clearance of drum.
 5. Do not use nonagitating or combination truck and trailer equipment for transporting ready-mixed concrete.
 6. Concrete Volume in Truck:
 - a. Limit to 63 percent of total volume capacity, in accordance with ASTM C94, when truck mixed.
 - b. Limit to 80 percent of total volume capacity when central mixed.
 7. Mix each batch of concrete in truck mixer for minimum 70 revolutions of drum or blades at rate of rotation designated by equipment manufacturer.
 8. Perform additional mixing, if required, at speed designated by equipment manufacturer as agitating speed.
 9. Place materials, including mixing water, in mixer drum before actuating the revolution counter for determining number of mixing revolutions.
- C. Aggregates: Thoroughly and uniformly wash before use.
- D. Admixtures:
 1. Air-Entraining Admixture: Add at plant through manufacturer-approved dispensing equipment.
 2. Water Reducers: Add prior to addition of superplasticizer.
 3. Superplasticizers and Air-Entraining Admixtures:
 - a. Add at concrete plant or at project site only through equipment furnished or approved by admixture manufacturer.
 - b. Equipment shall provide for easy and quick visual verification of admixture amount used for each dose.

- c. Add discharge amount to each load of concrete into separate dispensing container, verify amount is correct, then add to concrete.
- d. Additional dosage of superplasticizer may be added in the field using manufacturer-approved dispensing when unexpected delays cause too great of a slump loss.

E. Epoxy Bonding System: ASTM C 881, type as required by project conditions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PLACING CONCRETE

- A. Preparation: Meet requirements and recommendations of ACI 304R and ACI 301, except as modified herein.
- B. Notify Engineer not less than 24 hours prior to commencement of placement operations.
- C. Hand batch ticket for each load of concrete to ENGINEER at time of truck arrival on site.
- D. No additional water may be added to the concrete at any time after the truck has left the batch plant.
- E. Discharge Time:
 - 1. As determined by set time, do not exceed 1 1/2 hours after adding cement to water unless special approved time delay admixtures are used. Coordinate information with admixture manufacturer and Engineer prior to placing concrete.
 - 2. Adjust slump or air content at site by adding admixtures for particular load when approved by Engineer, then adjust plant dose rest of placement. Additional dosage at site shall be through an approved dispenser supplied by admixture manufacturer.
 - 3. Maintain required slump throughout time of concrete placement and consolidation. Discontinue use of superplasticizer if it fails to maintain slump in required range for the length of time required. Redesign mix, adjusting set control admixtures to maintain setting time in the range required.
- F. Placement into Formwork:
 - 1. Before depositing concrete, remove debris from space to be occupied by concrete.
 - 2. Prior to placement of concrete, dampen fill under slabs on ground, dampen sand where vapor retarder is specified, and dampen wood forms.
 - 3. Reinforcement: Secure in position before placing concrete.
 - 4. Place concrete as soon as possible after leaving mixer, without segregation or loss of ingredients, without splashing forms or steel above, and in layers not over 1.5 feet deep, except for slabs. Place and consolidate successive layers prior to initial set of first layer to prevent cold joints.
 - 5. Use placement devices, for example, chutes, pouring spouts, and pumps.
 - 6. Vertical Free Fall Drop to Final Placement: 4 feet in forms.
 - 7. Do not use aluminum conveying devices.
 - 8. Provide sufficient illumination for interior of forms so concrete at places of deposit are visible permitting confirmation of consolidation quality.
 - 9. Joints in Slabs:
 - a. Ensure space beneath plastic water stop completely fills with concrete.
 - b. During concrete placement, make visual inspection of entire water stop area.
 - c. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift waterstop to confirm full consolidation without voids, place remaining concrete to full height of slab.
 - d. Apply procedure to full length of waterstops.
 - 10. If reinforcement is in direct sunlight or is more than 20 degrees F higher in temperature than concrete temperature before placement, wet reinforcement with water fog spray before placing concrete to cool reinforcement.

11. Round off top exposed edges of walls with a 1/2 inch radius steel edging tool. Control joint edges round off exposed edge to 1/4-inch radius.
 12. Do not place concrete for supported elements until concrete previously placed in the supporting element has attained design strength.
- G. Conveyor Belts and Chutes:
1. Design and arrange ends of chutes, hopper gates, and other points of concrete discharge throughout conveying, hoisting, and placing system for concrete to pass without becoming segregated.
 2. Do not use chutes longer than 50 feet.
 3. Minimum Slopes of Chutes: Angled to allow concrete to readily flow without segregation.
 4. Conveyor Belts:
 - a. Approved by Engineer.
 - b. Wipe clean with device which does not allow mortar to adhere to belt.
 - c. Cover conveyor belts and chutes.
- H. Retempering: Not permitted for concrete where cement has partially hydrated.
- I. Pumping of Concrete:
1. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to assure completion of concrete placement without cold joints in case of a primary placing equipment breakdown.
 2. Minimum Pump Hose (Conduit) Diameter: 4 inches.
 3. Replace pumping equipment and hoses (conduits) that are not functioning properly.
- J. Maximum Size of Concrete Placements:
1. Limit size of each placement to allow for strength gain and volume change due to shrinkage.
 2. Where expansion joints or construction or control joints are not shown, or are spaced at more than 60 feet, provide intermediate construction joints at maximum spacing of 40 feet.
 3. Consider beams, girders, brackets, column capitals, and haunches as part of floor or roof system and place monolithically with floor or roof system.
 4. Should placement sequence result in cold joint located below finished water surface, install waterstop in joint.
- K. Minimum Time Between Adjacent Placements:
1. Construction Joints: 3 days.
 2. At least 2 hours shall elapse after depositing concrete in long columns and walls thicker than 8 inches before depositing concrete in beams, girders, or slabs supported thereon.
 3. For columns and walls, 10 feet in height or less, wait at least 45 minutes prior to depositing concrete in beams, girders, brackets, column capitals, or slabs supported thereon.
- L. Consolidation and Visual Observation:
1. Consolidate concrete with internal vibrators with minimum frequency of 8,000 cycles per minute and amplitude required to consolidate concrete in section being placed.
 2. Provide at least one standby vibrator in operable condition at placement site prior to placing concrete.
 3. Consolidation Equipment and Methods: ACI 309R.
 4. Provide sufficient windows in forms, or limit form height, to allow for concrete placement through windows and for visual observation of concrete.
 5. Vibration consolidation shall not exceed a distance of 5 feet from point of placement.
 6. Vibrate concrete in vicinity of joints to obtain impervious concrete.
- M. Hot Weather:
1. Prepare ingredients, mix, place, cure, and protect in accordance with ACI 305R.
 2. Placement frequency shall be such that lift lines will not be visible in exposed concrete finishes.

3. Maintain concrete temperature below 80 degrees F at time of placement. Ingredients may be cooled before mixing.
 4. Temperature of forms and reinforcement shall not exceed 90 degrees when concrete is placed.
 5. Make provisions for windbreaks, shading, fog spraying, sprinkling, ice, or wet cover, or other means to provide concrete with temperature specified.
 6. Prevent differential temperature between reinforcing steel and concrete.
- N. Cold Weather:
1. Maintain surface temperature of concrete above 40 degrees F and cure concrete as specified in Section 03 3900.
 2. Provide maximum and minimum thermometers placed on concrete surfaces spaced throughout Work to allow monitoring of concrete surface temperatures representative of Work.
 3. Contractor to furnish temperature records daily to Engineer. Keep for each pour for seven days. Record temperature at two hour intervals for:
 - a. Outside air.
 - b. Concrete as placed.
 - c. Air in coldest part of enclosure near concrete.
 - d. Locations as directed by Engineer.
 4. In accordance with ACI 306R and ACI 318.
 5. Heated Enclosures:
 - a. Heated enclosures may be used at any time during "cold weather" as defined by ACI 306.
 - b. Heated enclosures must be used when outdoor temperature falls below 5 degrees F.
 - c. Enclosures must be capable of supporting wind and snow loads and tight enough to prevent entrance of wind and weather.
 6. External Heating Units:
 - a. Vent heating units to atmosphere, and do not locally heat or dry concrete. Where water cure is specified, maintain wet condition.
 - b. Do not exhaust flue gases directly into an enclosed area to prevent concentrated carbon dioxide from causing concrete carbonation.
 - c. Provide continuous supervision of heating units when in use.
 7. Maintain curing conditions as specified in Section 03 3900.
 8. Remove protection so concrete temperature drop does not exceed 2 degrees in any one hour and 40 degrees in the first 24 hours after protection removal.

3.03 SLAB JOINTING

- A. Locate joints as indicated on the drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch (5 mm) thick blade and cut at least 1 inch (25 mm) deep but not less than one quarter (1/4) the depth of the slab.
- E. Contraction Joint Devices (Alternative to Saw Cut): Use preformed joint device, with top set flush with top of slab.
- F. Separate slabs on grade from vertical surfaces with joint filler.
- G. Coordinate openings in concrete with other trades.
- H. Place sections of concrete in a sequence which eliminates the effect of shrinkage to greatest extent practicable.

3.04 CONCRETE BONDING

- A. To New Concrete Wall Horizontal Construction Joints:
 - 1. Thoroughly clean and saturate joint with water.
 - 2. Cover horizontal wall surfaces with minimum 2 inches of cement-sand-water grout, (9 sack minimum) and immediately place concrete.
 - 3. Limit concrete lift placed immediately on top of grout to 12 inches thick.
 - 4. Thoroughly vibrate to mix and consolidate grout and concrete together.
- B. To Old Concrete:
 - 1. Mechanically roughen existing concrete surfaces to a clean, rough surface and provide a minimum roughness profile of ¼ -inch.
 - 2. Saturate surface with water for 24 hours, cover with 2 inches of grout, and place grout as specified for new concrete.

3.05 CONSTRUCTION JOINTS

- A. Locate construction joints as indicated. Joints shall be located so as not to impair the structural integrity of the structure.

3.06 SURFACE PREPARATION

- A. Construction Joints: Prior to placement of abutting concrete, clean contact surface:
 - 1. Remove laitance and spillage from reinforcing steel, waterstops and dowels.
 - 2. Roughen surface to a minimum of 1/4 inch amplitude:
 - a. Sandblast after the concrete has fully cured.
 - b. Water blast after the concrete has partially cured.
 - c. Green cut fresh concrete with high pressure water and hand tools.
 - 3. Perform cleaning so as not to damage water stop, if one is present.

3.07 INSTALLATION OF WATERSTOPS

- A. Plastic Waterstop:
 - 1. Install in accordance with manufacturer's written instructions.
 - 2. Splice, in accordance with the water stop manufacturer's written instructions, using a thermostatically controlled heating iron. Butt splice unless specifically detailed otherwise.
 - 3. Join waterstops at intersections to provide continuous seal.
 - 4. Center waterstop on joint.
 - 5. Secure waterstop in correct position to avoid displacement during concrete placement.
 - 6. Repair or replace damaged waterstop.
 - 7. Place concrete and vibrate to obtain impervious concrete in the vicinity of all joints.
 - 8. Joints in Slabs:
 - a. Ensure that space beneath plastic waterstop is completely filled with concrete.
 - b. During concrete placement, make a visual inspection of the entire water stop area.
 - c. Limit concrete placement to elevation of waterstop in first pass, vibrate the concrete under the water stop, lift the water stop to confirm full consolidation without voids, then place remaining concrete to full height of slab.
 - d. Apply procedure to full length of plastic waterstops.
- B. Special Waterstop
 - 1. Adhered Waterstop: Secure with manufacturer-recommended method (nails, primer, etc.)

3.08 PATCHING

- A. General:
 - 1. Prior to starting patching work, obtain quantities of color-matched patching material and manufacturer's detailed instructions.
 - 2. Develop patching techniques with manufacturer on mockup panel.
 - 3. Dress surface of patches that will remain exposed to view to match color and texture of adjacent surfaces.
- B. Tie Holes:

1. Fill with nonshrink grout, except where sealant is shown. Use only enough water to dry pack.
 2. Match color of adjacent concrete.
 3. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water.
- C. Defective Areas:
1. Remove defective concrete to a depth of sound concrete.
 2. If chipping is required, make edges perpendicular to surface with a minimum of 1/2-inch in depth. Do not feather edges. Obtain Engineer's approval of chipping work.
 3. Patch defective area to match appearance of adjacent concrete surfaces.
- D. Blockouts at Pipes or Other Penetrations:
1. Meet details shown or submit proposed blockouts for review.
 2. Use nonshrink grout.

3.09 CONCRETE FINISHING

- A. Notify Engineer of any Defective Concrete.
- B. Repairs:
1. After removing forms, remove all metal devices used to tie forms together in a way that leaves no metal within less than one inch of the concrete surface and does not injure the concrete surface. The contractor shall not burn off rods, bolts, or other metal devices. After removing the ties, roughen the opening and remove all concrete containing any oil.
 2. Immediately after removing forms, saturate all cavities produced, and all other holes, depressions, and honeycomb spots with water and carefully point with a cement and fine aggregate mortar mixed in the same proportions as the concrete being treated and of as dry a consistency as possible to use. For exposed surfaces, add as much white cement as necessary to provide a mortar the approximate color of the concrete. Use mortar in pointing that is not more than one hour old.
 3. Clean all open joints in the completed work to make them free of mortar and concrete.
 4. If using insulated forms or if allowed to leave forms in place more than 72 hours, point holes, cavities, depressions, and honeycomb areas and apply a sack rubbed or rubbed surface finish as soon after removing the forms as weather and curing conditions allow.
- C. Verify formwork joint offsets conform to ACI 117, as previously defined under Preparation.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile with full bed setting system.
 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 301.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
 3. Other Surfaces to Be Left Exposed: "Steel trowel" as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
 - a. Chemical Hardener: After slab has cured, apply water-diluted hardener in three coats per manufacturer's instructions, allowing 24 hours between coats.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.10 BACKFILL AGAINST WALLS

- A. Do not backfill against walls until concrete has obtained 28 day compressive strength.
- B. Place backfill simultaneously on both sides of wall, where required, to prevent differential pressures.
- C. Contractor is responsible for design and installation of wall bracing where backfill will result in differential pressures on either side of wall.

3.11 WATERTIGHTNESS TESTING

- A. Perform watertightness testing on all water containing structures unless specifically noted otherwise in the plans.
- B. Testing and re-testing, when required, shall be performed prior to backfilling.
- C. Test each structure for watertightness using the method specified in ACI 350.1 R-01 ("Tightness Testing of Environmental Engineering Concrete Structures"), Chapter 2, and as further specified herein.
- D. All testing, as well as any necessary repair and re-testing to secure a passing test shall be done entirely at Contractor's expense
- E. Initial Visual Test:
 - 1. Perform ACI 350.1-2.2 initial inspection and visual test "HST-VIO" prior to filling.
 - 2. Repair all areas of potential leakage as defined in "DEFECTIVE CONCRETE".
- F. Water Test:
 - 1. Fill tank with water per ACI 350.1-2.3.4, at a rate not exceeding 4 ft/hr. "Maximum liquid level" shall be per drawings. If not indicated, test level shall be 12 inches below top of wall.
 - 2. Hold water in tank for minimum of three 24-hour days.
 - 3. Repair leaks per ACI 350.1-2.3.6.
 - 4. Once visible leaks are repaired, proceed with "HST-050" leakage test per ACI 350.1-2.4, and as further specified here:
 - a. Mark high water level in two locations, approximately 180 degrees apart.
 - b. Clearly mark test locations, and notify Engineer and Owner that test period has begun.
 - c. Duration of test: Two 24-hour days.
 - d. Measure water level at 24-hour periods, record readings.
 - 5. Acceptance criteria:
 - a. No greater than 3/8 inch water level fall after two consecutive 24-hour days.
 - b. No observable leakage (per ACI 350.1-2.4.8).
 - c. If either "a" or "b" is not met, repair and re-test per ACI 350.1-2.5.5 and 2.5.6.

3.12 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- D. Compressive Strength Tests: ASTM C 39.
 - 1. For each test, mold and cure four concrete test cylinders if 6" cylinders are used. Mold and cure five concrete test cylinders if 4" cylinders are used. Obtain test samples for every 30 cu yd (23 cu m) or less of each class of concrete placed. Not less than one test per day
 - 2. From each set of cylinders, an approved testing laboratory shall test one cylinder at 7 days and two 6" cylinders (three 4" cylinders) at 28 days. The final cylinder shall be properly stored until after the has reviewed the 7 and 28 day tests. Unless otherwise specified, the 7 day test shall be for informational purposes only. Concrete acceptance shall be based on the average of the two or three cylinders tested at 28 days.
 - 3. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
 - 4. Passing test shall be as defined in ACI 318.
- E. Slump Tests: ASTM C 143.

1. A minimum of one slump test shall be taken for the first batch of concrete each day and for each set of test cylinders taken. Additional slump tests shall be taken whenever the consistency of concrete appears to vary.
- F. Air-content Tests: ASTM C 231, C173, or C 138.
 1. A minimum of one air-content test shall be taken for each set of test cylinders taken. Additional air-content tests shall be taken whenever the proportions of the concrete mix change.
- G. Concrete Temperature: ASTM C 1064.
 1. A record of concrete temperature shall be kept for each sample of concrete taken.

3.13 PROTECTION OF INSTALLED WORK

- A. After curing and applying final floor finish, cover slabs with plywood or particle board, plastic sheeting, or other material to keep floor clean and protect it from material and damage due to other construction work.
- B. Patch and repair defective areas and areas damaged by construction.

3.14 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Engineer and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete with excessive honeycombing, embedded debris or concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.
- E. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- F. Patch imperfections as directed.

END OF SECTION

SECTION 03390

CONCRETE CURING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Initial and final curing of horizontal and vertical concrete surfaces.

1.02 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
- B. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 2004 (Errata 2007).
- C. ACI 305R - Hot Weather Concreting.
- D. ACI 306R - Cold Weather Concreting.
- E. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).
- F. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2007.
- G. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2007.
- H. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2008.

1.03 SUBMITTALS

- A. See Section 01330 – Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on curing compounds and moisture-retaining sheet, including compatibility of different products and limitations.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 302.1R.
- B. Maintain one copy of each document on project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver curing materials in manufacturer's sealed packaging, including application instructions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Membrane Curing Compound: ASTM C309 Type 1 - Clear or translucent, Class A.
 - 1. Do not use for surfaces which will be in contact with process water.
 - 2. Should not prevent bond to future additional concrete or to other finishes.
- B. Moisture-Retaining Sheet: ASTM C171.
 - 1. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd, 40 inches wide.
- C. Polyethylene Film: ASTM D2103, 6 mil thick, clear.
- D. Water: Potable, not detrimental to concrete.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to be cured.

3.02 EXECUTION - HORIZONTAL SURFACES

- A. Curing by ponding, spraying or saturated sheet shall be used for all surfaces which will be in contact with process water, and for all other structures where possible. Membrane curing compound may be used for other structures if specifically requested by Contractor and approved by Engineer.
- B. Cure floor surfaces in accordance with ACI 308R.
- C. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
- D. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
- E. Absorptive Moisture-Retaining Sheet: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place for 7 days.
- F. Membrane Curing Compound: Apply curing compound in accordance with manufacturer's instructions in two coats, with second coat applied at right angles to first.

3.03 EXECUTION - VERTICAL SURFACES

- A. Cure surfaces in accordance with ACI 308R.
- B. Cure walls of liquid-retaining structures by covering with moisture-retaining sheets and poly. Run soaker hose along top of wall and allow water to soak both sides of wall continuously for 7 days.
 - 1. In lieu of this, loosen wall forms slightly, protect wall forms from freezing and evaporation loss, and use soaker hose as above.
- C. For non-liquid-retaining structures, additional curing possibilities are:
 - 1. Spraying: Spray water over surfaces and maintain wet for 7 days.
 - 2. Membrane Curing Compound: Apply compound in accordance with manufacturer's instructions in two coats, with second coat applied at right angles to first.

3.04 PROTECTION

- A. Do not permit traffic over unprotected floor surface.

3.05 FIELD QUALITY CONTROL

- A. Method and application of curing shall account for concrete temperature, air temperature, relative humidity, and wind velocity. When evaporation rates exceed 0.2 lb/sq.ft./hour, precautions shall be taken to prevent plastic shrinkage cracking. Use Figure 2.1.5 of ACI 305R for evaluating.

END OF SECTION 03390

DIVISION 5

METALS

SECTION 05523
ANCHOR BOLTS AND EXPANSION ANCHORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cast-In Anchor Bolts.
- B. Post-Installed Anchors.

1.02 REFERENCES

- A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2000a.
- B. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2000.
- C. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 2000.
- D. ASTM A 312/A 312M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes (Metric); 2001,
- E. ASTM A 325/A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2000.
- F. ASTM A 385 - Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip); 2001.
- G. ASTM F 593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2001.
- H. ASTM F 594 - Standard Specification for Stainless Steel Nuts; 2001.
- I. ICC Evaluation Service, Inc. (ICC): Evaluation Reports.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Expansion anchors and adhesive anchors:
 - a. Current ICC evaluation report or equivalent code agency report listing findings to include installation instructions, acceptance, special inspection requirements and restrictions.
 - b. Manufacturer's published installation instructions.
 - c. Test data for each size of anchor to be used: Verification that anchor is capable of developing allowable loads shown on Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Anchor Bolts and Nuts (including threaded rod anchors): All bolts and nuts are to be stainless steel unless specifically indicated otherwise on Drawings.
 - 1. Stainless Steel:
 - a. Bolts: ASTM F593, Grade 316.
 - b. Nuts: ASTM F594, Grade 316.
 - 2. Galvanized Steel:
 - a. Carbon steel bolts and nuts; hot-dip galvanized, ASTM A 153 and A 385.
- B. Adhesive Anchors (for concrete and grout filled masonry): See Structural Drawings.
- C. Adhesive Anchors (for hollow masonry):
 - 1. System as indicated on Structural Drawings, with addition of screen tube.
 - 2. Screen Tubes as recommended by manufacturer.
 - 3. Anchors may only be installed in hollow masonry if applied load is less than one half of the indicated allowable load on Structural Drawing detail. All other bolts to masonry shall be installed in grouted cells.
- D. Flat Washers: ANSI B18.22.1; of the same material as anchor bolts and nuts.

- E. Expansion Anchors: See Structural Drawings.

2.02 ANCHORS

A. General:

1. Anchor bolts shall be cast in place and, when acceptable to the Engineer or indicated on the drawings, may be post installed anchors of equivalent strength.
2. Two nuts, a jam nut, and a washer shall be furnished for anchor bolts, threaded rod anchors, and adhesive anchors indicated on the drawings to have locknuts; two nuts and a washer shall be furnished for all other anchor bolts, threaded anchor rods, and adhesive anchors.
3. Anti-seize thread lubricant shall be liberally applied to projecting, threaded portions of stainless steel anchor bolts, threaded rod anchors, and adhesive anchors immediately before final installation and tightening of the nuts.

B. Anchor Bolts:

1. Anchor bolts shall be delivered in time to permit setting before the structural concrete is placed.
2. Anchor bolts which are cast in place in concrete shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or the supporting template.

C. Expansion Anchors:

1. The minimum distance between the center of any expansion anchor and an edge or exterior corner of concrete shall be at least six times the diameter of the bolt. Unless otherwise indicated on the drawing, the minimum distance between the centers of expansion anchors shall be at least 12 times the diameter of the bolt.
2. Anti-seize thread lubricant shall be liberally applied to threaded stainless steel components of expansion anchors immediately before installation.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 INSTALLATION

- A. Adhesive Anchors and Expansion Anchors: Install in strict compliance with Manufacturer's instructions and with limitations of ICC Reports.

3.03 FIELD QUALITY CONTROL

- A. Notify Engineer when adhesive anchors are ready for each of two separate inspections. Allow 24 hours for Engineer's inspection. Any adhesive anchor completed without inspection is subject to rejection by Engineer, and subject to replacement by an additional adhesive anchor at no additional expense to Owner.

END OF SECTION

DIVISION 26

ELECTRICAL

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Wiring connectors.
- C. Electrical tape.
- D. Wire pulling lubricant.
- E. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 26 2100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conductors.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- F. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- I. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- J. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- K. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- B. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.
- H. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
- I. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
 - 1. Copper Building Wire:
 - a. Cerro Wire LLC: www.cerrowire.com.
 - b. Encore Wire Corporation: www.encorewire.com.
 - c. Southwire Company: www.southwire.com.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.

- 2. Control Circuits: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 - 1. Copper Building Wire: Type XHHW-2.

2.04 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 0526.
- C. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 - 3. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- D. Mechanical Connectors: Provide bolted type or set-screw type.
 - 1. Manufacturers:
 - a. Burndy LLC: www.burndy.com.
 - b. IlSCO: www.ilSCO.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
- E. Compression Connectors: Provide circumferential type or hex type crimp configuration.
 - 1. Manufacturers:
 - a. Burndy LLC: www.burndy.com.
 - b. IlSCO: www.ilSCO.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
- F. Crimped Terminals for control wiring: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
 - 1. Manufacturers:
 - a. Burndy LLC; _____: www.burndy.com.
 - b. IlSCO: www.ilSCO.com.
 - c. Thomas & Betts Corporation: www.tnb.com.

2.05 WIRING ACCESSORIES

- A. Electrical Tape:
 - 1. Manufacturers:
 - a. 3M: www.3m.com.
 - 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
- B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
 - 1. Manufacturers:
 - a. 3M: www.3m.com.
 - b. American Polywater Corporation: www.polywater.com.
 - c. Ideal Industries, Inc: www.idealindustries.com.
- C. Cable Ties: Material and tensile strength rating suitable for application.
 - 1. Manufacturers:
 - a. Burndy LLC: www.burndy.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- D. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.
- E. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- F. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- G. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- H. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- I. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
 - 1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing.
Replace SPDs damaged by performing high potential testing with SPDs connected.
- B. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- B. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - 3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.
- D. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal water pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - 3. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 - 4. Ground Ring:
 - a. Provide a ground ring encircling the building or structure consisting of bare copper conductor not less than 2 AWG in direct contact with earth, installed at a depth of not less than 30 inches (750 mm).
 - b. Where location is not indicated, locate ground ring conductor at least 24 inches (600 mm) outside building perimeter foundation.
 - c. Provide connection from ground ring conductor to:
 - 1) Service entrance rated automatic transfer switch.
 - 2) Metal building frame in at least two locations at diagonally opposite corners of the building.
 - 3) Ground rod electrodes located at each corner of the building/structure.
 - 5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
- E. Bonding and Equipment Grounding:
 - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 - 2. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 - 3. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

4. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
5. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
6. Provide bonding for metal building frame.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
 4. Manufacturers - Mechanical and Compression Connectors:
 - a. Burndy LLC: www.burndy.com.
 - b. Harger Lightning & Grounding: www.harger.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 5. Manufacturers - Exothermic Welded Connections:
 - a. Burndy LLC: www.burndy.com.
 - b. Cadweld, a brand of Erico International Corporation: www.erico.com.
- D. Ground Rod Electrodes:
 1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.
 4. Manufacturers:
 - a. Erico International Corporation: www.erico.com.
 - b. Galvan Industries, Inc: www.galvanelectrical.com.
 - c. Harger Lightning & Grounding: www.harger.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury

horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.

1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.
- D. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Perform inspections and tests listed in NETA ATS, Section 7.13.
- B. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- C. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - CAST-IN-PLACE CONCRETE: Concrete equipment pads.
- B. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 5. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
 - 3. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com.
 - b. Erico International Corporation: www.erico.com.
 - c. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
 - d. Thomas & Betts Corporation: www.tnb.com.
- C. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
- D. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch (13 mm) diameter.
 - b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch (6 mm) diameter.
 - c. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch (10 mm) diameter.
- E. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use expansion anchors.
 - 3. Manufacturers - Mechanical Anchors:
 - a. Hilti, Inc: www.us.hilti.com.
 - b. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com.
 - c. Simpson Strong-Tie Company Inc: www.strongtie.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.

- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- D. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- E. Secure fasteners according to manufacturer's recommended torque settings.
- F. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Rigid polyvinyl chloride (PVC) conduit.
- C. Conduit fittings.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - CAST-IN-PLACE CONCRETE: Concrete encasement of conduits.
- B. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- D. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- E. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- F. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- I. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- J. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 2. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 3. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- B. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 2. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit, PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
 - 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
 - 5. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- D. Embedded Within Concrete:
 - 1. Within Slab on Grade: Not permitted.
 - 2. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.
- E. Exposed, Exterior: Use galvanized steel rigid metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Fittings for Grounding and Bonding: Also comply with Section 26 0526.
- B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com.
 - 2. Republic Conduit: www.republic-conduit.com.
 - 3. Wheatland Tube Company: www.wheatland.com.

- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com.
 - c. Thomas & Betts Corporation: www.tnb.com.
 - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 - 1. Cantex Inc: www.cantexinc.com.
 - 2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com.
 - 3. JM Eagle: www.jmeagle.com.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.05 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil (0.51 mm).
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- E. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Unless otherwise approved, do not route conduits exposed:

- a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
- 4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
- 5. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
- F. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 - 4. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
- G. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 - 6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- H. Penetrations:
 - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 - 3. Conceal bends for conduit risers emerging above ground.
- I. Underground Installation:
 - 1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches (610 mm).
 - 2. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length for service entrance where not concrete-encased.
- J. Concrete Encasement: All conduits not otherwise embedded within concrete shall be concrete-encased. Provide concrete in accordance with Section 03 3000 with minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated. Where multiple conduits are to be concrete encased in the same trench, install conduit spacers to separate conduits by a minimum of 3 inches prior to pouring concrete.
- K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 - 1. Where conduits are subject to earth movement by settlement or frost.
- L. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an

accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

M. Provide grounding and bonding in accordance with Section 26 0526.

3.03 FIELD QUALITY CONTROL

- A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- B. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Underground warning tape.

1.02 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 70E - Standard for Electrical Safety in the Workplace; 2015.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - b. Transfer Switches:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
 - 3) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - 3. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
 - a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).
 - b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Manufacturers:
 - a. Brimar Industries, Inc: www.brimar.com.
 - b. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - c. Seton Identification Products: www.seton.com.
 - 2. Materials:

- a. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
- 3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
- 4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
- 5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
- 6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

2.03 UNDERGROUND WARNING TAPE

- A. Manufacturers:
 - 1. Brady Corporation: www.bradyid.com.
 - 2. Brimar Industries, Inc: www.brimar.com.
 - 3. Seton Identification Products: www.seton.com.
- B. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- C. Foil-backed Detectable Type Tape: 3 inches (76 mm) wide, with minimum thickness of 5 mil (0.1 mm), unless otherwise required for proper detection.
- D. Legend: Type of service, continuously repeated over full length of tape.
- E. Color:
 - 1. Tape for Buried Power Lines: Black text on red background.

2.04 WARNING SIGNS AND LABELS

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.brimar.com.
 - 2. Clarion Safety Systems, LLC: www.clarionsafety.com.
 - 3. Seton Identification Products: www.seton.com.
- B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 3. Interior Components: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

- F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.

3.02 FIELD QUALITY CONTROL

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 2100
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - CAST-IN-PLACE CONCRETE: Materials and installation requirements for cast-in-place concrete equipment pads.
- B. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0533.13 - Conduit for Electrical Systems.
- F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 3213 - Engine Generators: Emergency/standby power systems for interconnection with normal utility electrical supply.
- H. Section 26 3600 - Transfer Switches: Service entrance equipment.

1.03 DEFINITIONS

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.04 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Owner.
- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.06 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- B. Project Record Documents: Record actual locations of equipment and installed service routing.

1.07 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70 (National Electrical Code).
 - 2. The requirements of the Utility Company.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Division of Responsibility:
 - 1. Pad-Mounted Utility Transformers:
 - a. Transformer Vaults and Pads: Furnished and installed by Contractor per Utility Company requirements.
 - b. Transformers: Furnished and installed by Utility Company.
 - c. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
 - d. Transformer Protective Bollards: Furnished and installed by Contractor per Utility Company requirements.
 - e. Primary:
 - 1) Trenching and Backfilling for direct-buried primary: Provided by Utility Company.
 - 2) Conduit(s) stubbed out 5 feet from primary compartment of transformer: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Utility Company.
 - f. Secondary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
 - 2. Terminations at Service Point: Provided by Utility Company.
 - 3. Metering Provisions:
 - a. Meter Bases: Furnished and installed by Contractor per Utility Company requirements.

- b. Wall-Mounted Metering Transformer Cabinets: Furnished and installed by Contractor per Utility Company requirements.
- c. Metering Transformers: Furnished and installed by Utility Company.
- D. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 03 3000.
- E. Provide required protective bollards in accordance with Utility Company requirements.
- F. Provide required support and attachment components in accordance with Section 26 0529.
- G. Provide grounding and bonding for service entrance equipment in accordance with Section 26 0526.
- H. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 0553.

3.04 PROTECTION

- A. Protect installed equipment from subsequent construction operations.

END OF SECTION

SECTION 26 3213
ENGINE GENERATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged engine generator system and associated components and accessories:
 - 1. Engine and engine accessory equipment.
 - 2. Alternator (generator).
 - 3. Generator set control system.
 - 4. Generator set enclosure.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - CAST-IN-PLACE CONCRETE: Concrete equipment pads.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 3600 - Transfer Switches.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA/EGSA 404 - Standard for Installing Generator Sets; 2014.
- C. NEMA MG 1 - Motors and Generators; 2016.
- D. NFPA 37 - Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines; 2015.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 110 - Standard for Emergency and Standby Power Systems; 2016.
- G. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries; Current Edition, Including All Revisions.
- H. UL 2200 - Stationary Engine Generator Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
 - a. Transfer Switches: See Section 26 3600.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.
 - 5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Preinstallation Meeting: Convene one week before starting work of this section; require attendance of all affected installers.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.

1. Include generator set sound level test data.
- B. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
- C. Manufacturer's factory emissions certification.
- D. Manufacturer's certification that products meet or exceed specified requirements.
- E. Source quality control test reports.
- F. Manufacturer's detailed field testing procedures.
- G. Field quality control test reports.
- H. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- I. Maintenance contracts.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 1. NFPA 70 (National Electrical Code).
 2. NFPA 37 (Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines).
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store generator sets in accordance with manufacturer's instructions and NECA/EGSA 404.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to generator set components, enclosure, and finish.

1.08 WARRANTY

- A. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Packaged Engine Generator Set:
 1. Caterpillar Inc; Olympian: www.cat.com.
 2. Cummins Power Generation Inc: www.cumminspower.com.
 3. Kohler Co: www.kohlerpower.com.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

- A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. System Description:
 1. Application: Emergency/standby.
 2. Configuration: Single packaged engine generator set operated independently (not in parallel).
- D. Packaged Engine Generator Set:
 1. Type: Gaseous (spark ignition).

2. Power Rating: 200 kW, standby, minimum, sized by supplier for the following load steps:
 - a. Load Step 1: 16 kVA HVAC, Lighting, and Receptacles.
 - b. Load Step 2: 5 HP Booster Pump on 6-pulse VFD.
 - c. Load Step 3: 125 HP Fire Pump on 6-pulse VFD.
3. Voltage: As indicated on drawings.
4. Main Line Circuit Breaker:
 - a. Type: Thermal magnetic.
 - b. Trip Rating: Select according to generator set rating.
 - c. Features:
 - 1) Shunt trip.
 - 2) Auxiliary contacts.
- E. Generator Set General Requirements:
 1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
 2. Factory-assembled, with components mounted on suitable base.
 3. List and label engine generator assembly as complying with UL 2200.
 4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
 5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
 6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.
- F. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.
- G. Starting and Load Acceptance Requirements:
 1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
 2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
 3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
 4. Maximum Load Step: Supports 100 percent of rated load in one step.
- H. Exhaust Emissions Requirements:
 1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
 2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.
- I. Sound Level Requirements:
 1. Do not exceed 75.9 dBA when measured at 23 feet (7 m) from generator set in free field (no sound barriers) while operating at full load; include manufacturer's sound data with submittals.

2.03 ENGINE AND ENGINE ACCESSORY EQUIPMENT

- A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.
- B. Engine Fuel System - Gaseous (Spark Ignition):
 1. Fuel Source: Natural gas.
 2. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
 3. Provide components/features indicated and as necessary for operation and/or required by applicable codes, including but not limited to:

- a. Carburetor.
 - b. Gas pressure regulators.
 - c. Fuel shutoff control valves.
 - d. Low gas pressure switches.
- C. Engine Starting System:
 - 1. System Type: Electric, with DC solenoid-activated starting motor(s).
 - 2. Battery(s):
 - a. Battery Type: Lead-acid.
 - b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.
 - c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
 - 3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
 - 4. Battery Charger:
 - a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
 - b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within 24 hours, as required by NFPA 110 for Level 1 applications while carrying normal loads.
 - c. Recognized as complying with UL 1236.
 - d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
 - e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
 - f. Provide alarm output contacts as necessary for alarm indications.
 - 5. Battery Heater: Provide thermostatically controlled battery heater to improve starting under cold ambient conditions.
- D. Engine Speed Control System (Governor):
 - 1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
 - 2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.
- E. Engine Lubrication System:
 - 1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.
- F. Engine Cooling System:
 - 1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
 - 2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
 - 3. Coolant Heater: Provide thermostatically controlled coolant heater to improve starting under cold ambient conditions; size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature.
- G. Engine Air Intake and Exhaust System:
 - 1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
 - 2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.

3. Exhaust Silencer: Provide critical grade or better exhaust silencer with sound attenuation not less than basis of design; select according to manufacturer's recommendations to meet sound performance requirements, where specified.

2.04 ALTERNATOR (GENERATOR)

- A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.
- B. Exciter:
 1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
 2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
 3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.
- C. Maximum Temperature Rise: 80 Degrees C above ambient.
- D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.
- E. Enclosure: NEMA MG 1, drip-proof.
- F. Total Harmonic Distortion: Not greater than five percent.
- G. Alternator Heater: Provide strip heater to prevent moisture condensation on alternator windings.

2.05 GENERATOR SET CONTROL SYSTEM

- A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.
- B. Control Panel:
 1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
 2. Generator Set Control Functions:
 - a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
 - b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
 - c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
 - d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
 - e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
 - f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
 - g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
 3. Generator Set Status Indications:
 - a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
 - b. Current (Amps): For each phase.
 - c. Frequency (Hz).
 - d. Real power (W/kW).
 - e. Reactive power (VAR/kVAR).
 - f. Apparent power (VA/kVA).
 - g. Power factor.
 - h. Duty Level: Actual load as percentage of rated power.
 - i. Engine speed (RPM).
 - j. Battery voltage (Volts DC).
 - k. Engine oil pressure.
 - l. Engine coolant temperature.
 - m. Engine run time.

- n. Generator powering load (position signal from transfer switch).
- 4. Generator Set Protection and Warning/Shutdown Indications:
 - a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. In addition to NFPA 110 requirements, provide the following protections/indications:
 - 1) High AC voltage (shutdown).
 - 2) Low AC voltage (shutdown).
 - 3) High frequency (shutdown).
 - 4) Low frequency (shutdown).
 - 5) Overcurrent (shutdown).
 - c. Provide contacts for local and remote common alarm.
 - d. Provide lamp test function that illuminates all indicator lamps.
- 5. Other Control Panel Features:
 - a. Event log.
- C. Remote Annunciator:
 - 1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
 - 2. Generator Set Status Indications:
 - a. Generator powering load (via position signal from transfer switch).
 - b. Communication functional.
 - 3. Generator Set Warning/Shutdown Indications:
 - a. Comply with NFPA 110 for Level 1 systems including but not limited to the following indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. Provide two dry contact outputs for connection to an autodialer (autodialer provided by others):
 - 1) "Warning" common alarm.

- 2) "Shutdown" common alarm.
- c. Provide audible alarm with silence function.
- d. Provide lamp test function that illuminates all indicator lamps.
- D. Remote Emergency Stop: Provide approved red, mushroom style remote emergency stop button where indicated or required by authorities having jurisdiction.

2.06 GENERATOR SET ENCLOSURE

- A. Enclosure Type: Sound attenuating, weather protective.
- B. Enclosure Material: Steel or aluminum.
- C. Hardware Material: Stainless steel.
- D. Color: Manufacturer's standard.
- E. Access Doors: Lockable, with all locks keyed alike.
- F. Openings: Designed to prevent bird/rodent entry.
- G. Motor operated dampers shall be provided for all air intake and air exhaust openings to reduce heat loss when generator is not operating. Gravity dampers shall not be used. Dampers shall be motor driven closed and spring driven open.
- H. External Drains: Extend oil and coolant drain lines to exterior of enclosure for maintenance service.
- I. Sound Attenuating Enclosures: Line enclosure with non-hydroscopic, self-extinguishing sound-attenuating material.
- J. Exhaust Silencers: Where exhaust silencers are mounted within enclosure in main engine compartment, insulate silencer to minimize heat dissipation as necessary for operation at rated load under worst case ambient temperature.
- K. Interior Lights and Receptacles:
 - 1. Provide minimum of four LED light fixtures with clear glass globes and wire guards controlled by two three-way switches (one switch on each side of enclosure).
 - 2. Provide minimum of two 20 Amp GFI-protected convenience receptacles (one on each side of enclosure).
- L. Generator auxiliary loads shall be powered by a single phase 480 Volt circuit from Booster Pump Distribution Panel to generator enclosure.
- M. Provisions for generator set auxiliary loads inside generator enclosure:
 - 1. Provide 480 Volt, two-pole breaker, 480 Volt to 120/240 Volt single phase transformer and 120/240 Volt Lighting Panel to provide power for the following loads:
 - a. Jacket water heater.
 - b. Battery charger.
 - c. Battery heater.
 - d. Enclosure lights.
 - e. Enclosure convenience receptacles.

2.07 SOURCE QUALITY CONTROL

- A. Perform production tests on generator sets at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.
- B. Generator Set production testing to include, at a minimum:
 - 1. Operation at rated load and rated power factor.
 - 2. Single step load pick-up.
 - 3. Transient and steady state voltage and frequency performance.
 - 4. Operation of safety shutdowns.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.

- B. Verify that the ratings and configurations of generator sets and auxiliary equipment are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive equipment.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.
- D. Arrange equipment to provide minimum clearances and required maintenance access.
- E. Unless otherwise indicated, mount generator set on properly sized 6 inch (150 mm) high concrete pad constructed in accordance with Section 03 3000. Provide suitable vibration isolators, where not factory installed.
- F. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Identify system wiring and components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Provide services of a manufacturer's authorized representative to prepare and start systems and perform inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.
- B. Notify Owner and Engineer at least two weeks prior to scheduled inspections and tests.
- C. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- D. Provide all equipment, tools, and supplies required to accomplish inspection and testing, including load bank and fuel.
- E. Preliminary inspection and testing to include, at a minimum:
 - 1. Inspect each system component for damage and defects.
 - 2. Verify tightness of mechanical and electrical connections are according to manufacturer's recommended torque settings.
 - 3. Check for proper oil and coolant levels.
- F. Prepare and start system in accordance with manufacturer's instructions.
- G. Inspection and testing to include, at a minimum:
 - 1. Verify compliance with starting and load acceptance requirements.
 - 2. Verify voltage and frequency; make required adjustments as necessary.
 - 3. Verify phase sequence.
 - 4. Verify control system operation, including safety shutdowns.
 - 5. Verify operation of auxiliary equipment and accessories (e.g. battery charger, heaters, etc.).
- H. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.
- I. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Instructor: Manufacturer's authorized representative.
 - 4. Location: At project site.

3.06 PROTECTION

- A. Protect installed engine generator system from subsequent construction operations.

3.07 MAINTENANCE

- A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of engine generator system for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.
- B. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION

SECTION 26 3600
TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
 - 1. Automatic transfer switches.
 - 2. Includes service entrance rated transfer switches.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - CAST-IN-PLACE CONCRETE: Concrete equipment pads.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 26 2100 - Low-Voltage Electrical Service Entrance.
- F. Section 26 3213 - Engine Generators: For interface with transfer switches.
 - 1. Includes additional testing requirements.
 - 2. Includes related demonstration and training requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment; 2005.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.
- G. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
 - a. Engine Generators: See Section 26 3213.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 5. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Preinstallation Meeting: Convene one week before starting work of this section; require attendance of all affected installers.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.

- B. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
- C. Source quality control test reports.
- D. Manufacturer's detailed field testing procedures.
- E. Field quality control test reports.
- F. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- G. Maintenance contracts.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70 (National Electrical Code).
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

1.08 WARRANTY

- A. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Transfer Switches:
 - 1. Same as manufacturer of engine generator(s) used for this project.

2.02 TRANSFER SWITCHES

- A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Applications:
 - 1. Utilize open transition transfer unless otherwise indicated or required.
- D. Construction Type: Only "contactor type" (open contact) transfer switches are acceptable. Do not use "breaker type" (enclosed contact) transfer switches.
- E. Automatic Transfer Switch:
 - 1. Transfer Switch Type: Automatic transfer switch.
 - 2. Transition Configuration: Delayed-transition (with neutral position).
 - 3. Voltage: As indicated on the drawings.
 - 4. Ampere Rating: As indicated on the drawings.
 - 5. Neutral Configuration: Solid neutral (unswitched), except as indicated.
- F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).

- G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.
- H. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.
- I. Switching Methods:
 - 1. Open Transition:
 - a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
 - 2. Delayed Transition:
 - a. Provide break-before-make transfer with programmable time delay in a neutral position not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
 - 3. Obtain control power for transfer operation from line side of source to which the load is to be transferred.
- J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
- K. Enclosures:
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Outdoor Locations: Type 3R or Type 4.
 - 2. Door-in-a-door construction, where all controls and indicators are mounted on an inner door and protected from vandalism by outer door(s).
 - 3. Provide outer lockable door(s) for outdoor locations, with provisions for Owner-Supplied padlock(s).
 - 4. Finish: Manufacturer's standard unless otherwise indicated.
- L. Short Circuit Current Rating:
 - 1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as indicated on the drawings.
- M. Automatic Transfer Switches:
 - 1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
 - 2. Control Functions:
 - a. Automatic mode.
 - b. Test Mode: Simulates failure of primary/normal source.
 - c. Voltage and Frequency Sensing:
 - 1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
 - 2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - 3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - d. Outputs:
 - 1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
 - 2) Auxiliary contacts; one set(s) for each switch position.
 - e. Adjustable Time Delays:
 - 1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
 - 2) Transfer to alternate/emergency source time delay.

- 3) Retransfer to primary/normal source time delay.
- 4) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.
- f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.
- g. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
- 3. Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
- 4. Automatic Sequence of Operations:
 - a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
 - b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
 - c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
 - d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.
- N. Service Entrance Rated Transfer Switches:
 - 1. Furnished with integral disconnecting and overcurrent protective device on the primary/normal source and with ground-fault protection where indicated.
 - 2. Listed and labeled as suitable for use as service equipment according to UL 869A.

2.03 SOURCE QUALITY CONTROL

- A. Perform production tests on transfer switches at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.
- C. Verify that rough-ins for field connections are in the proper locations.
- D. Verify that mounting surfaces are ready to receive transfer switches.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install transfer switches plumb and level.
- F. Unless otherwise indicated, mount floor-mounted transfer switches on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 3000.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Identify transfer switches and associated system wiring in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.
- B. Prepare and start system in accordance with manufacturer's instructions.
- C. Automatic Transfer Switches:
 - 1. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The control wiring insulation-resistance tests listed as optional are not required.
- D. Provide additional inspection and testing as required for completion of associated engine generator testing as specified in Section 26 3213.
- E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.
- F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.04 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's personnel on operation, adjustment, and maintenance of transfer switches.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of 1 hour of training.
 - 3. Instructor: Manufacturer's authorized representative.
 - 4. Location: At project site.
- C. Coordinate with related generator demonstration and training as specified in Section 26 3213.

3.06 PROTECTION

- A. Protect installed transfer switches from subsequent construction operations.

3.07 MAINTENANCE

- A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of transfer switches for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.
- B. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION

DIVISION 43

**PROCESS GAS AND LIQUID HANDLING,
PURIFICATION AND STORAGE EQUIPMENT**

SECTION 43210

PACKAGED SKID MOUNTED WATER BOOSTER PUMPING SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnish one, (1) - factory built, factory delivered, above-ground water booster pump station, in a modular building with base frame on a structural base with all necessary internal piping, valves, fittings, supports, meters, control valves, pumps, motors, controls, and other necessary appurtenances as shown on the plans and specified herein.
- B. The booster station shall be complete when delivered and will not require internal contractor construction except to install the power service through the service conduit provided for that purpose and to connect the main water service to the required points.

1.02 QUALIFICATIONS

- A. The manufacturer of the specified equipment shall be regularly engaged in the manufacturing of packaged water boosters, packaged water control vaults, packaged water meter vaults and packaged sewage lift stations.
- B. The manufacturer shall have at least ten years of successful experience in manufacturing the above type of equipment.
- C. The entire equipment package specified shall be UL approved under the package pumping systems (QCZJ). The specified equipment shall have a UL label certifying the package system is in compliance with the (QCZJ) UL listing. Equipment manufactured without the QCZJ UL listing will not be accepted.

1.03 SUBMITTALS

- A. Equipment submittals shall be bound in a minimum of six copies. The submittals shall contain a minimum of two full size (24"x36") drawings.
- B. The submittal booklets will be complete with data sheets covering all individual components that make up the package station and the UL file number under which the manufacture is listed and shall be complete with the manufactures standard warranty policy.
- C. Each submittal shall be complete with a full size copy of the manufactures UL / manufacture logo Package Pumping Systems label
- D. One drawing shall cover the station chamber with equipment and one drawing with the electrical control schematic.
 - 1. The station drawing shall be to scale and be specific to this project with a minimum of three different views and illustrate the National Electrical Code (NEC) clearances.

1.04 WARRANTY

- A. Full warranty against defects in materials and workmanship for two years after substantial completion, including all parts, labor, and expenses.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Engineered Fluid, Inc.
- B. No Substitutions

2.02 BUILDING DESIGN CRITERIA

- A. The station building enclosure shall be a factory assembled, modular structure of one, (1) compartment all attached to the station base structure and requiring no additional assembly at the job site.

- B. The building design criteria shall be: (1.) To withstand snow load based on ASCE 7-05 Ground Snow Loads for the state and county of installation (2.) To withstand wind loads based on ASCE 7-05 for wind speeds; (3.) Be designed for site specific seismic requirements based on local conditions as dictated by the Available Ground Motion Parameters according to ASCE 7 and IBC 2006 and 2009 established by zip code and a live floor load of 125 PSF.
- C. The modular building enclosing each of the stations is shown at its minimum size so that National Standards mandated clearances are maintained above, below and around equipment for proper and safe servicing, removal and reinstallation of this equipment.

2.03 BUILDING CONSTRUCTION

- A. Insulation values for the walls and roof structure shall be a minimum R-21 in the walls and the roof. Insulation within the roof and wall panels shall be foam-in-place polyurethane material applied between the interior and exterior sheathing forming a closed cell bounded by the steel framing. The insulation shall have a minimum density of 2.2 lbs/cu. ft. nominal and shall be applied to the thickness required to provide a minimum R value of 21. The insulation shall have an ASTM E-84 flame spread index of 25 and smoke developed of 450.
- B. Building framing materials shall comply with the A.I.S.I. Specification for the Design of Cold-formed Steel Structural Members and to Standards ASTM C-955, ASTM C-1007, ASTM C-645, ASTM C-754 and ICBO 4782P. and 4784P. A framing design incorporating the members covered by the listed specifications and standards shall develop a structure meeting or exceeding the building design criteria listed previously.
- C. Metal-clad, foam insulated panels or SIPS will not be allowed.
- D. The building structure shall be fabricated using steel C-studs as wall framing members and C-joists for roof support. The size, placement and spacing of studs and joists shall be in accordance with the design criteria and material standards. The wall C-studs shall be a minimum 2" x 3 5/8" of 16 gauge material minimum. The roof C-joists shall be a minimum 1-5/8" x 8" size of 16 gauge material minimum.
- E. The exterior wall sheathing shall be 1/2" thick, exterior, CDX grade plywood.
- F. The exterior roof sheathing shall be 5/8" thick, exterior, CDX grade plywood.
- G. The interior wall and ceiling sheathing shall be 3/4" thick, exterior, CDX grade plywood.
- H. All interior wall & ceiling surfaces shall be covered with .090" thick FRP (fiberglass reinforced plastic) sheeting of pebble grain, gloss, white finish. The individual wall faces shall be covered with one continuous sheet. The FRP sheets shall be glued to the interior sheathing requiring no fasteners. Corner moldings of like FRP material shall be installed & finished in a workmanlike manner.
- I. Openings in the sidewalls and/or roof shall be as shown and be fully framed out and supported using single or multiple framing members sufficient to support and fasten those devices or equipment items requiring a framed opening, these being access hatches, HVAC equipment, pipe passages, conduit passages, door and window openings and other special purpose openings as might be shown and required. The attaching of devices or equipment to the building at a framed opening shall be done fully according to the device manufacturers mounting instructions.
- J. The building shall be warranted by the station manufacturer for a period of ten (10) years from the date of delivery.
- K. The building exterior shall be covered with a factory fabricated Steni Stone panel. The panels shall be attached to wood reinforcement panels that are imbedded in the building panels.

2.04 STEEL DOORS

- A. Doors, single and double leaf are manufactured of 18-gauge galvanized steel. All doors shall be full flush construction and 1-3/4 inches thick. Doors shall be reinforced, stiffened, insulated,

and sound deadened with a solid polystyrene foam board permanently bonded to the inside of each face skin. The lock and hinge edge of each door shall be welded with a center hairline seam the full height of the door. The lock edge shall be reinforced full height by a 14-gauge continuous one-piece channel extruded templating. The hinge edge shall be reinforced full height by a 14-gauge continuous one-piece channel, formed and tapped for hinges. Top and bottom of the door shall be closed with 16-gauge channels. Doors shall be thoroughly cleaned and receive an iron phosphate treatment prior to receiving one coat of prime paint. Door closures and rim panics are reinforced with 14-gauge channels.

- B. Doors shall be fully-mounted in frames produced for pre-hanging of commercial 1-3/4" doors. Frames are formed to 16-gauge commercial quality cold rolled steel conforming to ASTM A366 or A620 and A568. Frames are produced in two welded units, to be mechanically joined during installation. The base side is prepared for all required hardware. Both units, base and trim, are furnished with welded mitered faces. Frame anchoring includes compression anchors and stud screws. Door hinges shall be continuous gear hinges, fabricated of extruded 6063-T6 aluminum alloy/temper with pinless assembly. The doors shall have a lockset, exterior handle, and top mounted-door closer with hold-open device.
- C. Doors and frames shall be finished with a two-component, aliphatic/acrylic polyurethane coating, white in color, with a high gloss finish. The coating shall be resistant to a wide range of solvents and chemicals under splash and spill conditions. The coating system is V.O.C. compliant.

2.05 METAL ROOF SYSTEM

- A. The 9/16" USF decking sheathing shall be covered with a 26 gauge metal panel system to form a standing seam roof as shown. The panels shall have a Galvalume® substrate with a Kynar 500® finish. The panels shall meet UL Standard 2218, Class 4 impact resistant and Class A fire resistant rating. The system shall be complete with fascia and soffit. The roof slope shall be 5/12.
- B. The ridgeline of the roof shall be covered end to end with a broken edge panel open along the sides to create a roof vent along both sides of the entire ridge line. The top of the broken edge panel along the ridge line shall cover over the top of the standing seams to provide a finished appearance.

2.06 LIFTING DEVICE

- A. An adjustable spreader type lifting device, built to lift the building structure without impinging the lifting chains/cables on the building sidewalls, shall be provided by the pumping station manufacturer for use by the installing contractor for the purpose of unloading station from trailer.

2.07 FLOORDRAIN

- A. The floor drains shall be a 4" grated opening with 4" I.D threaded hub for connection of a drain line up under the station floor.

2.08 PROTECTIVE COATING

- A. All mill scale, rust, weld flux and other foreign matter shall be removed from all steel surfaces by steel shotblasting to SSPC SP-10 specification for near-white blast cleaning. Surface irregularities shall be removed by grinding.
- B. Steel and cast/ductile iron surfaces shall receive a minimum of two coats of hi-build epoxy coating. The coating material shall show excellent resistance to immersion in seawater as well as to splash or spillage of water, petroleum products, and salt solutions. The surfaces shall receive two coats a minimum of 4 mils each to a total of 8 mils dry.

- C. Piping interior shall have a fusion bonded epoxy coating applied after shotblasting. The coating shall meet AWWA C-213 standards and be applied to a minimum thickness of 12 mils.
- D. Paint touch-up kits shall be provided with the station for coating areas damaged in shipping.
- E. The floor in all working areas within the station shall be protected with heavy neoprene matting.

2.09 PUMPS

- A. Four horizontal end-suction centrifugal water pumps shall be installed in the booster station.
- B. Pump Schedule:
 - 1. Two pumps (1 duty/1 standby) 75 gpm @ 104 TDH
 - 2. Two pumps (fire pump – 1 duty/1 standby) 1,500 gpm @ 218 TDH
- C. The pumps shall have a maximum allowable speed of 3600 R.P.M..
- D. Minimum pump efficiency shall be 70%.
- E. Suction Pressure: 45 psi – 53 psi
- F. The pumps shall operate at the above condition with a minimum suction pressure of 120 feet.
- G. Each pump shall be bronze fitted, single stage with close grain cast iron construction.
- H. The pump casing shall have a bronze replaceable wear ring.
- I. The impeller shall be bronze, of the enclosed type, and statically and dynamically balanced.
- J. The one-piece pump/motor shaft shall be stainless steel or steel with a bronze sleeve.
- K. The pump shall have a single mechanical shaft seal of the Ni-Resist type, and properly vented to the suction connection.
- L. Suction and discharge connections shall be either threaded connections or 125 lb. ANSI flanges, depending upon pump size.
- M. Each pump shall be close-coupled to a 3600 RPM, 3 phase, 60 hertz, 230/460 volt ball-bearing, totally enclosed fan cooled, premium efficient horizontal electric motor, with a service factor of 1.15. Motor shall be of such size that it will operate continuously without exceeding its horsepower rating, exclusive of its service factor, at the design conditions.
- N. Motors shall be premium efficient for use with variable speed drives.

2.10 CONTROL SYSTEM

- A. The power distribution center and electrical controls shall be mounted in a common NEMA Type 1 gasketed fabricated steel enclosure.
 - 1. The enclosure shall have a full opening door, mounted on heavy piano hinges. Suitable type latching devices shall be provided on the door.
 - 2. Starters, breakers, relays, timers and wiring raceway shall be neatly arranged on a removable steel back plate.
 - 3. All circuit breaker operators, selector switches, indicating lights, and single phase items shall be mounted on or through die cut openings in the enclosure door.
 - 4. A duplex grounding type convenience outlet shall be mounted in die cut openings on the side of the enclosure, for operation of 115-volt devices.
 - 5. It shall not be necessary to open this enclosure, except for adjustment of controls.
 - 6. Additional enclosures may be used as necessary to meet power and control requirements.
- B. The control panel shall conform to the National Electrical Code specifications and shall be UL listed and labeled in accordance with UL standards No. 508 for Industrial Control Panels. In accordance with U.L. procedures, a U.L. label shall be affixed to the control panel.
 - 1. Control panel equipment shall be shipped loose for mounting and wiring by others.

- C. The Programmable Logic Controller shall be a MicroLogix 1400 as manufactured by Allen Bradley. I/O shall be supplied to accommodate all control processes in the system while providing for a 10% spare density for future use.
- D. The booster station manufacturer shall be responsible for the programming and satisfactory operation of the PLC System.
- E. A 5.7" Square D Magellan color touch screen HMI shall be supplied. The HMI shall display include but not limited to: Pressures, Flows, Alarms, Pump Status, Run Times, Setpoints
- F. All communication between the PLC's, HMI's, and Modems shall be via Ethernet. An unmanaged Ethernet switch shall be provided at each location where these devices are present. The switch shall have a minimum of 5 ports and be equal to a Phoenix Contact SFN5TX
- G. The programming shall be supplied to the owner on transferrable media and shall be fully commented and documented. OEM Coding, Locking, or making proprietary any portion of the control system programming will not be accepted.
- H. Properly sized, heavy duty, molded case thermal-magnetic air circuit breakers shall be provided for branch circuit disconnect service and for over-current protection of all control, motor and auxiliary circuits.
- I. Furnish complete variable frequency drives (VFD's) as specified herein or in the equipment schedule for loads designated to be variable speed. VFD's shall be user-selectable for either constant or variable torque loads. The VFD shall convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC induction motors. The VFD shall be a six-pulse input design, and the input voltage rectifier shall employ a full wave diode bridge; VFD's utilizing controlled SCR rectifiers shall not be acceptable. The output waveform shall closely approximate a sine wave. The VFD shall be of a pulse width modulation (PWM) output design utilizing current insulated gate bipolar transistors (IGBT) inverter technology and voltage vector control of the output PWM waveform.
- J. The VFD shall include a full-wave diode bridge rectifier and maintain a displacement power factor of near unity regardless of speed and load, shall produce an output waveform capable of handling maximum motor cable distances of up to 1,000 ft. (unshielded) without tripping or derating, and shall utilize voltage vector control (VVCPLUS), an output voltage-vector switching algorithm, or equivalent, in both variable and constant torque modes. VVCPLUS provides rated root mean square (RMS) fundamental voltage from the VFD. This allows the motor to operate at a lower temperature rise, extending its thermal life. VFD's that cannot produce rated RMS fundamental output voltage or require the input voltage to be increased above motor nameplate value to achieve rated RMS fundamental output voltage are not acceptable. VFD's that utilize Sine-Coded PWM or Look-up tables shall not be acceptable.
- K. The VFD selected must be able to source the motor's full load nameplate amperage (fundamental RMS) on a continuous basis, and be capable of running the motor at its nameplate RPM, voltage, current, and slip without having to utilize the service factor of the motor. The VFD shall offer a programmable motor parameter that allows the total number of poles of a motor to be programmed to optimize motor performance. VFD shall automatically boost power factor at lower speeds. The VFD will be capable of running either variable or constant torque (VT or CT) loads. In variable torque applications, the VFD shall provide a CT-start feature and be able to provide full torque at any speed up to the base speed of the motor. In either CT or VT mode, the VFD shall be able to provide its full rated output current continuously and 110% of rated current for 60 seconds.
- L. An Automatic Energy Optimization (AEO) selection feature shall be provided in the VFD to minimize energy consumption in variable torque applications. This feature shall optimize motor magnetization voltage and shall dynamically adjust output voltage in response to load,

independent of speed. Output voltage adjustment based on frequency alone is not acceptable for single motor VT configurations.

- M. For multi-motor variable torque configurations, user-selectable load profile curves including VT-High, VT-Medium, and VT-Low shall be provided to ensure easy commissioning and improved energy efficiency. VFD's requiring the operator to assign load torque data-points to create a V/Hz profile, are not acceptable. An initial ramp function shall be available to provide a user-selectable ramp, up to 60 seconds, for applications requiring a faster or slower ramp than the normal ramp. A Dual Ramp Down feature shall include a Check Valve Ramp Down and a final Ramp feature. The Check Valve Ramp Down shall be programmable to gently seat a check valve and reduce the potential of damage from excess pressure while shutting-down the system. Both time and end speed shall be programmable. On the Final Ramp, the VFD shall be programmable to quickly stop the motor after seating of a check valve or for a more rapid stopping than the normal ramp down setting.
- N. VFD shall offer up to 4 separate PID controllers. One controller shall operate the drive in closed loop, while the other 3 provide control signals to other equipment. VFD's with PI controllers only are not acceptable.
- O. An Auto tuning PI controller output feature shall provide automated PI controller settings. Once the user accepts the settings, the VFD will save the settings to memory.
- P. An empty pipe fill mode shall be available to fill an empty pipe in a short period of time, and then revert to the PID controller for stable operation. Pipe fill mode shall have a programmable time to reduce water hammer in the system or fill the pipe at a unit per time rate.
- Q. VFD shall offer a motor spinning test that will run the motor at 5 Hz until the OK button is pressed. This feature will allow the user to determine if the motor is running in the correct direction.
- R. An embedded cascade pump controller shall be included to provide lead pump alternation and provide control for up to 3 total pumps. The VFD Pump and 2 other pumps can be controlled either by a starter or soft starter.
- S. Switching of the input power to the VFD shall be possible without interlocks or damage to the VFD at a minimum interval of 2 minutes. Switching of power on the output side between the VFD and the motor shall be possible with no limitation or damage to the VFD and shall require no additional interlocks.
- T. An Automatic Motor Adaptation (AMA) function shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to spin the motor shaft or de-couple the motor from the load to accomplish this optimization. Additionally, the parameters for motor resistance and motor reactance shall be user-programmable.
- U. The VFD shall have temperature controlled cooling fans for quiet operation, minimized internal losses, and greatly increased fan life.
- V. VFD shall provide full torque to the motor, given input voltage fluctuations of up to +10% to -10% of the rated input voltage (525 to 690VAC, 380 to 480VAC, or 200 to 240VAC). Line frequency variation of $\pm 2\%$ shall be acceptable.
- W. The VFD shall provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor. DC Link reactor shall be installed so that power fluctuations to the DC Capacitors shall be reduced to increase Capacitor life. VFD's without a DC link reactor shall provide a 5% impedance line side reactor and provide spare capacitors.
- X. VFD protective features: VFD shall have input surge protection utilizing MOV's, spark gaps, and Zener diodes to withstand surges of 2.3 times line voltage for 1.3 msec. VFD shall include circuitry to detect phase imbalance and phase loss on the input side of the VFD. VFD shall auto-derate the output voltage and frequency to the motor if an input phase is lost. This result will maintain operation without decreasing the life expectancy of the VFD. The use of this

feature shall be user selectable and export a warning during the event. Printed Circuit boards shall be conformal coated to reduce the corrosion effect from environmental gases and other conditions. The conformal coating must meet IEC 61721-3-3, Class 3C2 as standard and the VFD shall have an optional 61721-3-3, Class 3C3 coating available. Automatic "No-Flow Detection" shall be available to detect a no-flow situation in pump systems where all valves can be closed. This shall be functional in closed loop control or when controlled by an external signal. Dry-pump detection shall be available to detect if the pump has run dry. If this condition occurs, the drive will be safely stopped. A timer shall be included to prevent nuisance tripping. End-of-Pump curve detection shall stop motor when the pump is operating outside of its programmed pump curve. VFD shall provide a flow compensation program to reduce energy by adjusting the Setpoint to match changes in flow (friction loss). Flow compensation shall also operate in Cascade control mode. VFD shall include current sensors on all three-output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.

- Y. VFD shall auto-derate the output voltage and frequency to the motor in the presence of sustained ambient temperatures higher than the normal operating range, so as not to trip on an inverter temperature fault. The use of this feature shall be user-selectable and a warning will be exported during the event. Function shall reduce switching frequency before reducing motor speed.
- Z. VFD shall auto-derate the output frequency by limiting the output current before allowing the VFD to trip on overload. The speed of the load can be reduced, but not stopped.
- AA. The VFD shall have the option of an integral RFI filter. VFD enclosures shall be made of metal to minimize RFI and provide immunity.
- AB. The VFD shall have a motor preheat function with the ability to be programmed to induce a small amount of current to the motor whenever it is at rest. This will prevent condensation inside the motor and help to extend its life without the need for space heaters or other external equipment.
- AC. Interface Features: VFD shall provide an alphanumeric backlit display keypad (LCP) which may be remotely mounted using a standard 9-pin cable. VFD may be operated with keypad disconnected or removed entirely. Keypad may be disconnected during normal operation without the need to stop the motor or disconnect power to the VFD.
- AD. VFD Keypad shall feature an INFO key that, when pressed, shall display the contents of the programming manual for the parameter that is currently viewed on the display. The description shall explain the feature and how the settings can be made by the operator.
- AE. VFD shall display all faults in plain text; VFD's which can display only fault codes are not acceptable.
- AF. The keypad shall feature a 6-line graphical display and be capable of digitally displaying up to five separate operational parameters or status values simultaneously (including process values with the appropriate engineering unit) in addition to Hand/Off/Auto, Local/Remote, and operating status.
- AG. Two lines of the display shall allow "free text programming" so that a site description or the actual name of the equipment being controlled by the VFD can be entered into the display.
- AH. Keypad shall provide an integral H-O-A (Hand-Off-Auto) and Local-Remote selection capability, and manual control of speed locally without the need for adding selector switches, potentiometers, or other devices.
- AI. All VFD's shall be of the same series, and shall utilize a common control card and LCP (keypad/display unit) throughout the rating range. The control cards and keypads shall be interchangeable through the entire range of drives used on the project.

- AJ. VFD keypad shall be capable of storing drive parameter values in non-volatile RAM uploaded to it from the VFD, and shall be capable of downloading stored values to the VFD to facilitate programming of multiple drives in similar applications, or as a means of backing up the programmed parameters.
- AK. VFD Display shall have the ability to display 5 different parameters pertaining to the VFD or the load including: current, speed, DC bus voltage, output voltage, input signal in mA, or other values from a list of 92 different user-selectable parameters.
- AL. VFD display shall indicate which digital inputs are active and the status of each relay.
- AM. It shall be possible to toggle between three status read-out screens by pressing the [Status] key. Various operating variables, even with different formatting, can be shown in each status screen.
- AN. VFD display shall indicate the value of any voltage or current signal, including the engineering units of measurement, connected to the analog input terminals.
- AO. VFD display shall indicate the value of the current at the analog output terminals, including the engineering units of measurement.
- AP. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
- AQ. Two-level password protection shall be provided to prevent unauthorized changes to the programming of the VFD. The parameters can be locked via a digital input and/or the unit can be programmed not to allow an unauthorized user to change the parameter settings.
- AR. A quick setup menu with factory preset typical parameters shall be provided on the VFD to facilitate commissioning. Use of macros shall not be required.
- AS. A digital elapsed time meter and kilowatt hour meter shall be provided in the display.
- AT. VFD shall offer as standard an internal clock. The internal clock can be used for: Timed Actions, Energy Meter, Trend Analysis, date/time stamps on alarms, Logged data, Preventive maintenance, or other uses. It shall be possible to program the clock for Daylight Saving Time / summertime, weekly working days or non-working days including 20 exceptions (holidays, etc.). It shall be possible to program a Warning in case the clock has not been reset after a power loss.
- AU. A battery back-up option shall be provided to maintain internal clock operation during power interruptions. Battery life shall be no less than 10 years of normal operation.
- AV. VFD shall provide full galvanic isolation with suitable potential separation from the power sources (control, signal, and power circuitry within the drive) to ensure compliance with PELV requirements and to protect PLC's and other connected equipment from power surges and spikes.
- AW. All inputs and outputs shall be optically isolated. Isolation boards between the VFD and external control devices shall not be required.
- AX. There shall be six fully programmable digital inputs for interfacing with the systems external control and safety interlock circuitry. Two of these inputs shall be programmable as inputs or outputs.
- AY. The VFD shall have two analog signal inputs. Inputs shall be programmable for either 0 -10V or 0/4-20 mA.
- AZ. One programmable analog output shall be provided for indication of the drive status. This output shall be programmable for output speed, voltage, frequency, motor current and output power. The analog output signal shall be 0/4-20 mA.

- BA. The VFD shall provide two user programmable relays with 75 selectable functions. Two form 'C' 230VAC/2A rated dry contact relay outputs shall be provided.
- BB. Floating point control interface shall be provided to increase/decrease frequency in response to external switch closures.
- BC. The VFD shall accept a N.C. motor temperature over-temperature switch input, as well as possess the capability to accept a motor thermistor input.
- BD. The VFD shall store in memory the last 10 faults with time stamp and recorded data.
- BE. Run permissive circuit shall be provided to accept a "system ready" signal to ensure that the VFD does not start until isolation valves, seal water pumps or other types of auxiliary equipment are in the proper state for VFD operation. The run permissive circuit shall also be capable of sending an output signal as a start command to actuate external equipment before allowing the VFD to start.
- BF. The VFD shall be equipped with a standard RS-485 serial communications port and front-of-drive accessible USB port. Danfoss FC or ModBus RTU communications shall be integrally mounted.
- BG. A Windows® compatible software program to display all monitoring, fault, alarm, and status signals shall be available. This software program shall allow parameter changes, storage of all VFD operating and setup parameters, and remote operation of the VFD.
- BH. VFD shall catch a rotating motor operating either in forward or reverse at up to full speed.
- BI. To protect the motors from single phasing, low voltage, voltage unbalance and reverse phasing, a phase monitor shall be supplied with the pump station controls. The phase monitors voltage and phase sensing circuit shall constantly monitor the three phase line voltages and detect harmful power line conditions. When any of the conditions occur, and output relay shall be deactivated until power line conditions return to an acceptable level. Trip and reset delays shall be provided to prevent nuisance tripping due to rapid power fluxuations.
- BJ. To protect the electrical system and equipment from damage due to excessive line surges caused by lightning or other circuit disturbances, a secondary surge arrester shall be supplied with the pump station controls. The arrester shall comply with ANSI standard C62.11-1987. The arrester shall be available in a one-pole, two-pole or three-pole version, and be suitable for both indoor and outdoor use. The arrester shall be permanently sealed in a LEXAN housing. The arrester shall have a maximum continuous operating voltage rating of 650 volts rms. The permissible line-to-line voltage of the system to which the arrester is applied depends on the circuit configuration, grounding, and voltage regulation. The secondary surge arrester shall be a Square D SDSA3650 for three phase and SDSA1175 for single phase applications.
- BK. Six digit, non-resettable elapsed time meters shall be provided to record the running time of each pump motor. These devices shall be mounted in die cut openings in the enclosure door.
- BL. Hand-Off-Automatic switches shall be oil tight, 2 or 3 position, and grouped conveniently with oil tight, full voltage indicating lights, on the panel door. Indicating lights shall identify the following functions:
 - 1. RED - LOW SUCTION PRESSURE.
 - 2. RED - HIGH DISCHARGE PRESSURE.
 - 3. GREEN - PUMP #1 RUNNING.
 - 4. GREEN - PUMP #2 RUNNING.
- BM. An auto dialer shall be provided to call out if system is in alarm. The auto dialer shall be RACO Guard-It Cellularm system or approved equal.

2.11 WIRING

- A. Power service to the water booster system shall be 3 wire, 3 phase, 60 hertz, 460 volt.

- B. Wiring of the station shall be in accordance with the National Electrical Code.
- C. All motor wiring shall be installed in conduit. All wiring from the control panel to the motor junction boxes shall be in conduit.
- D. The system shall be completely wired at the factory, except for power feed lines.
- E. All wiring in the control panel shall be color-coded.
- F. Short leads of flexible, polyvinyl covered steel conduit, with compatible grounding fittings, shall be used at the pump motors to enable servicing.
- G. All conduit and wires shall be adequately sized for the maximum anticipated load.

2.12 PIPING AND VALVES

- A. Piping shall be steel and conform to material specification ASTM A-53(CW) for nominal pipe size four (4) inch and smaller and ASTM A-53(ERW) Grade B for nominal pipe size five (5) inches and larger.
- B. Steel butt-welding fittings shall conform to material specification ASTM A-234 Grade WPB and to the dimensions and tolerances of ANSI Standards B16.9 and B16.28 respectively.
- C. Header, bypass and pump branch piping and valves shall be as shown on the drawings.
- D. Forged steel flanges shall conform to material specification ASTM A-105 Class 60 and/or ASTM A-181 for carbon steel forgings and to the dimensions and tolerances of ANSI Standards B16.5 as amended in 1992 for Class 150 and Class 300 flanges.
- E. The piping sizes shall be as shown on the drawings: Size 10 inch and below - Schedule 40, Size 12" and larger - Standard Weight (.375" wall)
- F. The steel piping in the station shall be supported by rectangular, 3/8" (minimum) flat, or round tubing that shall be fully welded to the steel floor and bolted to flanged joints in the piping system. The size of the welded pipe supports shall be determined by the station manufacture. The welded / flanged joint connection shall allow for lateral and transverse pipe support while allowing for necessary restraint and ease of removal. Kick bracing shall be provided as necessary.
- G. After the station piping and valves have been manufactured, the station piping system, including pumps, piping, fittings and all valves that make up the entire station piping shall be first tested with high-pressure air to test for leaks. High-pressure air shall be pumped into the piping system and a soap solution shall then be sprayed on any welded joints for leak indication. After final assembly of the pumps, piping and valves, the entire system shall be hydrostatically tested to test for leaks at all joints, connections and weld seams. Any deficiencies found during the air test or the hydrostatic test shall be repaired and the system shall be retested.
- H. Suction and discharge header piping shall be fabricated utilizing weld tees and/or weld reducing tees to maintain smooth water flows and minimize hydraulic losses in the transition from the pump branch piping to the header piping. Under no circumstances shall any pump branch or bypass piping connections be made by cutting a hole in the pipe and welding a branch take off.
- I. A single, right angle outlet, smooth nose, brass sample tap shall be supplied for each suction and discharge header pipe. A standard hose bib with valve and vacuum breaker shall be provided on the pump station suction header piping.
- J. Isolation valves used inside the station shall be flanged style butterfly valves that meet or exceed the design intention of the latest revision of AWWA standard C504. The valves shall have a working pressure of 250 psi. All valve components shall conform to Underwriters Laboratories classifications in accordance with ANSI/NSF Standard 61. Valve bodies shall be of ductile iron per ASTM A536. Valve discs shall be offset to provide an uninterrupted

360-degree seating edge and shall be ductile iron per ASTM A536. The disc seating edge shall be solid 316 stainless steel. Valve shafts shall be of ASTM A564 Type 360 stainless steel. Valve shaft seals shall be self-compensating V-type packing with a minimum of 4 sealing rings. The seat shall be of Buna-N and shall be molded in and vulcanized to the valve body. The seat shall contain an integral shaft seal protecting the valve bearings and packing from any line debris. Valve shaft bearings shall be Teflon lined with a non-metallic fiberglass composite backing and shall be permanently lubricated. The interior of the body shall have a full rubber lining vulcanized to the valve body. Valves 6" and smaller shall be provided with 10 position lever lock handles with throttle plates incorporating an infinite position stop, a memory stop, and a padlocking device for either fully open or fully closed position. Valves 8" and larger shall be provided with traveling nut manual actuators. Housing shall be cast iron. The actuators shall have independently adjustable open and closed position stops. The butterfly valves shall be manufactured by DeZurik, Pratt, or equal.

- K. Wafer style silent check valves shall be of silent operating type that closes as flow is reduced and fully closes at zero velocity stopping reverse flow which reduces or eliminate water hammer shock. The valve design shall incorporate a center guided, spring loaded poppet, guided at opposite ends and having a short linear stroke that generates a flow area equal to that of the pipe size. The valve shall operate equally well in the vertical or horizontal position with the flow up or down. All component parts shall be field replaceable and without the need of special tools. A replaceable guide bushing shall be provided and held in position by the valves spring. The cracking pressure shall be less than 1 psi. The valve disc shall be convex in sizes up to 6" and concave in 8" and larger to the flow direction providing for disc stabilization, maximum strength and a minimal flow velocity to open the valve. A rubber seal shall be furnished to provide a drip tight seal. The rubber seal shall be glued or chemically adhered. Ductile Iron valve bodies shall be coated inside and out with NSF/ANSI 61 certified fusion epoxy.
- L. The pump station shall be supplied with a flow meter. The meter shall include bidirectional metering capabilities with programmable totalizers. The meter shall allow for an accuracy of +/-0.25 percent with a flow range of 300:1. The M-2000 amplifier shall be integrally mounted to the detector or shall be available remote mounted. The amplifier shall be housed in a cast aluminum, powder coated, NEMA 4X enclosure. The amplifier shall receive the detectors analog signal, amplify the signal and convert the signal into digital information. The signal shall be converted to both analog and digital signals that shall display rate of flow and totalization. The processor shall control zero-flow stability, analog and frequency outputs, serial communications and a variety of other parameters. It shall include a four line, 20 character LCD display to at shall indicate rate of flow, forward and reverse totalizers and diagnostic messages. The display shall also serve to guide the user in simple terms through a user friendly programmable routine. Programmable parameters of the amplifier shall include (but are not limited to) calibration factors, totalizer resets, unit of measure, analog and pulse output scaling, flow alarm functions, language selection, low flow cutoff, noise dampening factor and excitation frequency selection. The amplifiers main function is to detect and condition flow information from the electromagnetic detector. The power consumption shall be 15 watts. The meter shall provide a variety of analog outputs, digital outputs, pulse outputs, frequency output and miscellaneous outputs. Units of measure shall include ounces, pounds, liters, US gallon, cubic meters, cubic feet and acre feet. The meter shall be supplied with stainless steel ground rings.
- M. The suction side of each pump shall include a flexible pump connection/expansion joint to reduce control pulsation shocks and noise transmission. The elastomer connector shall be constructed of neoprene and nylon with bias-ply tire cord. Solid plate steel flanges grip the sealing area and provide a fluid tight connection without the use of gaskets. The flanges shall be drilled and tapped to mate with the companion flanges. The single sphere arch shall be self-cleaning.

- N. Compression type couplings shall be used as required, to enable easy dismantling of station pumps and piping for maintenance and service. Couplings shall consist of two steel follower rings, two resilient gaskets, one steel middle ring, and a set of steel follower trackhead bolts.

2.13 PRESSURE GAUGES

- A. Two pressure gauges, one for influent pressure and one for discharge pressure shall be provided with the station. Gauges will be 4 ½" in diameter per ASME B40.100 and shall be graduated in psi. Rated accuracy will be ± .5% of full scale and the operating temperature shall be -40°F to +150°F. Additional error when temperature changes from referenced temperature of 60°F ±0.4% for every 18°F rising or falling (percentage of span). Standard features shall include a black fiberglass-reinforced thermoplastic case, black aluminum pointer, white aluminum with black lettering, dampened movement option, copper alloy C-type bourdon tube, copper alloy (0.6 mm) restrictor, copper alloy with ¼" NPT lower mount pressure connection with M4 internal tap and be weather resistant (NEMA 3 / IP54).
- B. The ¼" high pressure ball isolation valve standard features shall include a one piece brass body (UNI 5705-65), PTFE self-lubricating seats with flexible-lip design, double seal system to all the valve to be operated in both directions, chrome plated brass ball, blowout-proof brass stem with Viton O-ring, nylon black wedge handle that clearly shows ball position, and NPT taper ANSI B.1.20.1 connections.
- C. The pump station shall be supplied with two separately mounted pressure transmitters to monitor the suction pressure and discharge pressure. Each pressure transmitter shall sense gauge pressure of a predetermined span and transmit a 4-20 mA signal to the programmable logic controller. The accuracy of the transmitters shall be ±0.25% full scale with a 0 to 200 degree f temperature limit. The transmitter case shall be manufactured of 316 stainless steel. The transmitter shall NEMA 4X housing. The pressure transmitters shall be supplied with a 24 VDC power supply. Input voltage shall be 120 VAC, 60 Hz. Output voltage shall be 24 VDC. The pressure transmitters shall be Dwyer, Setra or approved equal and the power supply.

2.14 SPARE PARTS

- A. A touch-up kit containing epoxy coatings, as specified above, shall be provided for the coating of all field welds and for repair of any scratches or abrasions that have occurred during shipment or installation.

PART 3 EXECUTION

3.01 FACTORY TEST

- A. The water booster system shall be tested with water at the manufacturer's factory for leaks in the pumps and piping, excessive vibration, correct operation of all electrical appurtenances, and to ensure that all of the pump controls are operating properly. These tests shall, as closely as shop conditions permit, simulate field design conditions as specified under OPERATING CONDITIONS. Pump shall be tested, to insure compliance with its published head-capacity curve and insure full pumping capability. As applicable, pump tests shall include motor running amperage checks, at the design conditions, shut-off and other points along the curve, insuring non-overloading performance and pump efficiency.

3.02 INSTALLATION

- A. Installation of the water booster system shall be in accordance with the written instructions furnished by the manufacturer, and as recommend by the Engineer. In addition to the installation instructions, the manufacturer shall furnish six complete and detailed Operating Instructions, Service and Repair Sheets in a bound manual. This manual shall cover the initial start-up, operating procedures, maintenance and servicing procedures on the major component parts provided in the pump system. One manual shall be shipped with the system, the rest shall be sent direct.

3.03 START-UP

- A. The manufacturer shall provide the services of a factory-trained representative for a maximum period of one day, to assist the contractor with the initial start-up of the pump system. It shall be the responsibility of the contractor to inform all parties of this initial start-up, and to insure their attendance. The manufacturer's representative shall instruct all personnel attending the start-up in the correct and required operation, maintenance and service procedures for the water booster system.
- B. Without exception, the station manufacturer is directly responsible for station start-up and operator training. Third party contractors, agents or representatives are not to be allowed to start up the station nor the equipment therein. As such;

END OF SECTION

6.0 ATTACHMENTS

BID FORM

BID FORM

PROJECT IDENTIFICATION:

McHenry County College
Water Service Extension and Booster Station Installation
8900 U.S. Route 14
Crystal Lake, IL 60012

HR GREEN PROJECT NUMBER: 160386.01

THIS BID IS SUBMITTED TO:

McHenry County College
Attn: Ms. Jennifer Jones
8900 U.S. Route 14
Crystal Lake, Illinois 60012
(Hereinafter called OWNER)

- 1.01 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.
- 2.01 Bidder accepts all of the terms and conditions of the Instruction to Bidders. Bidder has not added any conditions or qualifying statements to the Bid. Bidder will sign and deliver the required number of counterparts of the Agreement with the Bonds, evidence of insurance coverage, and other documents required by the Bidding Requirements within five (5) days after the date of OWNER'S Notice of Award.
- 3.01 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:
- A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged.

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.
- D. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or

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

- E. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) Bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
 - F. 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.
 - G. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies and data with the Bidding Documents.
 - H. Bidder has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by ENGINEER is acceptable to Bidder.
 - I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
 - J. In accordance with Section 215 of the Clean Water Act (33 U.S.C. 1251 et seq.) and implementing EPA regulations, CONTRACTOR agrees that the CONTRACTOR, Subcontractors, and suppliers in the performance of this Contract will give preference to domestic construction materials.
 - K. In connection with the performance of Work under this Contract, CONTRACTOR agrees not to discriminate against any employee or applicant for employment because of age, race, religion, color, handicap, sex, physical condition or developmental disability or national origin. This provision shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. CONTRACTOR further agrees to take affirmative action to ensure equal employment opportunities for persons with disabilities. CONTRACTOR agrees to post in conspicuous places, available for employees and applicants for employment, notices setting forth the provisions of the nondiscrimination clause.
- 4.01 A. By submission of the Bid, each Bidder certifies, and in the case of a joint Bid each party thereto certifies as to his own organization, that in connection with the Bid:
- 1. 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;
 - 2. 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
 - 3. No attempt has been made or will be made by the Bidder to induce any other person or firm to submit or not to submit a Bid for the purpose of restricting competition.

B. Each person signing the Bid shall certify that:

1. 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 (I) i through (I) iii above; or
2. 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 (I) i through (I) iii 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 (I) i through (I) iii above.

5.01 Each pay item should have a unit price and a total price.

6.01 The unit price shall govern if no total price is shown or if there is a discrepancy between the product of the unit price multiplied by the quantity.

7.01 If a unit price is omitted, the total price will be divided by the quantity in order to establish a unit price.

8.01 A Bid will be declared unacceptable if neither a unit price nor a total price is shown.

9.01 The undersigned firm certifies that it has not been convicted of bribery or attempting to bribe an officer or employee of the State of Illinois, nor has the firm made an admission of guilt of such conduct which is a matter of record, nor has an official, agent, or employee of the firm committed bribery or attempted bribery on behalf of the firm and pursuant to the direction or authorization of a responsible official of the firm. The undersigned firm further certifies that it is not barred from contracting with any unit of State or local government as a result of a violation of State laws prohibiting Bid-rigging or Bid-rotating.

10.01 The undersigned submits herewith this schedule of prices covering the work to be performed, which includes all labor and materials required under this contract:

SCHEDULE OF PRICES

(For complete information covering these items, see plans and specifications)

MCHENRY COUNTY COLLEGE WATER SERVICE EXTENSION & BOOSTER STATION INSTALLATION					
BASE BID					
8900 US HWY 14, CRYSTAL LAKE, ILLINOIS					
	ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
	DEMOLITION				
1	Bituminous Pavement Removal (Full Depth)	189	SY		
2	Curb & Gutter Removal	14	LF		
3	Sidewalk Removal	100	SF		
4	Sign Removal & Replacement	2	EA		
5	Tree Removal	2	EA		
6	Tree Preservation Fencing	284	LF		
	DEMOLITION TOTAL				
	EROSION CONTROL				
7	Silt Fence	2,765	LF		
8	Inlet and Pipe Protection	2	EA		
9	Concrete Washout	1	EA		
	EROSION CONTROL TOTAL				
	EARTHWORK				
10	Topsoil Import & Spread	406	CY		
11	Spoil Material Hauloff	352	CY		
	EARTHWORK TOTAL				
	LANDSCAPING				
12	IDOT Type 2A Seed Mixture	1.30	ACRE		
13	IDOT Mulch Method 4 (Hydroseed)	1.30	ACRE		
14	Removal & Replacement of Landscape Bed	1	LS		
	LANDSCAPING TOTAL				
	ASPHALT PAVING				
15	Pavement Class D Patch, 2"	149	SY		
16	Pavement Class D Patch, 4"	41	SY		
17	Paint Pavement Marking Line 4"	24	LF		
	ASPHALT PAVING TOTAL				

	CONCRETE				
18	Concrete Sidewalk	100	SF		
19	Booster Station Reinforced Concrete Slab on Grade	364	SF		
20	Booster Station Reinforced Concrete Foundation	16	CY		
21	Standby Generator Reinforced Concrete Slab on Grade	59	SF		
22	Electric Transformer Reinforced Concrete Slab on Grade	1	EA		
	CONCRETE TOTAL				
	WATERMAIN				
23	8" DIP Water Service w/ Polyethylene Encasement (Open Cut)	650	LF		
24	12" DIP Watermain w/ Polyethylene Encasement (Open Cut)	990	LF		
25	Pressure Connection to 16" Watermain w/ 12" Valve & 5' Valve Vault	1	EA		
26	12" Watermain Valve & 5' Valve Vault	1	EA		
27	12"x8"x12" Tee	1	EA		
28	12" DIP 45° Bend	3	EA		
29	12" DIP 22.5° Bend	2	EA		
30	12" DIP 11.25° Bend	1	EA		
31	12" MJ Cap	1	EA		
32	Fire Hydrant w/ Auxillary Valve & Tee	3	EA		
33	8" Watermain Valve & Valve Box	2	EA		
34	8" DIP 45° Bend	9	EA		
35	8" DIP 22.5° Bend	1	EA		
36	8" DIP 11.25° Bend	2	EA		
37	Connection to Existing 8" Watermain	1	EA		
38	Trench Backfill	103	CY		
39	Watermain Booster Station (Complete)	1	LS		
	WATERMAIN TOTAL				
	CONCRETE CURB & GUTTER				
40	B-6.12 Curb & Gutter	14	LF		
	CONCRETE CURB & GUTTER TOTAL				
	SITE ELECTRICAL				
41	Standby Generator	1	EA		
42	CT Cabinet	1	EA		
43	Transfer Switch	1	EA		
44	Electric Secondary Wires	95	LF		
45	3" PVC Conduit	95	LF		
	SITE ELECTRICAL TOTAL				

	MISCELLANEOUS				
46	Guy Wire Stabilization	1	LS		
47	Traffic Control and Protection	1	LS		
48	Clean Construction & Demolition Debris (CCDD) Handling & Disposal	1	LS		
49	"Bike Path Closed" Sign	4	EA		
	MISCELLANEOUS TOTAL				
	TOTAL OF BID SECTIONS				
	DEMOLITION TOTAL				
	EROSION CONTROL TOTAL				
	EARTHWORK TOTAL				
	LANDSCAPING TOTAL				
	ASPHALT PAVING TOTAL				
	CONCRETE TOTAL				
	WATERMAIN TOTAL				
	CONCRETE CURB & GUTTER TOTAL				
	SITE ELECTRICAL TOTAL				
	MISCELLANEOUS TOTAL				
	TOTAL BASE BID				

SUMMARY

Total Base Bid: \$ _____

SCHEDULE OF SUPPLEMENTAL UNIT PRICES

If the pay items listed below are added to the project by Change Order, Bidder shall indicate the unit prices for quantities that apply to such quantities. Bidder has computed unit price(s) as provided in Paragraph 11.03.B of the General Conditions.

Crushed Stone (for unstable trench bottom)
as ordered (in place), per cubic yard \$ _____ per CY

Removal of Unsuitables (for unstable trench bottom)
as required, per cubic yard \$ _____ per CY

Aggregate Base Course CA-6 100% Crushed
as required, per ton \$ _____ per Ton

12.01 Bidder agrees that the Work will be substantially completed and ready for final payment on or before the dates or within the number of calendar days indicated in the Agreement.

12.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified above, which shall be stated in the Agreement.

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

Bid Submitted By: _____

Title: _____

Business Name: _____

Address: _____

Telephone: _____ Fax: _____ Email: _____

The signature below certifies that the entire bid document is in order and that all instructions, specifications, rules and regulations as stipulated by the McHenry County College will be adhered to and complied with.

Authorized Signature:

Date:

CONTRACTOR CERTIFICATION

CONTRACTOR CERTIFICATION
Illinois Revised Statute 1987
Chapter 38, Sections 33E-3 and 33E-4

The undersigned hereby certifies that it is not barred from bidding on this contract as a result of violation of either Section 33E-3 (bid rigging) or 33E-4 (bid rotating) of the Illinois Revised Statutes 1987, Chapter 38.

Under penalty of perjury, the undersigned Contractor certifies that this proposal has not been arrived at collusively or otherwise in violation of Federal or Illinois antitrust laws.

Company Name _____

By * _____

Address _____

City/State/ZIP _____

* Must be actual signature in ink of a representative of Contractor authorized to legally commit the Contractor.

Section 33E-5(b) pertains to disclosure of information related to the terms of a bid and any bidder's responsiveness to a request for bids. Specifically, district officials or employees must not knowingly open a sealed bid at a time or place other than as specified by the district. Also, any official who knowingly discloses any information related to the terms of a sealed bid or any bidder's responsiveness to the request for bids commits a class 3 felony. This section does allow, however, that no violation occurs if any disclosure made to an interested person also is made generally available to the public. **CONSEQUENTLY, COLLEGES SHOULD BE CAUTIOUS NOT TO DISCLOSE ANY INFORMATION THAT IS NOT RELEASED TO THE PUBLIC.**

Section 33E-6 contains several provisions potentially impacting College purchasing procedures. **SPECIFICALLY, A PERSON COMMITS A CLASS 4 FELONY WHEN INFORMATION CONCERNING THE SPECIFICATIONS OF A CONTRACT IS KNOWINGLY CONVEYED TO A BIDDER OR PROSPECTIVE BIDDER OTHER THAN THROUGH THE BID INVITATION, PRE-BID CONFERENCE, OR CONTRACT SOLICITATION PROCEDURE.** Thus, once an INVITATION FOR BID for a particular contract is released, MCC cannot respond to individual inquiries from bidders. Likewise, no information may be volunteered concerning potential Subcontractors if the contract involves subcontracting work.

**CERTIFICATION OF COMPLIANCE WITH
ILLINOIS PREVAILING WAGE LAW**

CERTIFICATE OF COMPLIANCE WITH THE ILLINOIS PREVAILING WAGE LAW

Every eligible bidder and contractor/vendor shall comply with the employment section of Public Contracts provision of the Prevailing Wage Act, 820 ILCS 130/1, as amended.

McHenry County College District 528
8900 U.S. Highway 14
Crystal Lake, IL 60012

INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS

Certificate of Compliance with the Illinois Prevailing Wage Law

This letter is to certify that _____
(name of company)

is in compliance with Section 39A9 of Chapter 48 of the Illinois Revised Statutes and all amendments pertaining to the payment of prevailing wages as established by the department of labor, to all laborers, workers, and mechanics performing work under this agreement/contract.

Company street address _____

City _____

County _____ State _____ Zip _____

Contact name _____ contact phone _____

Sworn and subscribed to me on this _____ day of _____, 20____; before me, notary public
appointed in _____ County for the state of Illinois.

Signature of Notary

printed name

Seal

Commission expiration date

city of residence

county of residence

W9 Request for Taxpayer ID Number and Certification

Request for Taxpayer Identification Number and Certification

Give Form to the
requester. Do not
send to the IRS.

Print or type See Specific Instructions on page 2.	Name (as shown on your income tax return)	
	Business name/disregarded entity name, if different from above	
	Check appropriate box for federal tax classification (required):	Exempt payee <input type="checkbox"/>
	<input type="checkbox"/> Individual/sole proprietor <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate	
	<input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶	
<input type="checkbox"/> Other (see instructions) ▶		
Address (number, street, and apt. or suite no.)		Requester's name and address (optional)
City, state, and ZIP code		
List account number(s) here (optional)		

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number								
				-				
Employer identification number								
				-				

Part II Certification

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
- I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
- I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

Sign Here
Signature of U.S. person ▶

Date ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

- Certify that the TIN you are giving is correct (or you are waiting for a number to be issued).
- Certify that you are not subject to backup withholding, or
- Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

AGREEMENT

AGREEMENT

Water Service Extension & Booster Station Installation

THIS AGREEMENT is by and between the McHenry County College, 8900 U.S. Route 14, Crystal Lake, Illinois 60012 (hereinafter called OWNER) and _____ (hereinafter called CONTRACTOR). OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1 – WORK

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

The project includes the installation of approximately +/- 990 lineal feet of 12" water main and approximately +/- 645 lineal feet of 8" water service including a booster station and associated valves and fire hydrants for McHenry County College. General construction for the water main/service extension and booster station project includes, but not limited to, installation of water main, water service, standby generator and booster station along with the other work associated with the project as outlined in the plans and specifications.

ARTICLE 2 – THE PROJECT

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

McHenry County College
Water Service Extension and Booster Station Installation
8900 U.S. Route 14
Crystal Lake, IL 60012

ARTICLE 3 – ENGINEER

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

ARTICLE 4 – CONTRACT TIMES

- 4.01 Time of Essence

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

- 4.02 Dates for Substantial Completion and Final Payment

- A. The work will be substantially completed by June 1, 2018, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions by July 18, 2018. Substantial completion is defined as having water service connection to the City's water system and an operable booster station which includes, but not limited to, passing of all pressure test acceptance of water main by the City of Crystal Lake and clean bacterial tests

so the water service could be put in use allowing the College to disban their private water system.

4.03 Liquidated Damages

- A. The Substantial Completion date of this project is June 1, 2018. The parties agree that the completion of the project is critical to provide parking areas for the college faculty and students. The parties agree that it is difficult to ascertain the College's damages because of the Contractor's failure to complete the project by the completion date but that \$1,000.00 per day is a reasonable estimate. The parties agree that that the Contractor shall pay to the College \$1,000.00 per day for each day beyond the time specified in paragraph 4.02 for Substantial Completion – not as a penalty or as a provision or means to enforce the completion date but rather as damages that both parties agree that the College will experience each additional day that the project is not completed by the completion date. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER \$1,000.00 for each day that expires after the time specified in paragraph 4.02 for completion and readiness for final payment, until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

- 5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in the Unit Price Schedule as completed in the CONTRACTOR'S Bid Form, as 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 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 Progress Payments; Retainage

- A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR'S Applications for Payment as recommended by ENGINEER each month during performance of the Work as provided below. All such payments will be measured by the schedule of values established and in accordance with Section 01290.
- B. Progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER may determine or OWNER may withhold.
 - 1. 90% of Work completed (with the balance being retainage). If the Work has been 50% completed as determined by ENGINEER, and if the character and progress of the Work have been satisfactory to OWNER and ENGINEER, OWNER, on recommendation of ENGINEER, may determine that as long as the character and progress of the Work remain satisfactory to them, there will be no retainage on account of Work subsequently

completed, in which case the remaining progress payments will be in an amount equal to 100% of the Work completed less the aggregate of previous retainage and payments previously made. At 50% completion, or any time thereafter, when the character and progress of the Work is not satisfactory, additional amounts may be retained, but in no event shall the total retainage be more than 10% of the value of the Work completed.

2. Upon Substantial Completion, the amount of retainage may be reduced. Upon Substantial Completion, OWNER may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the work still to be completed or corrected.

6.03 Final Payment

- A. Upon final completion and acceptance of the Work, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER.

ARTICLE 7 – INTEREST

- 7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall not bear interest.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 7.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:
 - A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
 - B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.
 - E. CONTRACTOR does not consider that any 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 Documents.
 - F. 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.

- G. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- H. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.
- I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- J. In accordance with Section 215 of the Clean Water Act (33 U.S.C. 1251 et seq.) and implementing EPA regulations, CONTRACTOR agrees that the CONTRACTOR, Subcontractors, and suppliers in the performance of this Contract will give preference to domestic construction materials.
- K. In connection with the performance of Work under this Contract, CONTRACTOR agrees not to discriminate against any employee or applicant for employment because of age, race, religion, color, handicap, sex, physical condition or developmental disability, or national origin. This provision shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training including apprenticeship. CONTRACTOR further agrees to take affirmative action to ensure equal employment opportunities for persons with disabilities. CONTRACTOR agrees to post in conspicuous places, available for employees and applicants for employment, notices setting forth the provisions of the nondiscrimination clause.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of the following:
 - 1. This Agreement
 - 2. Performance & Maintenance Bond
 - 3. Payment Bond
 - 4. Specifications as listed in the table of contents of the Project Manual
 - 5. Addenda
 - 6. Documents in the Appendix
 - 7. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed
 - b. Written Amendments
 - c. Change Orders
 - d. Work Change Directives
 - e. Field Orders
 - f. Engineer's written interpretations and clarifications

- B. The documents listed in Paragraph 9.01.A. are attached (except as expressly noted otherwise above) and incorporated by reference as part of this Agreement.
- C. There are no Contract Documents other than those listed above in this Article 9.

ARTICLE 10 – MISCELLANEOUS

10.01 Assignment of Contract

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

10.02 Successors and Assigns

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

10.03 Severability

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

10.04 Equal Employment Opportunity Clause

- A. In the event of CONTRACTOR'S and/or vendor's noncompliance with any provision of this Equal Employment Opportunity Clause, the Illinois Fair Employment Practices Act or the Fair Employment Practices Commission's Rules and Regulations for Public Contracts, the CONTRACTOR and/or vendor may be declared non-responsible and therefore ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the Contract may be canceled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation.
- B. During the performance of this Contract, CONTRACTOR and/or vendor agrees as follows:
 - 1. That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin or ancestry; and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify such underutilization.
 - 2. That, if it hires additional employees in order to perform this Contract, or any portion hereof, it will determine the availability (in accordance with the Commission's Rules and Regulations for Public Contracts) of minorities and women in the area(s) from which it may reasonably recruit and it will hire for each job classification for which employees are hired in such a way that minorities and women are not underutilized.

3. That, in all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, national origin, ancestry, age, marital status, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service.
4. That it will send to each labor organization or representative of workers with which it has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the CONTRACTOR'S obligations under the Illinois Fair Employment Practices Act and the Commission's Rules and Regulations for Public Contracts. If any such labor organization or representative fails or refuses to cooperate with CONTRACTOR in its efforts to comply with such Act and Rules and Regulations. CONTRACTOR will promptly so notify the Illinois Fair employment Practices Commission and the contracting agency and will recruit employees from other sources when necessary to fulfill its obligations thereunder.
5. That it will submit reports as required by the Illinois Fair Employment Practices Commission's Rules and Regulations for Public Contracts, furnish all relevant information as may from time to time be requested by the Commission or the contracting agency, and in all respects comply with the Illinois Fair Employment Practices Act and the Commission's Rules and Regulations for Public Contracts.
6. That it will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Illinois Fair Employment Practices Commission for purposes of investigation to ascertain compliance with the Illinois Fair Employment Practices Act and the Commission's Rules and Regulations for Public Contracts.
7. That it will include verbatim or by reference the provisions of Paragraphs 1 through 7 of this clause in every performance subcontract as defined in Section 2.10(b) of the Commission's Rules and Regulations for Public Contracts so that such provisions will be binding upon every such subcontractor, and that it will also so include the provisions of Paragraphs 1, 5, 6, and 7 in every supply subcontract as defined in Section 2.10(a) of the Commission's Rules and Regulations for Public Contracts so that such provisions will be binding upon every such subcontractor. In the same manner as with other provisions of this Contract, CONTRACTOR will be liable for compliance with applicable provisions of this clause by all its subcontractors; and further it will promptly notify the contracting agency and the Illinois Fair Employment Practices Commission in the event any subcontractor fails or refuses to comply therewith. In addition, no CONTRACTOR will utilize any subcontractor declared by the Commission to be non-responsible and therefore ineligible for Contracts or subcontracts with the State of Illinois or any of its political subdivision or municipal corporations.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed four (4) copies of this Agreement. One (1) copy each has been delivered to CONTRACTOR and ENGINEER and two copies to OWNER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR.

This Agreement will be effective on _____, 2018 (which is the Effective Date of the Agreement).

OWNER:

_____ **McHenry County College**

By: _____
(signature)

(typed name and title)

Attest _____
(signature)

Address for giving notices:

_____ 8900 U.S. Route 14

_____ Crystal Lake, Illinois 60012

CONTRACTOR:

By: _____
(signature)

(typed name and title)

Attest _____
(signature)

Address for giving notices:

License No. _____
(where applicable)

Approved as to form and execution this
_____ day of _____, 2018

(attorney for OWNER)

Countersigned by:

Chief Financial Officer
(or other designated official)

Agent for service of process: _____

(If CONTRACTOR is a corporation or a partnership,
attach evidence of authority to sign.)

Designated Representative:

Name: _____

Title: _____

Address: _____

Phone: _____

Facsimile: _____

Designated Representative:

Name: _____

Title: _____

Address: _____

Phone: _____

Facsimile: _____

STANDARD GENERAL CONDITIONS

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By



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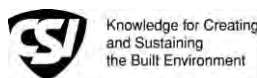
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These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. 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 which is evidence of the agreement between Owner and Contractor covering the Work.

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

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

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

7. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*--A document recommended by Engineer 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, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*-- Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*--The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any, (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*--The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*--See Paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*--The individual or entity named as such in the Agreement.

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

21. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

22. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

23. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*--The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*--A written notice given 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 under the Contract Documents.

29. *Owner*--The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*--Polychlorinated biphenyls.

31. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

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

33. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Schedule of Submittals*--A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

40. *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.

41. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

42. *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 for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

43. *Specifications*--That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain

administrative requirements and procedural matters applicable thereto.

44. *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 at the Site.

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

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

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

49. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *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, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

52. *Work Change Directive*--A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times

but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.

B. Intent of Certain Terms or Adjectives

1. 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 requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 Paragraph 9.09 or any other provision of the Contract Documents.

C. Day

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. Defective

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

- a. does not conform to the Contract Documents, or
- b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents, or
- c. has been damaged prior to Engineer's - recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. Furnish, Install, Perform, Provide

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean 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, shall mean 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, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases which 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 Bonds and Evidence of Insurance

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 Copies of Documents

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 Commencement of Contract Times; Notice to Proceed

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement

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 Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 Starting the Work

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

2.05 Before Starting Construction

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), 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 Documents;

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.

2.06 Preconstruction Conference

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 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 Initial 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 for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall 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 component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one 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. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

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

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement 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 or code, or any instruction of a Supplier shall be effective to change the duties or

responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of, their Related Entities, 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 Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, 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 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

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 knew or reasonably should have known thereof.

B. Resolving Discrepancies

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

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); 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 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, 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 Engineer's consultants, including electronic media editions; or

2. reuse any of 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 adaption by Engineer.

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

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's

sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party..

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor 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. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

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 the Work is to be performed 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.

4.02 *Subsurface and Physical Conditions*

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

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

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

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities 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; or

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.

4.03 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

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 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. Possible Price and Times Adjustments

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition 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 meet any one or more of the categories described in Paragraph 4.03.A; and

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 Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. Contractor knew of the existence of such conditions at the time Contractor made a final 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

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

c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

- a. reviewing and checking all such information and data,
- b. locating all Underground Facilities shown or indicated in the Contract Documents,
- c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and
- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, 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 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will

promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *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.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities 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; or

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 any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) 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.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. 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, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. 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. If Owner and Contractor cannot agree as to

entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, 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 a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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 a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified

in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection

from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed 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:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insured (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, (other than caused by flood) and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any

deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, 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 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 Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss 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 perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract

Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, 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. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *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. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or

received from the superintendent shall be binding on Contractor.

6.02 *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 at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall 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 shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 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 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

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

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

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

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

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

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

2. Substitute Items

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

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

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not 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

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,

B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

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

E. Engineer's Cost Reimbursement: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the 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.

F. Contractor's Expense: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual

or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

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

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, 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 any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *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 a particular 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 shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. 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 opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *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. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *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.

6.11 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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 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 by or based upon Contractor's performance of the Work.

B. Removal of Debris During Performance of the Work: During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall 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 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 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 property to stresses or pressures that will endanger it.

6.12 *Record Documents*

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

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. 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, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. 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. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.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 (except damage or loss attributable to the fault of Draw-

ings or Specifications or to the acts or omissions of Owner or Engineer or , 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).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

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

6.16 *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 threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. Shop Drawings

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will 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 6.17.D.

2. *Samples*: Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

a. Submit number of Samples specified in the Specifications.

b. 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 6.17.D.

B. 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. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

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

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents

with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. 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, conform to the information given in 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 (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.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's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures

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.

6.18 Continuing the Work

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or

disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 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 and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

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

1. abuse, modification, or improper 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.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

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 or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 Indemnification

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or

arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees 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 6.20.A shall 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.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal

shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 - OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. 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 their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, 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.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

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

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

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

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *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.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *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 Documents and will not be changed without written consent of Owner and Engineer.

9.02 *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 9.09. 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.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which 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. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. 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, subject to the provisions of Paragraph 10.05.

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show

partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty 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 Paragraph 14.07.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 9.09 shall also apply to, the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *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 by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall

promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *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 as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.

10.03 *Execution of Change Orders*

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

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

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

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice 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) is required by the provisions of any bond to be given to a surety, 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.

10.05 *Claims*

A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim, shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

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. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall 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 shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall 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, who 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 shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including 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, and hand tools not owned by the workers, 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.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, 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 property insurance established in accordance with Paragraph 5.06.D), 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 shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall 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 telegrams, long distance telephone calls, telephone service at the Site, expresses, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. Costs Excluded: The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety 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 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. 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.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. Contractor's Fee: When all the Work is performed on the basis of cost-plus, Contractor's fee shall

be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 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

1. Contractor agrees that:

a. 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

b. 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 on account of any of the foregoing will be valid.

C. Contingency Allowance

1. Contractor agrees that a 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 on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 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. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

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. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an

allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall 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 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five 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 Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted

by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

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 and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to

be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. 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, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, 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, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay 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 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 Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. 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, or both, 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, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *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, 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 shall 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.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay 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 correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *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 terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

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

B. If 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. 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 correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. 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 .

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, 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.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay 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) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *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 rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, 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, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, 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 (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) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. 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 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress

payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

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

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

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

B. Review of Applications

1. Engineer will, within 10 days after receipt of each Application for Payment, 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 on the Site 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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to 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 Documents; or

b. that 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, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, 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 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent

inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

- a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
- b. 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;
- c. there are other items entitling Owner to a set-off against the amount recommended; or
- d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action 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, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 Contractor's Warranty of Title

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 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 (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

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 tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial

Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

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. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and 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 14.04 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 5.10 regarding property insurance.

14.06 *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 is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *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, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible 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.

B. *Engineer's Review of Application and Acceptance*

1. 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 Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. 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. Payment Becomes Due

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and , will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance

with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will 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 established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. 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

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.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 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) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed 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.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. 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. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven 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;

3. 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) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

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

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and 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 15.03.

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, seven 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 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 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 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be

governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents 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.

17.03 *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 Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS

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GENERAL

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

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

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC - 1.01

Whenever the word ARCHITECT is used in the Specifications, it shall have the same meaning as the word ENGINEER as defined.

ARTICLE 2 – PRELIMINARY MATTERS

SC – 2.01

Add the following language at the end of paragraph 2.01B:

“No contractor or subcontractor shall be given a Notice to Proceed until executed contracts are transmitted to Owner.”

SC - 2.02

Delete paragraph 2.02.A. in its entirety and insert the following in its place:

- A. OWNER shall furnish to CONTRACTOR five copies of the Contract Documents with full-scale Drawings. Additional copies will be furnished upon request at the cost of reproduction.

SC – 2.03

Delete the last sentence of paragraph 2.03A. in its entirety and insert the following in its place:

In no event will the Contract Times commence to run later than the 90th day after the day of Bid opening or the sixtieth day after the Effective Date of the Agreement, whichever date is earlier.

SC - 2.05

Add the following language at the end of paragraph 2.05.A.:

A request for written interpretation or clarification of the Contract Documents shall be submitted on the Clarification/Interpretation Request form provided in the Appendix of this Project Manual.

SC - 2.07 A.3

Add the following to paragraph 2.07 A.3.

“Contractor’s Schedule of Values shall be verified. Each subcontractor and subsubcontractor and major material supplier shall be identified by name and address indicating the contract amount due and to become due in accordance with Section 5 of the Illinois Mechanics Lien Act.”

Revise 2.07 A.3 and 14.01 to read as follows:

Contractor’s Schedule of Values will be acceptable to Engineer as to form and substance if it provides the name and address of each subcontractor, the amount due and to become due each subcontractor and is sworn under oath by the Contractor in compliance with Section 5 of the Illinois Mechanics Lien Act.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC – 4.02

Add the following new paragraphs after paragraph 4.02.B.:

- A. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER'S Consultants have relied upon reports of explorations and tests of subsurface conditions at the Site:
 - 1. Contained in the Appendix
- B. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER'S Consultants relied upon the following drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) which are at or contiguous to the Site:
 - 1. None.

SC – 4.06

Add the following new paragraphs after paragraph 4.06.I.:

- J. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER'S Consultants have relied upon the following reports relating to a Hazardous Environmental Condition at the Site, if any:
 - 1. None.
- K. In the preparation of Drawings and Specifications, ENGINEER or ENGINEER'S Consultants relied upon the following drawings relating to a Hazardous Environmental Condition at the Site, if any:
 - 1. None.

ARTICLE 5 – BONDS AND INSURANCE

SC – 5.01

Delete the following text under Paragraph 5.01A

These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents.

Replace with:

These bonds shall remain in effect until the project has been finally accepted and final payment becomes due. Note, prior to the release of these bonds and final payment, a Maintenance Bond in the amount of 10% of the project cost will need to be submitted by Contractor to cover any items that may arise within the warranty period.

Add the following language at the end of Paragraph 5.01.C:

In addition, no further progress payments under the Agreement will be made by OWNER until CONTRACTOR complies with the provisions of this paragraph.

SC - 5.02

Add the following language at the end of paragraph 5.02.A.:

Surety or insurance companies shall have an A.M. Best rating of A- or better.

SC – 5.03

Add the following language as item 5.03 C

Evidence of Insurance:

1. When CONTRACTOR delivers the executed Agreement to OWNER, CONTRACTOR shall also deliver to OWNER, with a copy to each additional insured, identified certificates of insurance (and other evidence of insurance which OWNER or any additional insured may reasonably request) which CONTRACTOR is required to purchase and maintain in accordance with Article 5.
2. Before any Work at the site is started, OWNER will deliver to CONTRACTOR certificates of insurance (and other evidence of insurance which CONTRACTOR or any additional insured may reasonably request) which OWNER is required to purchase and maintain in accordance with Article 5.

SC - 5.04

Add the following new paragraph in section 5.04 A.:

7. Contractor to procure and maintain Contractors Pollution Coverage.

Add the following new paragraphs immediately after paragraph 5.04 B.:

- C. CONTRACTOR'S liability insurance shall contain an endorsement on the general liability policy that will provide full policy limits on a "per project" basis.
- D. The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:
 1. Worker's Compensation and related coverage's under paragraphs 5.04.A.1. and A.2. of the General Conditions:

- a. State: Statutory
 - b. Applicable Federal (e.g., USL&H/Jones Act): Statutory
 - c. Employer's Liability: Statutory
2. Comprehensive General Liability under paragraphs 5.04.A.3. through A.6. of the General Conditions which shall include completed operations and product liability coverage's and eliminate the exclusion with respect to property under the care, custody and control of Contractor.
- a. General Aggregate \$5,000,000
 - b. Products – Completed Operations Aggregate \$2,000,000
 - c. Personal and Advertising Injury \$2,000,000
 - d. Each Occurrence (Bodily Injury and Property Damage) \$2,000,000
 - e. Personal Injury Liability coverage will include claims arising out of employment.
 - f. Property Damage Liability insurance to provide Explosion, Collapse, and Underground coverages where applicable.
 - g. Excess or Umbrella Liability
 - 1. General Aggregate: \$5,000,000
 - 2. Each Occurrence: \$5,000,000
3. Automobile Liability under paragraph 5.04.A.6. of the General Conditions:
- a. Bodily Injury:
 - 1) Each Person \$1,000,000
 - 2) Each Accident \$2,000,000
 - b. Property Damage:
 - Each Accident \$1,000,000
- E. If the additional insured has other insurance, which is applicable to the loss, it shall be on an excess or contingent basis. The amount of the Contractor's liability under each policy shall not be reduced by the existence of such other insurances.
- F. The coverage will be primary and non-contributory and shall include a Waive of Subrogation.

SC - 5.06

Delete paragraph 5.06 in its entirety and insert the following in its place:

A. The Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been

made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

B. Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, false work, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

C By the terms of this insurance, a mandatory "all perils" deductibles of \$2,500 and an earthquake and flood deductible of \$25,000 has been established. The Contractor shall be responsible for payment of the deductibles in the event of a paid claim. The Contractor shall carry whatever additional insurance he may deem necessary to protect himself against hazards not covered by the Builder's Risk Insurance, including theft.

D. This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit. Owner's insurance shall not cover portions of the Work stored off the site unless expressly agreed to by the Owner in writing. The Contractor shall purchase and supply Owner and Construction Manager an all risk Installation Floater Policy which shall include perils of transit, including flood and earthquake, covering all property for this Project which will be in its care, custody and control. The Installation Floater shall name the Owner and Construction Manager as an additional insured. The off-site Work to be insured by Contractor must be clearly labeled and identified as owned by Owner; the location of storage shall be approved by Owner. Owner's insurance will not cover equipment such as tools owned by mechanics or tools, sheds, hoists, canvasses, tarpaulins, mixers, scaffolding, shoring, apparatus, machinery staging and towers owned or rented by Contractor and other similar items commonly referred to as construction equipment. At the Contractor's option and expense Contractor may carry theft or other coverage insurance not included in the above coverage, on materials which are in his possession for this project.

E. Partial occupancy or use shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

F. Liability of Contractor and Subcontractor is not limited by purchase of insurance. Nothing contained in the insurance requirements of the Contract Documents is to be construed as limiting the liability of the Contractor, the liability of any Subcontractor of any tier, or the liability of the Architect, or either of their respective insurance carriers. Owner does not, in any way, represent that the coverages or limits of insurance specified is sufficient or adequate to protect the Owner, Construction Manager, Contractor, Architect, or any Subcontractor's interest or liabilities, but are merely minimums. The obligation of the Contractor and every Subcontractor of any tier to purchase insurance shall not, in any way, limit their obligations to the Owner in the event that the Owner should suffer an injury or loss in excess of the amount recoverable through insurance, or any loss or portion of the loss which is not covered by either the Architect's, Construction Manager's, Contractor's or any Subcontractor's insurance.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

SC - 6.05

Delete the second sentence of Paragraph 6.05.A. in its entirety and insert the following in its place.

1. Where the specification or description contains or is followed by words reading that no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may not be submitted to ENGINEER for review. Where the specification or description contains or is followed by words reading "or equal", other items of material or equipment or material or equipment of other suppliers may be submitted to ENGINEER for review under the circumstances described below for "or equal" items. Where the specification or description does not contain or is not followed by words reading "or equal" or no substitution permitted, other items of material or equipment or material or equipment of other suppliers may be submitted to ENGINEER for review under the circumstances described for "substitute" items below.

Delete subparagraph 6.05.A.1. in its entirety and replace with the following:

- A. "Or equal" Items: If in ENGINEER'S sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named, equal in material and constructed quality, and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or equal" item, in which case review and approval of the proposed item may, in ENGINEER'S sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items.

Delete subparagraphs 6.05.A.1.a and 605.A.1.b in their entirety.

Add the following new subparagraph immediately after paragraph 6.05.A.2.d.

- B. The application for review of a substitute shall be on the CONTRACTOR'S Request For Substitution form provided in the Appendix of the Contract Documents and included with the submittal. The Installation List included with the Request shall include only installations of the proposed substitute in applications of approximately the same size and complexity, and the same design as those to be furnished for this Project. Include in the Installation List, as a minimum, the owner's name, address, and telephone number; engineer's name, address and telephone number; location and name of project; installation date, startup date, and date of final acceptance by owner; and application of material or equipment. If the experience indicated by the Installation List does not demonstrate at least 5 years of successful operation of the proposed substitute item, OWNER may require CONTRACTOR and Supplier to furnish, at CONTRACTOR'S expense, a special performance guarantee with surety bond as required by paragraph 6.05.D of the General Conditions with respect to the substitute. Only the time period between final approval of the proposed material or equipment on the referenced project and the Bid date for this Project will count towards the required satisfactory experience of the proposed substitute item. ENGINEER will be the sole judge of acceptability of experience, time credited, and whether the special performance guarantee will be required for a substitute item. ENGINEER will notify CONTRACTOR which proposed substitute(s) will require a special performance guarantee with surety bond.

Delete Paragraph 6.05.E. in its entirety and insert the following in its place:

- C. ENGINEER'S Cost Reimbursement: ENGINEER will record time required by ENGINEER and ENGINEER'S Consultants in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby.

Add the following new subparagraph immediately after paragraph 6.05.F.:

- G. If a substitute item of material or equipment proposed by CONTRACTOR is approved by ENGINEER, and the substitution requires a change in any of the Contract Documents to adapt the design to the proposed substitute, CONTRACTOR shall notify ENGINEER of the changes and be responsible for the costs involved to revise the design and to make modifications or changes to the construction, including the costs associated with the Work of other contractors due to such variance in design or space requirements. ENGINEER and

ENGINEER'S Consultants will prepare redesign and drawing revisions. CONTRACTOR shall reimburse OWNER for charges of ENGINEER and ENGINEER'S Consultants for redesign and drawing preparation. Reimbursement of ENGINEER shall be based on ENGINEER'S and ENGINEER'S consultants direct labor costs, indirect labor costs, profit on total labor, and any direct non-labor expenses such as travel and per diem.

SC – 6.06

In paragraph 6.06.B. delete the words “Supplementary Conditions” in two places and insert the words “Instructions to Bidders” in their place.

SC – 6.10

Add the following new paragraphs immediately after paragraph 6.10.A.:

- B. OWNER is exempt from state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Bid.

SC – 6.16

Add the following new paragraph immediately after paragraph 6.16.A.:

- B. Owner is not responsible for means, methods or techniques of construction nor site safety. Site safety is the sole and exclusive responsibility of Contractor. In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, and CONTRACTOR cannot be reached, OWNER may act to attempt to prevent threatened damage, injury, or loss. OWNER will give CONTRACTOR and ENGINEER prompt written notice of such action and the cost of the correction or remedy shall be charged against CONTRACTOR. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by OWNER in response to such an emergency, a Work Change Directive or Change Order will be issued.

SC – 6.17

Add the following new subparagraph immediately after subparagraph 6.17.D.3.:

- 4. After ENGINEER has reviewed and approved a Shop Drawing or Sample, CONTRACTOR shall provide the material or equipment approved. ENGINEER will not review subsequent submittals of a different manufacturer or Supplier unless CONTRACTOR provides sufficient information to ENGINEER that the approved material or equipment is unavailable, time of delivery will delay the construction progress, or OWNER requests a different manufacturer or Supplier.

SC – 6.20

Add the following two new paragraphs immediately after Paragraph 6.20.C of the General Conditions:

- D. The obligations of CONTRACTOR under Paragraph 6.20 shall be construed to include injury or damage resulting from any failure to use or misuse by CONTRACTOR, CONTRACTOR'S agents and employees of any scaffold, hoist, crane, stay, ladder, support or other mechanical contrivance erected or constructed by any person or any or all other kinds of equipment whether or not owned or furnished by OWNER. It is understood that this excludes use by OWNER or OWNER'S employees of scaffolding owned and furnished by OWNER.

- E. In the event that CONTRACTOR is requested but refused to honor the indemnity obligations of 6.20.A and 6.20.B CONTRACTOR shall, in addition to all other obligations, pay the cost of bringing any such action, including attorneys fees, to the party requesting indemnity.

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

SC – 9.03

Delete paragraph 9.03 in its entirety and insert the following in its place:

9.03 Project Representative

- A. ENGINEER will furnish a Resident Project Representative (RPR), assistants and other field staff to assist ENGINEER in observing the performance of the Work of CONTRACTOR.
- B. Through more extensive on-site observations of the Work in progress and field checks of materials and equipment by the RPR, ENGINEER shall “exercise reasonable professional care and skill” to provide further protection for OWNER against defects and deficiencies in the Work; but, the furnishing of such services will not make ENGINEER responsible for or give ENGINEER control over construction means, methods, techniques, sequences or procedures or for safety precautions or programs, or responsibility for CONTRACTOR’S failure to perform the Work in accordance with the Contract Documents.
- C. The responsibilities, authority, and limitations of the RPR are limited to those of ENGINEER in paragraph 9.10 of the General Conditions, and the Contract Documents, and are further limited and described as follows:
 - 1. RPR is ENGINEER’S agent at the site, will act as directed by and under the supervision of ENGINEER, and will confer with ENGINEER regarding RPR’s actions. RPR’s dealings in matters pertaining to the on-site work shall in general be with ENGINEER and CONTRACTOR keeping OWNER advised as necessary. RPR’s dealings with subcontractors shall only be through or with the full knowledge and approval of CONTRACTOR. RPR shall generally communicate with OWNER with the knowledge of and under the direction of ENGINEER.
 - 2. Duties and responsibilities of the RPR:
 - a. Conduct a preconstruction conference with OWNER, CONTRACTOR, Utilities, and other appropriate parties affected by the Project. This meeting will allow all parties to the Project the opportunity to develop specific guidelines of involvement, establish timetables of events, and define Project requirements.
 - b. Review Applications for Payment submitted by CONTRACTOR. Evaluate applications against work observed as being completed. Forward applications to OWNER for approval and payment after revision, when necessary.
 - c. Provide direction for the assistants and coordinate observation activities.
 - d. Direct visiting inspectors representing public or other agencies having jurisdiction over the Project to OWNER or CONTRACTOR as appropriate.
 - e. Administer all required Written Amendments and other documents amending, modifying, or supplementing the Contract Documents as the Project proceeds.

- f. Disapprove or reject Work which is observed to be "defective". Require inspection or testing of Work as provided in Article 13 of the General Conditions when it is deemed necessary.
- g. Review the testing of equipment and systems provided by CONTRACTOR and assess its compliance with the Contract Documents.
- h. Determine final quantities for Work installed which will serve as the basis for the final payment to CONTRACTOR.
- i. Coordinate efforts required to prepare record drawings showing those changes made during construction, based on the marked-up prints, drawings and other data furnished by CONTRACTOR to ENGINEER and which ENGINEER considers significant.

SC - 9.10

Add the following new paragraph immediately after Paragraph 9.10.E.:

- F. When ENGINEER is on the Project site to perform the duties and responsibilities as set forth in the Contract Documents, ENGINEER will comply with CONTRACTOR'S safety plans, programs, and procedures. In the event ENGINEER determines that CONTRACTOR'S safety plans, programs, and procedures do not provide adequate protection for ENGINEER, ENGINEER may direct its employees to leave the Project site or implement additional safeguards for ENGINEER'S protection. If taken, these actions will be in furtherance of ENGINEER'S responsibility to its own employees only, and ENGINEER will not assume any responsibility for protection of any other persons affected by the Work.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

SC – 10.03

Add the following new paragraph immediately after subparagraph 10.03.A.3.

- 4. Change Orders will be prepared on the form included in the Appendix of this Project Manual.

SC – 10.05

Add the following new subparagraph after paragraph 10.05.A:

- 1. Notice of the amount or extent of the claim shall include the following certification:

"CONTRACTOR certifies that this claim is made in good faith, that the supporting data are accurate and complete to the best of CONTRACTOR'S knowledge and belief, and that the amount or time requested accurately reflects the Contract adjustment for which CONTRACTOR believes OWNER is liable."

SC – 10.05 A.

In paragraph 10.05A modify the first sentence to read: All Claims, arising during construction, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision.

SC – 10.06

Add the following new paragraph immediately after paragraph 10.05.G:

- 10.06 CONTRACTOR acknowledges the applicability of the False Claims Act, 31 U.S.C. S3729, et seq., to this Contract, including liability for false and fraudulent claims resulting in civil penalties of \$5,000 to \$10,000, treble damages, and award of attorneys' fees and costs.

ARTICLE 11 – COST OF WORK; CASH ALLOWANCES; UNIT PRICE WORK

SC – 11.03

Delete Paragraph 11.03.D. in its entirety and insert the following in its place:

- D. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
1. if the total cost of a particular item of Unit Price Work amounts to 5% or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25% from the estimated quantity of such item indicated in the Agreement; and
 2. if there is no corresponding adjustment with respect to any other item of Work; and
 3. if CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof; or if OWNER believes that the quantity variation entitles OWNER to an adjustment in the unit price, either OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

SC – 12.01

Delete paragraph 12.01.B.2. in its entirety and insert the following in its place:

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum which includes an allowance for overhead and profit in accordance with Paragraph 12.01.C.

SC – 12.01

Delete paragraph 12.01 C. 2c, in its entirety and insert the following in its place:

- c. Adjustments in the Contract Sum and the Contract Time shall be effected only by a properly executed Change Order. The Contractor and Owner agree that notwithstanding any other provisions herein, the combined overhead and profit included in the total cost of any Change Order shall not exceed the following schedule:
- 1 For the General Contractor, for work performed by its own forces, ten percent (10%) of the cost.
 - 2 For the General Contractor for work performed by the General Contractor's Subcontractor, five percent (5%) of the amount due to the Subcontractor.
 - 3 For all Subcontractor or Sub-Subcontractor involved, for work performed by that Subcontractor or Sub-Subcontractor's own forces, an aggregate of not to exceed ten percent (10%) of the cost.

- 4 Total aggregate cost of overhead and profit to Owner shall not exceed fifteen percent (15%), regardless of the number of levels of Subcontractors and Sub-Subcontractors involved.

SC – 12.02

Add the following new paragraph immediately after paragraph 12.02.B.:

- C. Time extensions provided under paragraphs 12.02 and 12.05 of the General Conditions will only be allowed for controlling items of Work (critical path).

SC – 12.03

Delete paragraph 12.03.B. in its entirety and insert the following in its place:

- B. Except as provided for in paragraph 15.01., CONTRACTOR shall make no claim for damages for delay in the performance of the Work occasioned by acts or neglect by OWNER or any of its representatives, including ENGINEER, or ENGINEER's Consultants, or because of any injunction which may be brought against OWNER or its representative, including ENGINEER or ENGINEER's Consultants, and agrees that any such claim shall be fully compensated for by an extension of time in an amount equal to the time lost due to such delay, and that such time extension shall be CONTRACTOR's sole and exclusive remedy for such delay.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

SC – 14.02

Amend the first sentence of subparagraph 14.02.A.1. by striking out the words "20 days" and inserting the words "30 days" in their place.

Amend the first sentence of paragraph 14.02.C. by striking out the words "Ten days" and inserting the words "Twenty days" in their place.

SC – 14.04

Add the following new subparagraphs immediately after paragraph 14.04.A.:

1. CONTRACTOR'S request for issuance of a Certificate of Substantial Completion shall occur after CONTRACTOR has, in the opinion of the ENGINEER, satisfactorily delivered all schedules, guarantees, Bonds, certificates or other evidence of insurance required by ARTICLE 5, certificates of inspection, affidavit of wage rate compliance, marked-up record documents (as provided in paragraph 6.12) and other documents. ENGINEER will not prepare a tentative certificate of Substantial Completion until all operation and maintenance data has been submitted and approved.

SC – 14.07

Amend the first sentence of subparagraph 14.07.A.1. by striking out the following words: "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, marked up record documents (as provided in paragraph 6.12), and other documents"

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

SC – 15.04

Amend paragraphs 15.04.A and B by striking out the words “30 days” in six places and inserting the words “60 days” in their place and by striking out the words “seven days” in two places and inserting the words “ten days” in their place.

ARTICLE 16 – DISPUTE RESOLUTION

Add the following paragraphs immediately after 16.01:

SC – 16.02

During construction and after construction, at the sole discretion of the Owner, all claims, disputes and other matters in question between any of the Architect, Construction Manager, Owner, Contractor, Subcontractor or any material supplier arising out of, or relating to, agreements to which two or more of said parties are bound, or the Contract Documents or the breach thereof, except as provided in subparagraph 4.2.13 with respect to the Architect's decisions on matters relating to aesthetic effect, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtain, as modified herein. At least one member of the arbitration panel shall be an attorney whose practice is primarily focused on the construction industry. In any such arbitration, the arbitrator shall make separate findings as to liability and the amount of damages with respect to each party to the arbitration to the extent any liability or responsibility for damages exists. The Architect, subcontractors and material suppliers who have an interest in the dispute shall be joined as parties to the arbitration. The Owner's contracts with the Architect and Construction Manager and the Contractor's subcontracts with the subcontractors and material suppliers, shall require such joinder. The arbitrator shall have authority to decide all issues between the parties including but not limited to claims for extras, delay and liquidated damages, matters involving defects in the Work, right to payment, whether matters decided by the Architect involve aesthetic effect and whether the necessary procedures for arbitration have been followed. The foregoing agreement to arbitrate and any other agreement to arbitrate with an additional person or persons, duly consented to by the parties, shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrator shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

SC - 16.03

Any Claim arising out of or related to the Contract, except those waived as provided for in Subparagraph 9.10.5, may, with the Owner's consent, be subject to arbitration. Prior to arbitration, the parties may, with the Owner's consent, endeavor to resolve disputes by mediation unless otherwise agreed in writing, all parties shall carry on the work and perform their duties during any mediation or arbitration proceedings.

SC - 16.04

In addition to the other rules of the American Arbitration Association applicable to any arbitration hereunder, the following shall apply:

1. Promptly upon the filing of the arbitration each party shall be required to set forth in writing and to serve upon each other party a detailed statement of its contentions of fact and law; .
2. All parties to the arbitration shall be entitled to reasonable discovery procedures and to the scope of discovery applicable to civil actions under Illinois law, including the provisions of the Code of Civil Procedure and Illinois Supreme Court rules applicable to discovery. Such discovery shall be noticed, sought and governed by those provisions of Illinois law;

3. The arbitration shall be commenced and conducted as expeditiously as possible consistent with affording reasonable discovery as provided herein. Similarly, the scope of discovery, and the extent of proceedings hereunder relating to discovery, shall be consistent with the parties' intent that the arbitration be conducted as expeditiously as possible;
4. The arbitrator(s) shall apply the law of Illinois and the terms and conditions of the Contract Documents and this Agreement;
5. These additional rules shall be implemented and applied by the arbitrator(s).

SC - 16.5

Claims and Timely Assertion of Claims. In the event of any litigation or arbitration between the parties hereunder, all attorneys' fees and other costs incurred shall be borne by the party determined to be at fault and in the event that more than one party is determined to be at fault, shall be allocated equitably by the court or arbitrator.

ARTICLE 17 – MISCELLANEOUS

SC – 17.01

Delete paragraph 17.01.A in its entirety and insert the following in its place:

- A. Whenever any provision of the Contract Documents requires the giving of a written notice or the delivery of any Bond, Agreement, Certificate of Insurance or any other item, it shall be deemed to have been validly given if delivered in person to the individual, to a member of the firm, or to an officer of the cooperation for whom it is intended, or if delivered at or sent by registered or certified mail (return receipt), postage prepaid, to the last business address known to the giver of the article.

SC – 17.07

Add the following new paragraph immediately after paragraph 17.06:

17.07 Lien Waivers:

- A. OWNER may at any time require CONTRACTOR to furnish lien waivers for labor and materials covered by specified Applications for Payment.

SC – 18

Add the following new paragraphs after paragraph 17.07:

- 18.01. Contractor acknowledges that this project is governed by the Illinois Prevailing Wage Act. Construction Manager shall pay its laborers if any and assure the Owner that Subcontractors shall pay its laborers not less than the established prevailing rate of wages. 820 ILCS 130/1 et seq. Construction Manager shall comply with all reporting requirements of the Illinois Prevailing Wage Act. Similarly, the Contractor shall assure owner that all Subcontractors and sub-tier subcontractors comply with the reporting requirements of the Illinois Prevailing Wage Act. Contractor and each sub-tier shall with each pay application submit certified payroll records as required by 820 ILCS 130/5.
- 18.02. Contractor represents that it does not discriminate in its hiring practices based upon race, color, religion, sex, marital status, national origin or ancestry, age, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service. Contractor

shall assure the Owner that Subcontractors shall not discriminate as set forth in this paragraph. 775 ILCS 5/2-1053; 44 Ill. Admin. Code Section 750 et seq. Contractor shall (1) refrain from unlawful discrimination and discrimination based on citizenship status in employment and undertake affirmative action to assure equality of employment opportunity and eliminate the effects of past discrimination; (2) Comply with the procedures and requirements of the Department's regulations concerning equal employment opportunities and affirmative action; (3) Provide such information, with respect to its employees and applicants for employment, and assistance as the Department may reasonably request; (4) Have written sexual harassment policies that shall include, at a minimum, the following information: (i) the illegality of sexual harassment; (ii) the definition of sexual harassment under State law; (iii) a description of sexual harassment, utilizing examples; (iv) the vendor's internal complaint process including penalties; (v) the legal recourse, investigative and complaint process available through the Department and the Commission; (vi) directions on how to contact the Department and Commission; and (vii) protection against retaliation as provided by Section 6-101 of this Act. A copy of the policies shall be provided to the Owner or Department of Human Rights upon request.

- 18.03. Contractor represents that it has in place a Sexual Harassment Policy in accordance with the Illinois Human Rights Act and shall assure the Owner that Subcontractors shall have in place a Sexual Harassment Policy prior to commencement of work on the Project. 775 ILCS 5/1-105.
- 18.04. Contractor represents that it is in conformance with the Drug Free Workplace Act. 30 ILCS 580/1 et seq.
- 18.05. Contractor by execution of this Agreement certifies it is not barred from contracting as a result of bid rigging or bid rotation. 720 ILCS 5/33 E-11.
- 18.06. Contractor by execution of this Agreement agrees to provide Owner the name of each employee who may have direct daily contact with students, and such additional information as is necessary and authorizes Owner to submit such information to the State Police and other state agencies. Such information will be submitted for a criminal history records check and a check of the Statewide Sex Offender Database. Such investigation shall be performed at the Owner expense. 105 ILCS 5/10-21.9(f). Owner reserves the right to reject the use of any laborer with a criminal record of a conviction of or a finding of child abuse or who has been identified as a sex offender.
- 18.07. Contractor agrees by the execution of this agreement to give preference in employment and appointment to persons who have been members of the armed forces of the United States or who, while citizens of the United States, were members of the armed forces of allies of the United States in time of hostilities with a foreign country in accordance with the Veterans Preference Act. 330 ILCS 55.

END OF SECTION 00800

PERFORMANCE & MAINTENANCE BOND

PERFORMANCE & MAINTENANCE BOND

PERFORMANCE & MAINTENANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

McHenry County College

8900 US Highway 14

Crystal Lake, IL 60012-2761

CONTRACT

Date:

Amount:

Description (Name and Location):

MCC Water Service Extension & Booster Station

Job No.: 160386 Sealed Project Manual

and Sealed Plans stamped "For Construction"

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____ (Seal)

Name and Title:

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____ (Seal)

Name and Title:

SURETY

(Seal)

Surety's Name and Corporate Seal

By:

Signature and Title

(Attach Power of Attorney)

Attest:

Signature and Title

SURETY

(Seal)

Surety's Name and Corporate Seal

By:

Signature and Title

(Attach Power of Attorney)

Attest:

Signature and Title:

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

2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:

3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and

3.2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 3.1; and

3.3. Owner has agreed to pay the Balance of the Contract Price to:

1. Surety in accordance with the terms of the Contract;
2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.

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

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

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

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or

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

1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
2. Deny liability in whole or in part and notify Owner citing reasons therefor.

5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and

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

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

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

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after 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 period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

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

12.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY – Name, Address and Telephone
Surety Agency or Broker
Owner's Representative (engineer or other party)

PAYMENT BOND

PAYMENT BOND

PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

McHenry County College
8900 US Highway 14
Crystal Lake, IL 60012-2761

CONTRACT

Date:

Amount:

Description (Name and Location):

MCC Water Service Extension & Booster Station

Job No.: 160386 Sealed Project Manual

and Sealed Plans stamped "For Construction"

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____ (Seal)

Name and Title:

SURETY

(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____

Signature and Title

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____ (Seal)

Name and Title:

SURETY

(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

Attest: _____

Signature and Title:

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

2. With respect to Owner, this obligation shall be null and void if Contractor:

2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2. Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.

4. Surety shall have no obligation to Claimants under this Bond until:

4.1. Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2. Claimants who do not have a direct contract with Contractor:

1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and

2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to Surety and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.

6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:

6.1. Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

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

7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.

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

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

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

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, 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 shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. DEFINITIONS

15.1. Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and 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.

15.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY – Name, Address and Telephone

Surety Agency or Broker:

Owner's Representative (engineer or other party):

NOTICE OF AWARD

NOTICE OF AWARD

Notice of Award

Dated: _____

Project: MCC Water Service Extension & Booster Station Installation		Owner's Contract No.:
Contract:	Owner: McHenry County College	Engineer's Project No.: 160386
Bidder:		Contact:
Bidder's Address: (send Certified Mail, Return Receipt Requested)		

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for the McHenry County College Pond Restoration Project generally consists of the following:

The project includes the installation of approximately +/- 990 lineal feet of 12" water main and approximately +/- 645 lineal feet of 8" water service including a booster station and associated valves and fire hydrants for McHenry County College. General construction for the water main/service extension and booster station project includes, but not limited to, installation of water main, water service, standby generator and booster station along with the other work associated with the project as outlined in the plans and specifications.

The Contract Price of your Contract is _____ (\$ _____).

Four (4) copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

Additional sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within five [5] days of the date you receive this Notice of Award.

1. Deliver to the Owner four (4) fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents - the Contract Security Bonds and proof of insurance coverage as specified in the General Terms and Conditions.

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 ten (10) days after you comply with the above conditions, Owner will return to you one (1) fully executed counterpart of the Contract Documents.

McHenry County College

Owner

By:

Authorized Signature – Agent for McHenry County College

Title

Copy to: HR Green, Inc.
Mr. Todd Wheeland, MCC

NOTICE TO PROCEED

Notice to Proceed

Dated: _____

Project: MCC Water Service Extension & Booster Station Installation		Owner's Contract No.:
Contract:	Owner: McHenry County College	Engineer's Project No.: 160386
Contractor:..		

Contractor's Address: [send Certified Mail, Return Receipt Requested]

You are notified that the Contract Times under the above contract will commence to run on _____. On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is _____ and the date of readiness for final payment is _____.

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

1. Attend Pre-Construction Meeting
2. Submit required Bonds to Owner and Insurance Certificates
3. Obtain all necessary permits
4. Preliminary Schedule of Construction

_____ (Contractor) Received by:	McHenry County College Owner Given by: Authorized Signature
_____ (Title)	_____ Title
_____ (Date)	_____ Date

Copy to: HR Green, Inc.
Mr. Todd Wheeland, MCC

CONSTRUCTION ADMINISTRATION FORMS

CONSTRUCTION ADMINISTRATION FORMS

Contractor's Submittal Transmittal

Dated _____

Transmittal No.: _____

Submittal No.: _____

To:	Urgency: Extreme _____ Normal _____
	Substitute: Yes _____ No _____
	Project:
Attention:	

Specification Section No: _____ Paragraph No: _____ Drawing No: _____

Submittal Includes: _____ Shop Drawings _____ Product Data _____ Samples _____ Test Results _____ O&M Data _____ Misc	
Copies	Description

THESE ARE TRANSMITTED:
_____ For Approval _____ As Requested _____ For Your Use

Remarks:

- The information included in this submittal has been reviewed by the undersigned, before submitting to the Engineer, for compliance with paragraph 6.17 of the General Conditions.
- Identified in this submittal, in accordance with paragraph 6.17 of the General Conditions, are _____ variations from the Contract Documents and indicated on the following pages:

- Contract Clarification/Interpretation Request form(s) were submitted and response(s) received:
____ Yes ____ No (If yes, attach form(s) to this transmittal)

Contractor: _____

Signature: _____ Date _____

Name (print): _____

Title: _____

[illegible]

Comments:

This image shows a full page of blank handwriting practice paper. It features multiple sets of horizontal lines. Each set consists of three lines: two solid black outer lines and one dashed purple middle line, providing a guide for letter height and placement. The lines are evenly spaced across the entire page.

Contractor's Clarification/Interpretation Request

Clarification Request No.	Date:
Contractor:	Specification Section/Drawing No.:
Project:	
Contract:	

This is a request for clarification/interpretation on the following:

Prepared by:	Date Response Needed:
Response:	

Prepared by:	Date:
Response Returned to Contractor On:	
cc: Owner _____	
Resident Project Representative: _____	

Work Change Directive

No. _____

Date of Issuance: _____ Effective Date: _____

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

You are directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

Purpose for Work Change Directive:

- ☐ Authorization for Work described herein to proceed on the basis of Cost of the Work due to:
- ☐ Nonagreement on pricing of proposed change.
- ☐ Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price \$ _____ (increase/decrease)

Contract Time _____ (increase/decrease)
days

If the change involves an increase, the estimated amounts are not to be exceeded without further authorization.

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Accepted for Contractor by:	Date
Approved by Funding Agency (if applicable):	Date:

Change Order

No. _____

Date of Issuance: _____ Effective Date: _____

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

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

Description:

Attachments: (List documents supporting change):

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:
Original Contract Price:	Original Contract Times: <input type="checkbox"/> Working days <input type="checkbox"/> Calendar days
\$ _____	Substantial completion (days or date): _____
	Ready for final payment (days or date): _____
[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____:
\$ _____	Substantial completion (days): _____
	Ready for final payment (days): _____
Contract Price prior to this Change Order:	Contract Times prior to this Change Order:
\$ _____	Substantial completion (days or date): _____
	Ready for final payment (days or date): _____
[Increase] [Decrease] of this Change Order:	[Increase] [Decrease] of this Change Order:
\$ _____	Substantial completion (days or date): _____
	Ready for final payment (days or date): _____
Contract Price incorporating this Change Order:	Contract Times with all approved Change Orders:
\$ _____	Substantial completion (days or date): _____
	Ready for final payment (days or date): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____ Engineer (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____
Approved by Funding Agency (if applicable): _____		Date: _____

Contractor's Application For Payment No. _____

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

APPLICATION FOR PAYMENT

Change Order Summary

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

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

CONTRACTOR'S CERTIFICATION

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

By:	Date:

Payment of:	\$ _____	(Line 8 or other - attach explanation of other amount)
is recommended by:	_____	_____ (Date)
	(Engineer)	
Payment of:	\$ _____	(Line 8 or other - attach explanation of other amount)
is approved by:	_____	_____ (Date)
	(Owner)	
Approved by:	_____	_____ (Date)
	Funding Agency (if applicable)	

CONTRACTOR'S APPLICATION FOR PAYMENT

Progress Estimate

Contractor's Application

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

Progress Estimate

Contractor's Application

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

Stored Material Summary

Contractor's Application

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

Certificate of Substantial Completion

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

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- ☐ All Work under the Contract Documents: ☐ The following specified portions:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [revised tentative] [definitive] list of items to be completed or corrected, is attached hereto. 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.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- ☐ Amended Responsibilities ☐ Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

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

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

Executed by Engineer

Date

Accepted by Contractor

Date

Accepted by Owner

Date

CONTRACTOR'S REQUEST FOR SUBSTITUTION
(Include with Submittal)

Provisions requiring submittal of this form are described in Paragraph 6.05 of the General and Supplementary Conditions.

Substitution Request No.: _____

Project: _____

Contract: _____

We hereby apply for consideration _____

(Proposed Substitute Manufacturer)

as a substitute manufacturer to the manufacturer(s) named in Specification Section _____

Paragraph/Drawing No. _____ for the following reasons. (Check one or more)

_____ The specified equipment or material is unavailable or the time of delivery will substantially delay the construction of the project, but not as result of Contractor's failure to pursue Work promptly or coordinate various activities. (Provide supporting information)

_____ The proposed equipment or material will provide for packaging and coordination with other equipment from a single source supplier. (Submit name of source supplier and other equipment to be packaged.)

_____ The proposed equipment or material is a "Substitute Item" to that specified and the Contractor will provide the Owner with a credit of \$_____ if the equipment or material is accepted.

We certify that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to the specified, be suited to the same use as that specified, and will not prejudice Contractor's achievement of Substantial Completion on time.

Contractor: _____

Signature: _____ Date: _____

Name (print): _____

Title: _____

NOTE: Engineer may require Contractor to furnish, at Contractor's expense, additional data about the proposed substitute including but not limited to, an analysis by Contractor of the equivalency of the proposed substitute to the named item.

A. Physical Characteristics of Proposed Substitute (if applicable).

Operating Weight: _____ Height: _____ Width: _____ Depth: _____

Voltage: _____ Hertz: _____ KWor HP: _____

B. Will acceptance of the proposed substitute by the Owner:

1. Require a change in the Drawings or Specifications: Yes ☐ No ☐
If yes, attach an explanation and detailed drawings or specifications.

2. Require payment of any license fee or royalty: Yes ☐ No ☐
If yes, attach an explanation.

3. Result in a change of contract time: Yes ☐ No ☐

C. Variations of proposed substitute from specified material, equipment, methods or procedures include: (if none, state none. Attach separate listing if more space is needed.)

1.

2.

3.

4.

D. Service Source (Maintenance, Repair, and Replacement) Availability:

1. Name of Business: _____

Address: _____

Years in Business: _____ Factory Authorized: Yes ☐ No ☐

Parts Stocked: Major: Yes ☐ No ☐ Minor: Yes ☐ No ☐

Field Service Staff Available: Yes ☐ No ☐

2. Name of Business: _____

Address: _____

Years in Business: _____ Factory Authorized: Yes ☐ No ☐

Parts Stocked: Major: Yes ☐ No ☐ Minor: Yes ☐ No ☐

Field Service Staff Available: Yes ☐ No ☐

E. Identify costs, direct or indirect, if any, associated with acceptance of this proposed substitute.
(If none, state none.)
