CITY OF JOLIET
WILL COUNTY, ILLINOIS
SPECIFICATIONS, PLANS, CONTRACT PROPOSAL, CONTRACT AND CONTRACT BOND

FOR THE

2024 LIFT STATION REPLACEMENT PROGRAM- BENTON LIFT STATION AND GREENFIELD LIFT STATION

CONTRACT NO. 2809-0424

APPROVED
DEPARTMENT OF PUBLIC UTILITIES

_____
DIRECTOR OF PUBLIC UTILITIES

DATE February 15, 2024

APPROVED

DEPARTMENT OF PUBLIC UTILITIES

_____
DEPUTY DIRECTOR OF PUBLIC UTILITIES

DATE: 2/15, 2024

SUBMITTED BY

_____
CONTRACTORS NAME

_____
ADDRESS

_____
CITY AND STATE

_____
PHONE

DATE:_____, 2024

February 2024

PROJECT MANUAL

CITY OF JOLIET

2024 LIFT STATION REPLACEMENT PROGRAM- BENTON LIFT STATION AND GREENFIELD LIFT STATION

CONTRACT NUMBER 2809-0424

Joliet, Illinois

Donohue & Associates, Inc.
230 Monroe Street, Suite 2925
Chicago, IL 60606
312.236.9147 | donohue-associates.com

Donohue Project No.: 14163

This page intentionally left blank.

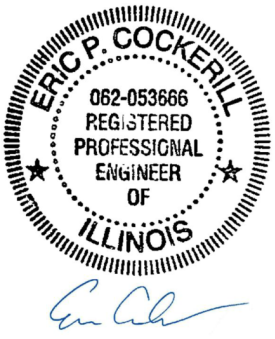
PROJECT MANUAL

CITY OF JOLIET

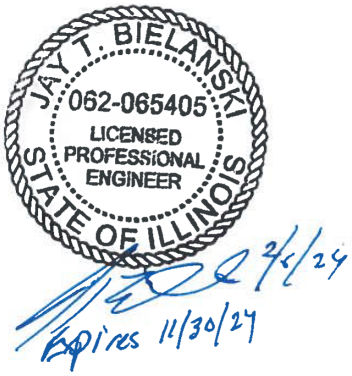
2024 LIFT STATION REPLACEMENT PROGRAM- BENTON LIFT STATION AND GREENFIELD LIFT STATION
JOLIET, ILLINOIS







Exp. 11/30/25 February 6, 2024



Donohue & Associates, Inc.
230 West Monroe, Suite 2925
Chicago, IL 60606
Phone: 312-236-9147

www.donohue-associates.com

Project No. 14163

This page intentionally left blank.

PROJECT MANUAL

CITY OF JOLIET

2024 LIFT STATION REPLACEMENT PROGRAM- BENTON LIFT STATION AND GREENFIELD LIFT STATION
CONTRACT NUMBER 2809-0424

JOLIET, ILLINOIS

TABLE OF CONTENTS

INVITATION TO BID	00 11 16
INSTRUCTIONS TO BIDDERS	00 21 13
PREVAILING WAGE REQUIREMENTS	00 30 50
CITY OF JOLIET BIDDING REQUIREMENTS	00 30 90
BID FORM	00 41 33
BID BOND	00 43 13
AGREEMENT	00 52 33
NOTICE OF AWARD	00 53 00
NOTICE TO PROCEED	00 55 00
PERFORMANCE BOND	00 61 13.13
PAYMENT BOND	00 61 13.16
GENERAL CONDITIONS	00 72 00
SUPPLEMENTARY CONDITIONS	00 73 00

TECHNICAL SPECIFICATIONS

DIVISION 01 – GENERAL REQUIREMENTS

Section 01 11 00 – Summary of Work
Section 01 21 00 – Allowances
Section 01 29 73 – Schedule of Values
Section 01 31 19 – Project Meetings
Section 01 32 16 – Construction Progress Schedule
Section 01 32 33 – Construction Photographs
Section 01 33 00 – Submittal Procedures
Section 01 35 16 – Alteration Project Procedures
Section 01 41 00 – Regulatory Requirements
Section 01 45 29 – Testing Laboratory Services
Section 01 52 00 – Construction Facilities
Section 01 53 05 – Temporary Pumping Systems
Section 01 55 26 – Traffic Control
Section 01 57 19 – Temporary Environmental Controls
Section 01 61 00 – Common Product Requirements
Section 01 74 00 – Cleaning and Waste Management

Section 01 78 39 – Project Record Documents
Section 01 79 10 – Systems Demonstrations

DIVISION 03 – CONCRETE

Section 03 20 00 – Concrete Reinforcing
Section 03 30 00 – Cast-In-Place Concrete
Section 03 62 00 – Non-shrink Grouting

DIVISION 05 – METALS

Section 05 50 00 – Metal Fabrications

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

Section 07 92 00 – Joint Sealants

DIVISION 09 – FINISHES

Section 09 96 00 – High-Performance Coatings

DIVISION 22 – PLUMBING

Section 22 00 05 – Plumbing Systems

DIVISION 26 – ELECTRICAL

Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
Section 26 05 26 – Grounding and Bonding for Electrical Systems
Section 26 05 29 – Hangers and Supports for Electrical Systems
Section 26 05 33.13 – Cabinets and Boxes for Electrical Systems
Section 26 05 33.16 – Conduit for Electrical Systems
Section 26 05 43 – Underground Ducts and Raceways for Electrical Systems
Section 26 05 53 – Identification for Electrical Systems
Section 26 05 90 – Electric Utility Services
Section 26 08 00 – Electrical Systems Demonstrations
Section 26 27 26 – Wiring Devices
Section 26 32 13.16 – Gas-Engine-Driven Generator Sets
Section 26 36 00 – Transfer Switches

DIVISION 31 – EARTHWORK

Section 31 10 00 – Site Cleaning
Section 31 23 00 – Excavation and Fill
Section 31 23 33 – Trenching and Backfilling
Section 31 25 00 – Erosion and Sediment Control

DIVISION 32 – EXTERIOR IMPROVEMEMTS

Section 32 11 23 – Aggregate Base Courses
Section 32 12 16 – Asphalt Paving
Section 32 16 13 – Curbs and Gutters
Section 32 16 23 – Sidewalks Concrete
Section 32 31 13 – Chain Link Fences and Gates
Section 32 92 00 – Turf and Grasses

DIVISION 33 – UTILITIES

Section 33 05 05 – Site Utilities
Section 33 05 07.13 – Horizontal Directional Drilling
Section 33 05 61 – Manholes, Catch Basins, and Inlets
Section 33 31 13 – Sanitary Sewer Gravity Piping
Section 33 31 23 – Sanitary Sewerage Force Main Piping
Section 33 42 11 – Storm Water Gravity Piping
Section 33 52 00 – Natural Gas Piping

DIVISION 40 – PROCESS INTERCONNECTIONS

Section 40 05 05 – Exposed Piping Installation
Section 40 05 06 – Couplings, Adapters, and Specials for Process Piping
Section 40 05 07 – Pipe Hangers and Supports
Section 40 05 09 – Pipe Sleeves and Seals
Section 40 05 10 – Testing Piping Systems
Section 40 05 19 – Ductile Iron Process Pipe
Section 40 05 23 – Stainless Steel Process Pipe
Section 40 05 31.13 – Polyvinyl Chloride Process Pipe
Section 40 05 53 – Process Valves
Section 40 05 97 – Piping and Equipment Identification
Section 40 61 13 – Process Control System (PCS) General Provisions
Section 40 61 20 – Process Control System (PCS) Configuration Services
Section 40 61 21 – Process Control System - Testing
Section 40 61 26 – Process Control System - Training
Section 40 61 30 – Process Control System – O&M Data
Section 40 62 63 – Operator Interface Terminals
Section 40 63 43 – Programmable Logic Controllers
Section 40 67 63 – Control Panel Mounted Uninterruptible Power Supply (UPS)
Section 40 70 00 – Instrumentation of Process Systems
Section 40 78 00 – Panel Mounted Instruments
Section 40 79 00 – Miscellaneous Instruments

DIVISION 43 – PROCESS GAS AND LIQUID HANDLING EQUIPMENT

Section 43 25 13 – Submersible Centrifugal Pumps

APPENDIX A – Geotechnical Borings

APPENDIX B – Contractor Forms

This page intentionally left blank.

LEGAL NOTICE
CITY OF JOLIET
ADVERTISEMENT TO BIDS

CONTRACT NO. 2809-0424

PROJECT NAME: 2024 LIFT STATION REPLACEMENT PROGRAM- BENTON LIFT STATION AND GREENFIELD LIFT STATION

The City of Joliet, Illinois, does hereby invite sealed bids for replacement of two sanitary lift stations, including wet well, two submersible pumps at each location, control panels, installation of Owner-furnished backup generator at one location, and associated piping, valves and electrical improvements.

Bids will be received at the Office of the City Clerk, City of Joliet Municipal Building, 150 West Jefferson Street, Joliet, Illinois 60432-4156 until **10:00 A.M. local time on Tuesday – March 19, 2024** at which time they will be opened and publicly read aloud. **BIDS WILL BE OPENED AND PUBLICLY READ ALOUD IN CONFERENCE ROOM 1**.

It is highly recommended, that all bids be tabbed to mark the Bid Bond and Lump Sum Bid Price pages. It is required that an electronic copy of the entire submission be included on a USB flash drive. Bid results will also be posted on the City's website, and emails sent out to individuals who have subscribed to the related RSS feed. It is preferred that you mail your bids/proposals. They should be addressed as follows:

CITY OF JOLIET - SEALED BID ENCLOSED
OFFICE OF THE CITY CLERK
150 W. JEFFERSON ST.
JOLIET, IL 60432

If you do choose to hand deliver your bid, it must be delivered to the Office of the City Clerk between the hours of 8:00 A.M. and 4:30 P.M., located at the above address. It must be marked clearly on the outside of the SEALED package with the CONTRACT NUMBER AND NAME OF THE PROJECT, DATE AND TIME OF THE SUBMISSION DEADLINE, NAME AND ADDRESS AND PHONE NUMBER OF YOUR COMPANY. Please make sure to mention you are delivering a sealed bid, so the receiver knows to time stamp the envelope upon receipt.

Receipt of your submittal in any location other than the City Clerk's office at City Hall, 150 W. Jefferson St., Joliet, IL 60432, does not constitute receipt. If you are using a delivery service, the fact that it was signed for by someone at City of Joliet does not constitute receipt. To ensure that your package was received prior to the opening, you can email cityclerk@joliet.gov or call 815-724-3780 to verify receipt of document.

Electronic copies can be downloaded free of charge at https://www.joliet.gov/bids. No hard copies will be available for purchase.

All bidders will be required to submit Bid Security in the form of a Certified Check, Cashier's Check or a Bid Bond in the amount of **Ten percent (10%) of the Base Bid**, payable to the City of Joliet.

All Bidding Document holders should sign up for RSS feeds at: https://www.joliet.gov/government/departments/finance/purchasing/bids-proposals/construction-public-utilities to automatically receive addendums. Addendums will also be posted on the City of Joliet's website at: https://www.joliet.gov/bids. The potential vendor/contractor remains responsible for obtaining all addendums to the original specification so they should check the specific bid page before submitting a bid to make sure they have received all addendums to a specific contract. Bidders are to acknowledge receipt of all addendums within the bid package.

The City of Joliet has a local qualified bidder ordinance that would apply to this contract. To apply to be a local qualified bidder please go to: https://www.joliet.gov/government/departments/finance/purchasing/prequalification-local-bidder.

The successful bidder will be required to post performance Security and to provide a Certificate of Insurance as set forth in the Invitation of Bid and the General Terms & Conditions.

The City of Joliet reserves the right to reject any and all bids, parts of any and all bids, or to waive technical errors or omissions in bids. The Contract shall be subject to the provisions of the *Prevailing Wage Act* (820 ILCS 130/1 et seq.) to the extent required by law.

ALL PROPOSALS ARE SUBJECT TO THE REQUIREMENTS OF THE CITY OF JOLIET PROCUREMENT CODE (Section 2-430 - 2-453 of the Code of Ordinances)

BID DOCUMENT FEE: Free electronic download

Published in the Labor Record:
Thursday, February 22, 2024

Beth Beatty
City Manager

Melissa L. Lopez
Purchasing/Contracts Administrator

FINANCE DEPARTMENT
PURCHASING DIVISION
PHONE: 815-724-3925
FAX: 815-724-3929

CITY OF JOLIET

150 WEST JEFFERSON STREET
JOLIET, ILLINOIS 60432-4158

Prospective Bidder:

Enclosed are bid documents which may be of interest to your company. Please note the date and time as to when this bid will be opened. The bid documents **must** be returned intact - the same order as received.

The bid must be submitted in an opaque sealed envelope **prior** to the date and time set forth for the bid opening, as published in the Legal Notice – Advertisement for Bids. The bid must be addressed to:

City of Joliet – Sealed Bid Enclosed
Office of the City Clerk
150 W Jefferson St
Joliet, IL 60432

The outside of the sealed envelope – face of the envelope, **must** include the following:

- Bid Number
- Name of Project
- Date and Time of Bid Opening
- Company Contact Information
  - Name
  - Address
  - Phone number

Acknowledgement of all addenda to the contract **must** be included within the submitted bid packet. Failure to do any of the above may invalidate your proposal.

Any questions or clarifications concerning these specifications should be in writing and directed to the Purchasing Division at purchasing@joliet.gov.

Respectfully,

City of Joliet

INSTRUCTIONS TO BIDDERS

This page intentionally left blank.

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

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

A. City – The City of Joliet

B. Owner – The City of Joliet

C. Bid: The Offer of the Bidder

D. *Bidder* – The individual, corporation, or partnership who submits a Bid.

E. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

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

G. Contract Documents – Invitation to Bid Instructions, General Conditions, Special Provisions, Specifications, Drawings, Addendums, Proposal (in so far as it is not inconsistent with other contract documents), and Contract Form.

Other definitions shall be as defined in City of Joliet Ordinance 7345 or in other Contract Documents.

ARTICLE 2 – GENERAL REQUIREMENTS

2.01 Bids shall be made in accordance with the instructions. Failure to execute proposals as required may, in the discretion of the City, be cause for rejection of the bid.

2.02 Bids shall be submitted on the forms provided by the City of Joliet. Each bid must be submitted bound with all other contract documents.

2.03 Bid prices shall be net, including therein transportation and handling charges F.O.B. City of Joliet, and shall further include all charges of whatsoever sort for labor and materials contained in the work or materials designated in the specifications and proposals.

ARTICLE 3 – COPIES OF BIDDING DOCUMENTS

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

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

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

4.01 Underground Facilities

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others. Owner and Engineer do not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

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

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

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

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

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

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

D. Carefully study all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that have been identified in the Supplementary Conditions as containing reliable Technical Data;

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

F. Obtain and carefully study (or assume responsibility for doing so) all examinations, investigations, explorations, tests, studies, and data concerning conditions, (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;

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

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

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

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

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

ARTICLE 5 – PRE-BID CONFERENCE

5.01 No Pre-Bid Conference will be held.

ARTICLE 6 – SITE AND OTHER AREAS

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

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing – ***and no such questions will be accepted within 6 days of the time of the opening of bids.*** Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

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

ARTICLE 8 – BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of not less than **ten percent (10%) of Bidder's Computed Base Bid Price** and in the form of a certified or bank check or a Bid bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 6.01 of the General Conditions.

8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or **61 days** after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

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

ARTICLE 10 – LIQUIDATED DAMAGES

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

ARTICLE 11 – SUBSTITUTE AND ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute items. Whenever it is specified or described in the Bidding Documents that a substitute item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement. The procedure for submission of any such application by Contractor and consideration by Engineer is set forth in the General Conditions and may be supplemented in the Supplementary Conditions or General Requirements.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 Bidders shall submit a list of proposed Subcontractors having direct contract with the Contractor within 24 hours of the bid opening. Include the address and phone number for each Subcontractor.

ARTICLE 13 – PREPARATION OF BID

13.01 Only the Bid form included with the Bidding Documents shall be used. Bidder shall not add any conditions or qualifying statements to the Bid.

13.02 All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed. A Bid price shall be indicated for each item listed therein. Any erasures or corrections shall be dated and initialed by the bidder.

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

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

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

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

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

13.08 Bids that are signed by an attorney-in-fact for corporations, partnerships, limited liability companies, individuals, or joint ventures shall have attached thereto a power-of-attorney evidencing authority to sign the Bid.

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

13.10 All bids shall be submitted in an opaque, sealed envelope to the city clerk, 150 West Jefferson Street, Joliet, Illinois 60432, prior to the time and date set forth for bid opening in the notice to bidders. Each bid shall be addressed to the city clerk and shall bear on the face of the envelope the name of the bidder, and a statement that it is a sealed bid, to be opened for the contract considered, at the date and hour set forth in the invitation to bid.

13.11 All addenda shall be acknowledged within the submitted Bid packet on the Bid Form. Bids received without acknowledgment of addenda, if any, may invalidate your Bid. Addenda will be provided in an electronic format (.pdf format) on the City's website. All Bidding Document holders should sign up for RSS feeds at https://www.joliet.gov/government/departments/finance/purchasing/bids-proposals/construction-public-utilities and provide your first and last name and email address to automatically receive addendums. Addendums will be posted on the City of Joliet's website at https://www.joliet.gov/bids

13.12 The Bid shall contain the full name, address, and telephone number for communications regarding the Bid.

13.13 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number for the state of the Project, if any, shall also be shown on the Bid form.

13.14 Bidder shall execute and **attach to their Bid** the City of Joliet Affidavits provided in Section 00 30 90.

13.15 Bidder shall submit **with their Bid** information required by the Responsible Bidder Ordinance provided in Section 00 21 13.

13.16 Bidder shall submit the bid bond provided in Section 00 43 13 **with their Bid**.

ARTICLE 14 – BASIS OF BID

14.01 Lump Sum

A. Bidders shall submit a Bid on a Lump Sum basis as set forth in the Bid Form.

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

14.01 Basis of Design:

A. Unless otherwise indicated, design of this Project is based upon the material and equipment named first in the list of Supplier's in a Specification section. Engineer has performed an evaluation of other listed Supplier's material and equipment and has determined it to be equal in quality, function and performance to that of the Supplier named first. When other Supplier's are listed, Contractor may be required to make modifications or adjustments, at Contractor's expense, to coordinate the installation of the furnished material and equipment with associated elements of Work, such as piping and electrical connections, or support and mounting provisions.

14.02 Base Bid Material and Equipment:

A. Bidder has included in the Bid price, the installed cost of material and equipment furnished from Supplier A, B, or C or from Supplier A if "No Substitute Allowed" is noted.

B. If a substitute not listed in the specifications is offered, Bidder agrees that the procedures for submission and consideration by Engineer for determining the acceptability of substitutes will be as set forth in the General Conditions and the Supplementary Conditions.

C. Design of selected items of material and equipment on this Project is based upon material and equipment furnished by Supplier A. Supplier(s) whose material or equipment is considered by Engineer to be equal in quality, function and performance to that of Supplier A are identified as Supplier B or C.

D. The Bid price shall be based on the installed cost of material and equipment furnished by Suppliers A, B, or C without consideration of substitutes.

E. Written application and supporting documentation for review of proposed substitutes shall be submitted not later than 2 days after the Effective Date of the Agreement. The procedures for submission and consideration by Engineer for determining the acceptability of substitutes are set forth in the General Conditions and Supplementary Conditions. Should the substitute not be acceptable, Contractor shall provide Supplier A, B, or C for the price bid.

ARTICLE 15 – SUBMITTAL OF BID

15.01 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Invitation to Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title and the name and address of Bidder, and shall be accompanied by the Bid Security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED – BENTON AND GREENFIELD LIFT STATIONS REPLACEMENT PROJECT".

15.02 Bids received after the official bid closure time will be returned to the bidder unopened.

15.03 Unless otherwise indicated in these bid documents, the Contractor may not submit alternate or multiple bids as part of this bid package. The submission of more than one bid within a single bid package may be cause for rejection of any or all of the bids of that contractor.

15.04 The Affidavits included in these Contract Documents must be executed and submitted with the bid.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

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

ARTICLE 17 – OPENING OF BIDS

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

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

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

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

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

19.02 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications, safety record, and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in Article 12 of these Instructions To Bidders.

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

19.04 In evaluating Bids for lowest Bid price, Owner will consider the Lump Sum Base Bid Price without regard to alternates and supplemental unit prices.

19.05 Owner shall have the right to reject any supplemental unit prices for additions to or deductions from the Work as given in the Bid, if the prices are considered excessive or unreasonable, or to accept any supplemental unit prices that may be considered fair and reasonable.

19.06 If the contract is to be awarded, it will be awarded to the lowest responsive, responsible Bidder.

ARTICLE 20 – CONTRACT SECURITY AND INSURANCE

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

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner with the required bonds and certificates or policies of insurance as required by the Supplementary Conditions. Within ten days thereafter, Owner will deliver one fully signed counterpart to Contractor and Engineer.

ARTICLE 22 – SALES AND USE TAXES

22.01 Neither the Owner nor the project is subject to sales taxes. Contact Owner to obtain the Owner's tax identification number.

ARTICLE 23 – WAGE RATES

23.01 Bidders will be required to comply with all laws, including those relating to the employment of labor and the payment of the general prevailing rate of hourly wages in the locality in which the work is to be performed for each craft or type of worker or mechanic needed to execute the contract or perform such work, also the general prevailing rate for legal holiday and overtime work (including, but not necessarily limited to 820 ILCS 130/0.01 et seq. the "Prevailing Wage Act") as ascertained by the City shall be paid for each craft or type of worker needed to execute the contract or to perform such work. If at the time this Contract is executed, or if during the term of this Contract, there is an excessive unemployment in Illinois as defined in the employment of Illinois Workers on Public Works Act, 30 ILCS 570-0.01 et seq., as two consecutive months of unemployment exceeding 5% Contractor agrees to employ Illinois laborers. An "Illinois Laborer" is defined as any person who has resided in Illinois for at least 30 days and intends to become or remain an Illinois resident. The Bidder shall require all subcontractors (if any) to conform with said laws, and any rules or regulations now and thereafter issued pursuant to said laws by Bidders, his subcontractors, and/or anyone working through or on behalf of Bidder or Bidder's subcontractors. Certified payroll reports shall be submitted to the City of Joliet for primary and subcontractors.

23.02 Pursuant to State of Illinois Public Act 86-799 (effective January 1, 1990), these specifications list in Section 00 30 50, the prevailing rate of wages for the county where the contract is being performed and for each craft or type of worker needed to execute each Contract. Each Contractor and their subcontractors shall pay wages to their workers according to the attached schedules and any applicable updates to these wages, as provided by law.

23.03 The wage rates will be incorporated into and made a part of the Contract Documents when the Contract Documents are prepared for execution. Contractor shall comply with Chapter 820 of the Illinois Compiled Statutes, Section 130/5, as amended in 2005 by Public Act 094-0515, regarding certified payroll records retainage and the filing of **weekly** certified payrolls.

23.04 All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over the construction of the Project shall apply to the contract throughout including the Employment of Illinois Workers on Public Works Act (30 ILCS 570).

23.05 The wage rates are incorporated in this Project Manual.

ARTICLE 24 – NON-DISCRIMINATION IN EMPLOYMENT

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

ARTICLE 25 – RESPONSIBLE BIDDERS ORDINANCE

25.01 All bidders must comply with the requirements of the Responsible Bidder Ordinance adopted by the City of Joliet provided in Section 00 30 90. Documentation required by the Ordinance shall be submitted with bid.

25.02 No contract will be awarded to any person, firm, or corporation that is in arrears to the City of Joliet, Illinois upon any debt or contract, or who has failed to execute in whole or in part, in a satisfactory manner, any contract with the City of Joliet, or who is a defaulter as to surety or otherwise upon any obligation to the City of Joliet, Illinois.

ARTICLE 26 – CONSTRUCTION CONTRACT MINORITY PARTICIPATION

26.01 Bidders will be required to meet the City of Joliet's requirements for Minority Participation provided in Section 00 30 90.

ARTICLE 27 – ETHICS ORDINANCE

27.01 The City of Joliet has an Ethics Ordinance (Section 2-333 et seq. of the Code of Ordinances of the City of Joliet) which prohibits any appointed or elected official of the City of Joliet, or any employee of the City of Joliet from receiving or soliciting anything of value to influence that City official or employee in carrying out his or her official duties. The City of Joliet appreciates your anticipated cooperation in refraining from offering any official or employee any thing, item, service, or favor of value to influence that person's decision on any City business. With your cooperation, the City of Joliet will achieve its goal of maintaining a fair and competitive contract procedure that promotes the best interests of the citizens of the City of Joliet. You should report immediately any violation of the Ethics Ordinance to the Inspector General, including any solicitation of a thing of value by a City official or employee. A bidder or contractor's participation or encouragement in the violation of the Ethics Ordinance may result in the rejection of a bid, termination of contract, or declaration of ineligibility to bid on future contracts.

27.02 It is the duty of any bidder, proposer, consultant, subcontractor, applicant for pre-qualification for a City contract, applicant for local bidder certification, and all officers, directors, agents, partners and employees of any bidder, proposer, consultant, subcontractor, or such applicant to cooperate with the Inspector General in any investigation or hearing undertaken pursuant to City of Joliet

Ordinance 2-180, et. seq.. Any of the aforementioned parties understands and will abide by all provisions of the aforementioned Ordinance. All contractors must inform subcontractors of the provision and require understanding and compliance with it.

27.03 A copy of the City of Joliet Ethics Ordinance and all other City Ordinances are available in the City Clerk's office or on the City website for your review.

END OF INSTRUCTIONS TO BIDDERS

PREVAILING WAGE REQUIREMENTS

1. GENERAL

A. This Contract shall be subject to the provisions of the Prevailing Wage Act (820 ILCS 130/1 et seq.) to the extent required by law.

For Prevailing Wage information please go to the City of Joliet Website
https://www.joliet.gov/government/departments/finance/purchasing/prevailing-wage-information

For current Prevailing Wage Rates, go to State of Illinois Website below and follow the instructions:
https://labor.illinois.gov/laws-rules/conmed/current-prevailing-rates.html

If you cannot access or have difficulty retrieving the prevailing wage information, contact Purchasing Division purchasing@joliet.gov or call 815-724-3925 and we will send you the relevant prevailing wage information.

B. The prevailing wage law does not prohibit payment of more than the prevailing rate of wages nor does it limit the hours of Work that may be performed by any employee in any particular period of time.

C. The CONTRACTOR shall post a copy of the wage determination in a prominent place at the site of the Work where the employees can easily see it.

D. CONTRACTOR is required to submit to ENGINEER and to the OWNER's Project Manager (or his or her designee) certified payroll submittals on a **weekly** basis to demonstrate compliance with this section. Submittals shall be in the form of Adobe Acrobat .pdf files sent concurrently to ENGINEER and to the OWNER's Project Manager. Paper copies are not needed nor desired.

2. CERTIFIED PAYROLL

A. CONTRACTOR shall submit to OWNER certified payroll on a weekly basis, in accordance with Chapter 820 of the Illinois Compiled Statutes, Section 130/5, as amended in 2005 by Public Act 094-0515. Certified payroll records shall be retained by CONTRACTOR for not less than 3 years, in accordance with Public Act 094-0515.

B. Certified payroll shall be delivered to OWNER and ENGINEER electronically via standard e-mail in .pdf format for each trade involved in the project. Paper copies of certified payroll records are not desired or required. Failure to provide certified payroll in any billing period is considered by the ENGINEER to be adequate cause for rejection of the CONTRACTOR'S pay estimate.

END OF SECTION
(plus attachments)

Will County Prevailing Wage Rates posted on 1/25/2024

						Overtime										
Trade Title	**Rg**	**Type**	**C**	**Base**	**Foreman**	**M-F**	**Sa**	**Su**	**Hol**	**H/W**	**Pension**	**Vac**	**Trng**	**Other Ins**	**Add OT 1.5x owed**	**Add OT 2.0x owed**
ASBESTOS ABT-GEN	All	ALL		48.90	49.90	1.5	1.5	2.0	2.0	17.37	15.91	0.00	0.91		0.00	0.00
ASBESTOS ABT-MEC	All	BLD		40.59	43.84	1.5	1.5	2.0	2.0	15.22	15.16	0.00	0.88		2.80	5.60
BOILERMAKER	All	BLD		54.71	59.63	2.0	2.0	2.0	2.0	6.97	25.06	0.00	2.83		0.00	0.00
BRICK MASON	All	BLD		50.81	55.89	1.5	1.5	2.0	2.0	12.50	23.01	0.00	1.16	0.00	0.00	0.00
CARPENTER	All	ALL		53.51	58.86	2.0	2.0	2.0	2.0	12.29	29.38	0.25	0.81		0.00	0.00
CEMENT MASON	All	ALL		46.25	48.25	2.0	1.5	2.0	2.0	12.39	31.82	0.00	0.80	0.00	0.00	0.00
CERAMIC TILE FINISHER	All	BLD		45.62	45.62	1.5	1.5	2.0	2.0	12.75	15.64	0.00	1.04	0.00	0.00	0.00
CERAMIC TILE LAYER	All	BLD		53.14	58.14	1.5	1.5	2.0	2.0	12.75	19.41	0.00	1.12	0.00	0.00	0.00
COMMUNICATION TECHNICIAN	All	BLD		43.00	47.30	1.5	1.5	2.0	2.0	16.89	16.10	0.00	0.75	2.37	0.00	0.00
ELECTRIC PWR EQMT OP	All	ALL		60.15	66.00	1.5	1.5	2.0	2.0	13.08	20.29	0.00	3.25	0.00	0.00	0.00
ELECTRIC PWR GRNDMAN	All	ALL		46.92	66.00	1.5	1.5	2.0	2.0	10.21	15.83	0.00	2.54	0.00	0.00	0.00
ELECTRIC PWR LINEMAN	All	ALL		60.15	66.00	1.5	1.5	2.0	2.0	13.08	20.29	0.00	3.25	0.00	0.00	0.00
ELECTRICIAN	All	BLD		52.00	56.68	1.5	1.5	2.0	2.0	17.34	21.56	0.00	1.35	4.76	0.00	0.00
ELEVATOR CONSTRUCTOR	All	BLD		65.12	73.26	2.0	2.0	2.0	2.0	16.08	20.56	5.20	0.70		0.00	0.00
GLAZIER	All	BLD		49.75	51.25	1.5	2.0	2.0	2.0	15.44	25.36	0.00	2.07	0.00	0.00	0.00
HEAT/FROST INSULATOR	All	BLD		54.12	57.37	1.5	1.5	2.0	2.0	15.22	17.86	0.00	0.88		4.15	8.30
IRON WORKER	All	ALL		49.00	53.90	2.0	2.0	2.0	2.0	13.81	29.18	0.00	1.00	0.00	0.00	0.00
LABORER	All	ALL		48.90	49.65	1.5	1.5	2.0	2.0	17.37	15.91	0.00	0.91		0.00	0.00
LATHER	All	ALL		53.51	58.86	2.0	2.0	2.0	2.0	12.29	29.38	0.25	0.81		0.00	0.00
MACHINIST	All	BLD		55.74	59.74	1.5	1.5	2.0	2.0	9.93	8.95	1.85	1.47		0.00	0.00
MARBLE FINISHER	All	ALL		38.75	52.46	1.5	1.5	2.0	2.0	12.50	20.95	0.00	0.66	0.00	0.00	0.00
MARBLE SETTER	All	BLD		49.96	54.96	1.5	1.5	2.0	2.0	12.50	22.31	0.00	0.85	0.00	0.00	0.00
MATERIAL TESTER I	All	ALL		38.90		1.5	1.5	2.0	2.0	17.37	15.91	0.00	0.91		0.00	0.00
MATERIALS TESTER II	All	ALL		43.90		1.5	1.5	2.0	2.0	17.37	15.91	0.00	0.91		0.00	0.00
MILLWRIGHT	All	ALL		53.51	58.86	2.0	2.0	2.0	2.0	12.29	29.38	0.25	0.81		0.00	0.00
OPERATING ENGINEER	All	BLD	1	56.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00

Will County Prevailing Wage Rates posted on 1/25/2024

OPERATING ENGINEER	All	BLD	2	55.30	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	3	52.75	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	4	51.00	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	5	60.35	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	6	57.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	BLD	7	59.60	60.60	2.0	2.0	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	1	64.55	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	2	63.05	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	3	58.55	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	4	54.05	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	5	66.05	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	FLT	6	54.05	64.55	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	1	54.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	2	54.25	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	3	52.20	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	4	50.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	5	49.60	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	6	57.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
OPERATING ENGINEER	All	HWY	7	55.80	58.80	1.5	1.5	2.0	2.0	22.95	20.05	2.00	2.70		0.00	0.00
PAINTER	All	ALL		51.55	57.99	1.5	1.5	1.5	2.0	14.76	15.69	0.00	1.86	0.00	0.00	0.00
PAINTER - SIGNS	All	BLD		45.49	51.09	1.5	1.5	2.0	2.0	8.20	16.81	0.00	0.00	0.00	0.00	0.00
PILEDRIVER	All	ALL		53.51	58.86	2.0	2.0	2.0	2.0	12.29	29.38	0.25	0.81		0.00	0.00
PIPEFITTER	All	BLD		55.00	58.00	1.5	1.5	2.0	2.0	12.65	22.85	0.00	3.12	0.00	0.00	0.00
PLASTERER	All	BLD		48.75	51.68	1.5	1.5	2.0	2.0	17.33	20.33	0.00	1.15	0.00	0.00	0.00
PLUMBER	All	BLD		56.80	60.20	1.5	1.5	2.0	2.0	17.00	17.29	0.00	1.73		0.00	0.00
ROOFER	All	BLD		49.25	54.25	1.5	1.5	2.0	2.0	11.83	16.14	0.00	1.11	0.00	0.00	0.00
SHEETMETAL WORKER	All	BLD		54.25	56.96	1.5	1.5	2.0	2.0	13.60	19.43	0.00	1.59	2.62	0.00	0.00
SPRINKLER FITTER	All	BLD		56.60	59.35	1.5	1.5	2.0	2.0	14.45	18.80	0.00	0.75	0.00	0.00	0.00
STONE MASON	All	BLD		50.81	55.89	1.5	1.5	2.0	2.0	12.50	23.01	0.00	1.16	0.00	0.00	0.00
TERRAZZO FINISHER	All	BLD		46.94	46.94	1.5	1.5	2.0	2.0	12.75	17.73	0.00	1.07	0.00	0.00	0.00

Will County Prevailing Wage Rates posted on 1/25/2024

TERRAZZO MECHANIC	All	BLD		50.85	54.35	1.5	1.5	2.0	2.0	12.75	19.12	0.00	1.10	0.00	0.00	0.00
TRAFFIC SAFETY WORKER I	All	HWY		40.10	41.70	1.5	1.5	2.0	2.0	10.60	9.35	0.00	1.00	0.00	0.00	0.00
TRAFFIC SAFETY WORKER II	ALL	HWY		41.10	42.70	1.5	1.5	2.0	2.0	10.60	9.35	0.00	1.00	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	1	43.70	44.25	1.5	1.5	2.0	2.0	11.15	13.26	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	2	43.85	44.25	1.5	1.5	2.0	2.0	11.15	13.26	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	3	44.05	44.25	1.5	1.5	2.0	2.0	11.15	13.26	0.00	0.15	0.00	0.00	0.00
TRUCK DRIVER	All	ALL	4	44.25	44.25	1.5	1.5	2.0	2.0	11.15	13.26	0.00	0.15	0.00	0.00	0.00
TUCKPOINTER	All	BLD		50.53	51.53	1.5	1.5	2.0	2.0	9.55	21.72	0.00	1.11	0.00	0.00	0.00

Legend
Rg Region
Type Trade Type - All,Highway,Building,Floating,Oil & Chip,Rivers
C Class
Base Base Wage Rate
OT M-F Unless otherwise noted, OT pay is required for any hour greater than 8 worked each day, Mon through Fri. The number listed is the multiple of the base wage.
OT Sa Overtime pay required for every hour worked on Saturdays
OT Su Overtime pay required for every hour worked on Sundays
OT Hol Overtime pay required for every hour worked on Holidays
H/W Health/Welfare benefit
Vac Vacation
Trng Training
Other Ins Employer hourly cost for any other type(s) of insurance provided for benefit of worker.

Explanations WILL COUNTY

The following list is considered as those days for which holiday rates of wages for work performed apply: New Years Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day and Veterans Day in some classifications/counties. Generally, any of these holidays which fall on a Sunday is celebrated on the following Monday. This then makes work performed on that Monday payable at the appropriate overtime rate for holiday pay. Common practice in a given local may alter certain days of celebration. If in doubt, please check with IDOL.

EXPLANATION OF CLASSES

ASBESTOS - GENERAL - removal of asbestos material/mold and hazardous materials from any place in a building, including mechanical systems where those mechanical systems are to be removed. This includes the removal of asbestos materials/mold and hazardous materials from ductwork or pipes in a building when the building is to be demolished at the time or at some close future date.

Will County Prevailing Wage Rates posted on 1/25/2024

ASBESTOS - MECHANICAL - removal of asbestos material from mechanical systems, such as pipes, ducts, and boilers, where the mechanical systems are to remain.

CERAMIC TILE FINISHER

The grouting, cleaning, and polishing of all classes of tile, whether for interior or exterior purposes, all burned, glazed or unglazed products; all composition materials, granite tiles, warning detectable tiles, cement tiles, epoxy composite materials, pavers, glass, mosaics, fiberglass, and all substitute materials, for tile made in tile-like units; all mixtures in tile like form of cement, metals, and other materials that are for and intended for use as a finished floor surface, stair treads, promenade roofs, walks, walls, ceilings, swimming pools, and all other places where tile is to form a finished interior or exterior. The mixing of all setting mortars including but not limited to thin-set mortars, epoxies, wall mud, and any other sand and cement mixtures or adhesives when used in the preparation, installation, repair, or maintenance of tile and/or similar materials. The handling and unloading of all sand, cement, lime, tile, fixtures, equipment, adhesives, or any other materials to be used in the preparation, installation, repair, or maintenance of tile and/or similar materials. Ceramic Tile Finishers shall fill all joints and voids regardless of method on all tile work, particularly and especially after installation of said tile work. Application of any and all protective coverings to all types of tile installations including, but not be limited to, all soap compounds, paper products, tapes, and all polyethylene coverings, plywood, masonite, cardboard, and any new type of products that may be used to protect tile installations, Blastrac equipment, and all floor scarifying equipment used in preparing floors to receive tile. The clean up and removal of all waste and materials. All demolition of existing tile floors and walls to be re-tiled.

COMMUNICATIONS TECHNICIAN

Installation, operation, inspection, maintenance, repair and service of radio, television, recording, voice, sound and vision production and reproduction, telephone and telephone interconnect, facsimile, equipment and appliances used for domestic, commercial, educational and entertainment purposes, pulling of wire through conduit but not the installation of conduit.

MARBLE FINISHER

Loading and unloading trucks, distribution of all materials (all stone, sand, etc.), stocking of floors with material, performing all rigging for heavy work, the handling of all material that may be needed for the installation of such materials, building of scaffolding, polishing if needed, patching, waxing of material if damaged, pointing up, caulking, grouting and cleaning of marble, holding water on diamond or Carborundum blade or saw for setters cutting, use of tub saw or any other saw needed for preparation of material, drilling of holes for wires that anchor material set by setters, mixing up of molding plaster for installation of material, mixing up thin set for the installation of material, mixing up of sand to cement for the installation of material and such other work as may be required in helping a Marble Setter in the handling of all material in the erection or installation of interior marble, slate, travertine, art marble, serpentine, alberene stone, blue stone, granite and other stones (meaning as to stone any foreign or domestic materials as are specified and used in building interiors and exteriors and customarily known as stone in the trade), carrara, sanionyx, vitrolite and similar opaque glass and the laying of all marble tile, terrazzo tile, slate tile and precast tile, steps, risers treads, base, or any other materials that may be used as substitutes for any of the aforementioned materials and which are used on interior and exterior which are installed in a similar manner.

Will County Prevailing Wage Rates posted on 1/25/2024

MATERIAL TESTER I: Hand coring and drilling for testing of materials; field inspection of uncured concrete and asphalt.

MATERIAL TESTER II: Field inspection of welds, structural steel, fireproofing, masonry, soil, facade, reinforcing steel, formwork, cured concrete, and concrete and asphalt batch plants; adjusting proportions of bituminous mixtures.

OPERATING ENGINEER - BUILDING

Class 1. Asphalt Plant; Asphalt Spreader; Autograde; Backhoes with Caisson Attachment; Batch Plant; Benoto (requires Two Engineers); Boiler and Throttle Valve; Caisson Rigs; Central Redi-Mix Plant; Combination Back Hoe Front End-loader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Conveyor (Truck Mounted); Concrete Paver Over 27E cu. ft; Concrete Paver 27E cu. ft. and Under: Concrete Placer; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes, All; Cranes, Hammerhead; Cranes, (GCI and similar Type); Creter Crane; Spider Crane; Crusher, Stone, etc.; Derricks, All; Derricks, Traveling; Formless Curb and Gutter Machine; Grader, Elevating; Grouting Machines; Heavy Duty Self-Propelled Transporter or Prime Mover; Highlift Shovels or Front Endloader 2-1/4 yd. and over; Hoists, Elevators, outside type rack and pinion and similar machines; Hoists, One, Two and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes; Hydraulic Boom Trucks; Hydro Vac (and similar equipment); Locomotives, All; Motor Patrol; Lubrication Technician; Manipulators; Pile Drivers and Skid Rig; Post Hole Digger; Pre-Stress Machine; Pump Cretes Dual Ram; Pump Cretes: Squeeze Cretes-Screw Type Pumps; Gypsum Bulker and Pump; Raised and Blind Hole Drill; Roto Mill Grinder; Scoops - Tractor Drawn; Slip-Form Paver; Straddle Buggies; Operation of Tie Back Machine; Tournapull; Tractor with Boom and Side Boom; Trenching Machines.

Class 2. Boilers; Broom, All Power Propelled; Bulldozers; Concrete Mixer (Two Bag and Over); Conveyor, Portable; Forklift Trucks; Highlift Shovels or Front Endloaders under 2-1/4 yd.; Hoists, Automatic; Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted); Rollers, All; Steam Generators; Tractors, All; Tractor Drawn Vibratory Roller; Winch Trucks with "A" Frame.

Class 3. Air Compressor; Combination Small Equipment Operator; Generators; Heaters, Mechanical; Hoists, Inside Elevators (remodeling or renovation work); Hydraulic Power Units (Pile Driving, Extracting, and Drilling); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Low Boys; Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 4. Bobcats and/or other Skid Steer Loaders; Oilers; and Brick Forklift.

Class 5. Assistant Craft Foreman.

Class 6. Gradall.

Class 7. Mechanics; Welders.

OPERATING ENGINEERS - HIGHWAY CONSTRUCTION

Class 1. Asphalt Plant; Asphalt Heater and Planer Combination; Asphalt Heater Scarfire; Asphalt Spreader; Autograder/GOMACO or other similar type machines: ABG Paver; Backhoes with Caisson Attachment; Ballast Regulator; Belt Loader; Caisson Rigs; Car Dumper; Central Redi-Mix Plant; Combination Backhoe Front Endloader Machine, (1 cu. yd. Backhoe Bucket or over or with

attachments); Concrete Breaker (Truck Mounted); Concrete Conveyor; Concrete Paver over 27E cu. ft.; Concrete Placer; Concrete Tube Float; Cranes, all attachments; Cranes, Tower Cranes of all types: Creter Crane: Spider Crane; Crusher, Stone, etc.; Derricks, All; Derrick Boats; Derricks, Traveling; Dredges; Elevators, Outside type Rack & Pinion and Similar Machines; Formless Curb and Gutter Machine; Grader, Elevating; Grader, Motor Grader, Motor Patrol, Auto Patrol, Form Grader, Pull Grader, Subgrader; Guard Rail Post Driver Truck Mounted; Hoists, One, Two and Three Drum; Heavy Duty Self-Propelled Transporter or Prime Mover; Hydraulic Backhoes; Backhoes with shear attachments up to 40' of boom reach; Lubrication Technician; Manipulators; Mucking Machine; Pile Drivers and Skid Rig; Pre-Stress Machine; Pump Cretes Dual Ram; Rock Drill - Crawler or Skid Rig; Rock Drill - Truck Mounted; Rock/Track Tamper; Roto Mill Grinder; Slip-Form Paver; Snow Melters; Soil Test Drill Rig (Truck Mounted); Straddle Buggies; Hydraulic Telescoping Form (Tunnel); Operation of Tieback Machine; Tractor Drawn Belt Loader; Tractor Drawn Belt Loader (with attached pusher - two engineers); Tractor with Boom; Tractaire with Attachments; Traffic Barrier Transfer Machine; Trenching; Truck Mounted Concrete Pump with Boom; Raised or Blind Hole Drills (Tunnel Shaft); Underground Boring and/or Mining Machines 5 ft. in diameter and over tunnel, etc; Underground Boring and/or Mining Machines under 5 ft. in diameter; Wheel Excavator; Widener (APSCO).

Class 2. Batch Plant; Bituminous Mixer; Boiler and Throttle Valve; Bulldozers; Car Loader Trailing Conveyors; Combination Backhoe Front Endloader Machine (Less than 1 cu. yd. Backhoe Bucket or over or with attachments); Compressor and Throttle Valve; Compressor, Common Receiver (3); Concrete Breaker or Hydro Hammer; Concrete Grinding Machine; Concrete Mixer or Paver 7S Series to and including 27 cu. ft.; Concrete Spreader; Concrete Curing Machine, Burlap Machine, Belting Machine and Sealing Machine; Concrete Wheel Saw; Conveyor Muck Cars (Haglund or Similar Type); Drills, All; Finishing Machine - Concrete; Highlift Shovels or Front Endloader; Hoist - Sewer Dragging Machine; Hydraulic Boom Trucks (All Attachments); Hydro-Blaster; Hydro Excavating (excluding hose work); Laser Screed; All Locomotives, Dinky; Off-Road Hauling Units (including articulating) Non Self-Loading Ejection Dump; Pump Cretes: Squeeze Cretes - Screw Type Pumps, Gypsum Bulker and Pump; Roller, Asphalt; Rotary Snow Plows; Rototiller, Seaman, etc., self-propelled; Self-Propelled Compactor; Spreader - Chip - Stone, etc.; Scraper - Single/Twin Engine/Push and Pull; Scraper - Prime Mover in Tandem (Regardless of Size); Tractors pulling attachments, Sheeps Foot, Disc, Compactor, etc.; Tug Boats.

Class 3. Boilers; Brooms, All Power Propelled; Cement Supply Tender; Compressor, Common Receiver (2); Concrete Mixer (Two Bag and Over); Conveyor, Portable; Farm-Type Tractors Used for Mowing, Seeding, etc.; Forklift Trucks; Grouting Machine; Hoists, Automatic; Hoists, All Elevators; Hoists, Tugger Single Drum; Jeep Diggers; Low Boys; Pipe Jacking Machines; Post-Hole Digger; Power Saw, Concrete Power Driven; Pug Mills; Rollers, other than Asphalt; Seed and Straw Blower; Steam Generators; Stump Machine; Winch Trucks with "A" Frame; Work Boats; Tamper-Form-Motor Driven.

Class 4. Air Compressor; Combination - Small Equipment Operator; Directional Boring Machine; Generators; Heaters, Mechanical; Hydraulic Power Unit (Pile Driving, Extracting, or Drilling); Light Plants, All (1 through 5); Pumps, over 3" (1 to 3 not to exceed a total of 300 ft.); Pumps, Well Points; Vacuum Trucks (excluding hose work); Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches.

Class 5. SkidSteer Loader (all); Brick Forklifts; Oilers.

Class 6. Field Mechanics and Field Welders

Class 7. Dowell Machine with Air Compressor; Gradall and machines of like nature.

Will County Prevailing Wage Rates posted on 1/25/2024

OPERATING ENGINEER - FLOATING

Class 1. Craft Foreman; Master Mechanic; Diver/Wet Tender; Engineer; Engineer (Hydraulic Dredge).

Class 2. Crane/Backhoe Operator; Boat Operator with towing endorsement; Mechanic/Welder; Assistant Engineer (Hydraulic Dredge); Leverman (Hydraulic Dredge); Diver Tender.

Class 3. Deck Equipment Operator, Machineryman, Maintenance of Crane (over 50 ton capacity) or Backhoe (115,000 lbs. or more); Tug/Launch Operator; Loader/Dozer and like equipment on Barge, Breakwater Wall, Slip/Dock, or Scow, Deck Machinery, etc.

Class 4. Deck Equipment Operator, Machineryman/Fireman (4 Equipment Units or More); Off Road Trucks; Deck Hand, Tug Engineer, Crane Maintenance (50 Ton Capacity and Under) or Backhoe Weighing (115,000 pounds or less); Assistant Tug Operator.

Class 5. Friction or Lattice Boom Cranes.

Class 6. ROV Pilot, ROV Tender

TRAFFIC SAFETY Worker I

Traffic Safety Worker I - work associated with the delivery, installation, pick-up and servicing of safety devices during periods of roadway construction, including such work as set-up and maintenance of barricades, barrier wall reflectors, drums, cones, delineators, signs, crash attenuators, glare screen and other such items, and the layout and application or removal of conflicting and/or temporary roadway markings utilized to control traffic in construction zones, as well as flagging for these operations.

TRAFFIC SAFETY WORKER II

Work associated with the installation and removal of permanent pavement markings and/or pavement markers including both installations performed by hand and installations performed by truck.

TRUCK DRIVER - BUILDING, HEAVY AND HIGHWAY CONSTRUCTION

Class 1. Two or three Axle Trucks. A-frame Truck when used for transportation purposes; Air Compressors and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry-alls; Fork Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors 2-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Power Mower Tractors; Self-propelled Chip Spreader; Skipman; Slurry Trucks, 2-man operation; Slurry Truck Conveyor Operation, 2 or 3 man; Teamsters; Unskilled Dumpman; and Truck Drivers hauling warning lights, barricades, and portable toilets on the job site.

Class 2. Four axle trucks; Dump Crets and Adgetors under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yeards; Ready-mix Plant Hopper Operator, and Winch Trucks, 2 Axles.

Class 3. Five axle trucks; Dump Crets and Adgetors 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnatrailers or turnapulls when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, 1-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long; Slurry trucks, 1-man operation; Winch trucks, 3 axles or more; Mechanic--Truck Welder and Truck Painter.

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

TERRAZZO FINISHER

The handling of sand, cement, marble chips, and all other materials that may be used by the Mosaic Terrazzo Mechanic, and the mixing, grinding, grouting, cleaning and sealing of all Marble, Mosaic, and Terrazzo work, floors, base, stairs, and wainscoting by hand or machine, and in addition, assisting and aiding Marble, Masonic, and Terrazzo Mechanics.

Other Classifications of Work:

For definitions of classifications not otherwise set out, the Department generally has on file such definitions which are available. If a task to be performed is not subject to one of the classifications of pay set out, the Department will upon being contacted state which neighboring county has such a classification and provide such rate, such rate being deemed to exist by reference in this document. If no neighboring county rate applies to the task, the Department shall undertake a special determination, such special determination being then deemed to have existed under this determination. If a project requires these, or any classification not listed, please contact IDOL at 217-782-1710 for wage rates or clarifications.

LANDSCAPING

Landscaping work falls under the existing classifications for laborer, operating engineer and truck driver. The work performed by landscape plantsman and landscape laborer is covered by the existing classification of laborer. The work performed by landscape operators (regardless of equipment used or its size) is covered by the classifications of operating engineer. The work performed by landscape truck drivers (regardless of size of truck driven) is covered by the classifications of truck driver.

MATERIAL TESTER & MATERIAL TESTER/INSPECTOR I AND II

Notwithstanding the difference in the classification title, the classification entitled "Material Tester I" involves the same job duties as the classification entitled "Material Tester/Inspector I". Likewise, the classification entitled "Material Tester II" involves the same job duties as the classification entitled "Material Tester/Inspector II".

Will County Prevailing Wage Rates posted on 1/25/2024

CITY OF JOLIET BIDDING REQUIREMENTS

This page intentionally left blank.

CITY OF JOLIET BIDDING REQUIREMENTS

1. GENERAL

   A. The Bidder is notified that this Section of the Project Manual must be printed, executed, and submitted in its entirety (00 30 90-1 through 00 30 90-37) with your bid.

This page intentionally left blank.

NOTICE

The City of Joliet has adopted a Responsible Bidder Ordinance (2-440). In addition to any other requirement, unless otherwise expressly stated in a bid solicitation or an award of contract, or applicable state or federal law or regulation states otherwise, all bidders must comply with the following requirements in order to submit a bid or be awarded a contract.

1. The bidder must be a duly organized legal entity in good standing with the Illinois Secretary of State and in compliance with all laws prerequisite to doing business in the state and submit a copy of the Illinois Secretary of State Department of Business Services online records evidencing that the bidder has a current corporate annual report on file, if required. If the bidder is an individual, sole proprietorship, or partnership, this subsection shall not apply.

2. The bidder must have a valid Federal Tax Identification Number or Social Security Number (for individuals), documents evidencing current registration with the Illinois Department of Revenue and the Illinois Department of Employment Security (if bidder has employees).

3. The bidder must be an equal opportunity employer and comply with Section 2000(e) of Chapter 21, Title 42 of the United States Code and Executive Order 11246.

4. The bidder shall provide certificates of insurance indicating the following coverages if called for in the bid solicitation: general liability, workers compensation, completed operations, automobile, hazardous occupation, and product liability.

5. A statement that all employees are (i) covered under a current workers' compensation insurance policy, and (ii) properly classified under such policy. If the bidder is insured with a carrier, the evidence of workers' compensation insurance shall be a copy of the "Information Page" which includes the name and address of the insured, as well as class codes upon which the compensation premium is based and the total estimated remuneration per class code.

6. A statement of compliance with all provisions of the Illinois Prevailing Wage Act (820 ILCS 130), as amended, and all the rules and regulations therein, for the past five (5) years. Such statement shall also provide that the contractor has reviewed the Prevailing Wage Act or the federal Davis-Bacon

and Related Acts, has reviewed and agrees to pay the applicable prevailing wage rates attached to the bid specifications, and will strictly comply with the Prevailing Wage Act or federal Davis-Bacon and Related Acts and related requirements, including wages, medical and hospitalization insurance and retirement for those trades covered in the Act. A contractor who has been found, by the Illinois Department of Labor, to be in violation of the Prevailing Wage Act twice within a three (3) year period shall be deemed to not be Responsible Bidder for two (2) years from the date of the latest finding.

7. Certification of compliance with the Substance Abuse Prevention on Public Works Projects Act (820 ILCS 265/1, et seq.).

8. A certification that individuals who perform work on the public works project on behalf of the contractor are properly classified as either (i) an employee, or (ii) an independent contractor under all applicable state and federal laws and local ordinances.

9. Documents evidencing any professional or trade licenses required by law or local ordinance for any trade or specialty in which the contractor is seeking a contract award. Additionally, the contractor must disclose any suspension or revocation of such license held by the company, or of any director, officer, or manager of the company.

10. For construction contracts (construction of new facilities, renovation of existing facilities, or road construction projects), or demolition contracts, over $25,000 (twenty five thousand dollars), evidence of participation in apprenticeship and training programs applicable to the work to be performed on the project, which are approved by and registered with the United States Department of Labor's Office of Apprenticeship, or its successor organization. The required evidence includes but is not limited to a copy of all applicable apprenticeship standards or Apprenticeship Agreement(s) for any apprentice(s) who will perform work on the public works project.

11. Disclosure of the name and address of each subcontractor from whom the contractor has accepted a bid and/or intends to hire on any part of the project. Further, each such subcontractor shall be required to adhere to the requirements set forth herein as though it were bidding directly to the city. Each contractor shall submit all subcontractor information and supporting documentation to the city prior to the subcontractor commencing work on the project.

12. Unless otherwise agreed to in a collective bargaining agreement, the bidder shall certify that it provides, or contributes to, a health care plan for those employees working on the project and shall provide a copy of the health care plan upon request. The contributions toward a health care plan must be part of the employee's regular compensation, and not merely part of the employee's compensation during the period of time for which the employee is performing work on the project.

13. Unless otherwise agreed to in a collective bargaining agreement, the bidder shall certify that it contributes to an employee pension or retirement program, including but not limited to a 401k, a defined benefit plan or a similar plan for its field employees working on the project and shall provide a copy of the plan upon request. The contributions toward a pension or retirement program must be a part of the employee's regular compensation and not merely part of the employee's compensation during the period of time for which the employee is performing work on the project.

14. Certification that the bidder has not been subject to any determinations by a court or governmental agency for violations of federal, state, or local laws, including but not limited to serious, willful, or repeated violations of the Occupational Safety and Health Act (OSHA), violations of contracting or antitrust laws, tax or licensing laws, environmental laws, or the federal Davis-Bacon and Related Acts.

15. Any material changes to the contractor's status, at any time during the performance of the project, must be reported in writing to the city within fourteen (14) days of its occurrence. Failure to comply with this requirement is grounds for the contractor to be deemed a non-responsible bidder.

16. The submission requirements of this Ordinance also apply to subcontractors, except that the contractor shall submit all subcontractor submissions to the city prior to the subcontractor commencing work on the project. Failure of a subcontractor to submit the required information shall not disqualify the successful bidder from performing work on the project and shall not constitute a contractual default and/or breach by the successful bidder. However, the city may withhold all payments otherwise due for work performed by a subcontractor until the subcontractor submits the required information and the city approves such information. Further, where the city deems necessary, the city may also require that the successful bidder remove the subcontractor from the project and replace it with a responsive and responsible subcontractor.

CERTIFICATIONS/ATTACHMENTS

For each required certification or submission, the bidder shall comply with the appropriate subsection of the City of Joliet code of ordinances by initialing the page and/or attaching the required documentation to the page.

The certification pages should be initialed and submitted with the bid along with the required attachments.

There are 16 certification pages and a checklist that follows.

2-440(1) - The bidder must be a duly organized legal entity in good standing with the Illinois Secretary of State and in compliance with all laws prerequisite to doing business in the state and submit a copy of the Illinois Secretary of State Department of Business Services online records evidencing that the bidder has a current corporate annual report on file, if required. If the bidder is an individual, sole proprietorship, or partnership, this subsection shall not apply.

I hereby certify that the bidder is a duly organized legal entity in good standing with the Illinois Secretary of State and in compliance with all laws prerequisite to doing business in the state.

_____

Initials of bidder

Or:

I certify that the bidder is an individual, sole proprietor, or partnership.

_____

Initials of bidder

Attachment: Illinois Secretary of State Department of Business Services online records evidencing that the bidder has a current corporate annual report on file (if required).

Mark attachment as "Attachment A"

2-440(2) - The bidder must have a valid Federal Tax Identification Number or Social Security Number (for individuals), documents evidencing current registration with the Illinois Department of Revenue and the Illinois Department of Employment Security (if bidder has employees).

Attachment: Documents evidencing current registration with the Illinois Department of Revenue and the Illinois Department of Employment Security (if bidder has employees).

Mark attachment as "Attachment B"

2-440(3) - The bidder must be an equal opportunity employer and comply with Section 2000(e) of Chapter 21, Title 42 of the United States Code and Executive Order 11246.

I certify that the bidder is an equal opportunity employer and is in compliance with Section 2000(e) of Chapter 21, Title 42 of the United States Code and Executive Order 11246.

_____

Initials of bidder

2-440(4) - The bidder shall provide certificates of insurance indicating the following coverages if called for in the bid solicitation: general liability, workers compensation, completed operations, automobile, hazardous occupation, and product liability.

Attachments: Certificates of insurance indicating the following coverages as called for in the bid solicitation.

Mark attachment as "Attachment C"

2-440(5) - A statement that all employees are (i) covered under a current workers' compensation insurance policy, and (ii) properly classified under such policy. If the bidder is insured with a carrier, the evidence of workers' compensation insurance shall be a copy of the "Information Page" which includes the name and address of the insured, as well as class codes upon which the compensation premium is based and the total estimated remuneration per class code.

I certify that all employees are (i) covered under a current workers' compensation insurance policy, and (ii) properly classified under such policy.

_____

Initials of bidder

Attachment: "Information Page" which includes the name and address of the insured, as well as class codes upon which the compensation premium is based and the total estimated remuneration per class code (if applicable).

Mark attachment as "Attachment D"

2-440(6) - A statement of compliance with all provisions of the Illinois Prevailing Wage Act (820 ILCS 130), as amended, and all the rules and regulations therein, for the past five (5) years. Such statement shall also provide that the contractor has reviewed the Prevailing Wage Act or the federal Davis-Bacon and Related Acts, has reviewed and agrees to pay the applicable prevailing wage rates attached to the bid specifications, and will strictly comply with the Prevailing Wage Act or federal Davis-Bacon and Related Acts and related requirements, including wages, medical and hospitalization insurance and retirement for those trades covered in the Act. A contractor who has been found, by the Illinois Department of Labor, to be in violation of the Prevailing Wage Act twice within a three (3) year period shall be deemed to not be Responsible Bidder for two (2) years from the date of the latest finding.

I certify that the bidder is in compliance with all provisions of the Illinois Prevailing Wage Act (820 ILCS 130), as amended, and all the rules and regulations therein, and has been for the past five (5) years.

_____

Initials of bidder

I certify that that the contractor has reviewed the Prevailing Wage Act or the federal Davis-Bacon and Related Acts, has reviewed and agrees to pay the applicable prevailing wage rates attached to the bid specifications, and will strictly comply with the Prevailing Wage Act or federal Davis-Bacon and Related Acts and related requirements, including wages, medical and hospitalization insurance and retirement for those trades covered in the Act.

_____

Initials of bidder

2-440(7) - Certification of compliance with the Substance Abuse Prevention on Public Works Projects Act (820 ILCS 265/1, et seq.).

I certify that the bidder is in compliance with the Substance Abuse Prevention on Public Works Projects Act (820 ILCS 265/1, et seq.).

_____

Initials of bidder

2-440(8) - A certification that individuals who perform work on the public works project on behalf of the contractor are properly classified as either (i) an employee, or (ii) an independent contractor under all applicable state and federal laws and local ordinances.

I certify that all individuals who perform work on the public works project on behalf of the contractor are properly classified as either (i) an employee, or (ii) an independent contractor under all applicable state and federal laws and local ordinances.

_____

Initials of bidder

2-440(9) - Documents evidencing any professional or trade licenses required by law or local ordinance for any trade or specialty in which the contractor is seeking a contract award. Additionally, the contractor must disclose any suspension or revocation of such license held by the company, or of any director, officer, or manager of the company.

Attachments: Documents evidencing any professional or trade licenses required by law or local ordinance for any trade or specialty in which the contractor is seeking a contract award.

Mark attachment as "Attachment E"

Attachments: Disclosure of any suspension or revocation of such license held by the company, or of any director, officer, or manager of the company.

Mark attachment as "Attachment E1"

Or

I certify that the contractor has not been the subject of any suspension or revocation of such license held by the company, or of any director, officer, or manager of the company.

_____

Initials of bidder

2-440(10) - For construction contracts (construction of new facilities, renovation of existing facilities, or road construction projects), or demolition contracts, over $25,000 (twenty five thousand dollars), evidence of participation in apprenticeship and training programs applicable to the work to be performed on the project, which are approved by and registered with the United States Department of Labor's Office of Apprenticeship, or its successor organization. The required evidence includes but is not limited to a copy of all applicable apprenticeship standards or Apprenticeship Agreement(s) for any apprentice(s) who will perform work on the public works project.

Attachments: Evidence of participation in apprenticeship and training programs applicable to the work to be performed on the project, which are approved by and registered with the United States Department of Labor's Office of Apprenticeship, or its successor organization. The required evidence includes but is not limited to a copy of all applicable apprenticeship standards or Apprenticeship Agreement(s) for any apprentice(s) who will perform work on the public works project.

Mark attachment as "Attachment F"

2-440(11) - Disclosure of the name and address of each subcontractor from whom the contractor has accepted a bid and/or intends to hire on any part of the project. Further, each such subcontractor shall be required to adhere to the requirements set forth herein as though it were bidding directly to the city. Each contractor shall submit all subcontractor information and supporting documentation to the city prior to the subcontractor commencing work on the project.

Attachments: The name and address of each subcontractor from whom the contractor has accepted a bid and/or intends to hire on any part of the project.

Mark attachment as "Attachment G"

I certify and acknowledge that the bidder shall submit all subcontractor information and supporting documentation to the city prior to the subcontractor commencing work on the project.

_____

Initials of bidder

2-440(12) - Unless otherwise agreed to in a collective bargaining agreement, the bidder shall certify that it provides, or contributes to, a health care plan for those employees working on the project and shall provide a copy of the health care plan upon request. The contributions toward a health care plan must be part of the employee's regular compensation, and not merely part of the employee's compensation during the period of time for which the employee is performing work on the project.

I certify that the bidder provides, or contributes to, a health care plan for those employees working on the project and shall provide a copy of the health care plan upon request. I further certify that these contributions are part of the employee's regular compensation, and not merely part of the employee's compensation during the period of time for which the employee is performing work on the project.

_____

Initials of bidder

Or

I certify that the bidder is subject to a collective bargaining agreement which addresses issues regarding a health care plan.

_____

Initials of bidder

2-440(13) - Unless otherwise agreed to in a collective bargaining agreement, the bidder shall certify that it contributes to an employee pension or retirement program, including but not limited to a 401k, a defined benefit plan or a similar plan for its field employees working on the project and shall provide a copy of the plan upon request. The contributions toward a pension or retirement program must be a part of the employee's regular compensation and not merely part of the employee's compensation during the period of time for which the employee is performing work on the project.

I certify that the bidder contributes to an employee pension or retirement program, including but not limited to a 401k, a defined benefit plan or a similar plan for its field employees working on the project and shall provide a copy of the plan upon request. These contributions toward a pension or retirement program are part of the employee's regular compensation and not merely part of the employee's compensation during the period of time for which the employee is performing work on the project.

_____

Initials of bidder

Or

I certify that the bidder is subject to a collective bargaining agreement which addresses contributions to an employee pension or retirement program, including but not limited to a 401k, a defined benefit plan or a similar plan for its field employees working on the project and shall provide a copy of the plan upon request.

_____

Initials of bidder

2-440(14) - Certification that the bidder has not been subject to any determinations by a court or governmental agency for violations of federal, state, or local laws, including but not limited to serious, willful, or repeated violations of the Occupational Safety and Health Act (OSHA), violations of contracting or antitrust laws, tax or licensing laws, environmental laws, or the federal Davis-Bacon and Related Acts.

I certify that the bidder has not been subject to any determinations by a court or governmental agency for violations of federal, state, or local laws, including but not limited to serious, willful, or repeated violations of the Occupational Safety and Health Act (OSHA), violations of contracting or antitrust laws, tax or licensing laws, environmental laws, or the federal Davis-Bacon and Related Acts.

_____

Initials of bidder

> 2-440(b) - Any material changes to the contractor's status, at any time during the performance of the project, must be reported in writing to the city within fourteen (14) days of its occurrence. Failure to comply with this requirement is grounds for the contractor to be deemed a non-responsible bidder.

I certify and acknowledge that any material changes to the contractor's status, at any time during the performance of the project, must be reported in writing to the city within fourteen (14) days of its occurrence. Failure to comply with this requirement is grounds for the contractor to be deemed a non-responsible bidder.

_____

Initials of bidder

2-440(d) - The submission requirements of this Ordinance also apply to subcontractors, except that the contractor shall submit all subcontractor submissions to the city prior to the subcontractor commencing work on the project. Failure of a subcontractor to submit the required information shall not disqualify the successful bidder from performing work on the project and shall not constitute a contractual default and/or breach by the successful bidder. However, the city may withhold all payments otherwise due for work performed by a subcontractor until the subcontractor submits the required information and the city approves such information. Further, where the city deems necessary, the city may also require that the successful bidder remove the subcontractor from the project and replace it with a responsive and responsible subcontractor.

I certify and acknowledge that the submission requirements of this Ordinance also apply to subcontractors. I further acknowledge that the city may withhold all payments otherwise due for work performed by a subcontractor until the subcontractor submits required information and the city approves such information. I further acknowledge that where the city deems necessary, the city may also require that the successful bidder remove the subcontractor from the project and replace it with a responsive and responsible subcontractor.

_____

Initials of bidder

CERTIFICATION CHECKLIST

Initial bottom of page to certify that required certifications and attachments are complete.

Bidders/Contractor are required to certify to the following items:

2-440(1) – Good standing with S.O.S. _____

2-440(3) – Equal opportunity employer _____

2-440(5) – Workers' compensation coverage _____

2-440(6) – Prevailing Wage Act _____

2-440(7) – Substance Abuse Prevention on Public Works Act _____

2-440(8) – Employees properly classified _____

2-440(9) – Contractor properly licensed _____

2-440(11) – Disclosure of subcontractor information _____

2-440(12) – Employee health care plan _____

2-440(13) – Employee retirement plan _____

2-440(14) – OSHA compliance _____

2-440(b) – Required reporting of change in status _____

2-440(d) – Required updating of subcontractor information _____

Bidders/Contractor are required to attach the following documents:

2-440(1) – S.O.S. annual report (if required) _____

2-440(2) – Registration with IDOR and IDES _____

2-440(4) – Certificates of insurance _____

2-440(5) – Information page regarding workers' compensation _____

2-440(9) – Professional or trade licenses required _____

2-440(9) – Disclosure of suspension or revocation of license _____

2-440(10) – Apprenticeship standards or agreements (if required) _____

2-440(11) – List of subcontractors _____

I certify that all required certifications and attachments are included in the bid documents

_____

Initials of bidder

This page intentionally left blank.

DEPARTMENT OF PUBLIC WORKS
815-724-4200 Direct
815-723-7770 Fax

CITY OF JOLIET

150 WEST JEFFERSON STREET
JOLIET, ILLINOIS 60432-4158

GENERAL CONTRACTOR

RE: 2024 CONSTRUCTION PROJECTS

Dear General Contractor:

The City of Joliet currently has specifications, which require ten **(10%)** percent minority participation in contracts over $100,000.00. In an effort to track this information better, the City of Joliet will be requiring all GENERAL CONTRACTS to submit to a complete list of sub-contractors they intend to use on the awarded project at the pre-construction meeting. The issuance of this sub-contractor list will help the City ensure that minority requirements are met as well as prevailing wages. The sub-contractor list should include the dollar amount or percentage of this contract for the work the sub-contractor is responsible. I.D.O.T. for BC 260-A is an example of such an acceptable form. In addition, the specification states that monthly certified payroll records are to be submitted to the Engineer. This will also be enforced for the upcoming construction season.

The City of Joliet appreciates your effort throughout the years and looks forward to working with you in the upcoming construction season.

Gregory P. Ruddy, P.E.
Director of Public Works

Allison Swisher
Director of Public Utilities

This page intentionally left blank.

The Bidder's attention is called to the following Equipment Employment Opportunity Construction Contract Specification:

The contractor's aggregate workforce on all construction work covered by this contract shall include any combination of minority or female participation equaling or exceeding ten percent (10%) of the contractor's aggregate workforce. Compliance with this specification will be measured against the total hours performed, including all subcontracts.

The contractor shall submit to the Project Engineer monthly certified payroll records in order to monitor the total work hours and those hours worked by minorities and/or females, before receiving a monthly payment. Upon completion of the contract, the contractor shall submit to the Project Engineer a summary of the total work hours and those hours worked by minorities and/or females prior to receiving any retainage reduction or final payment.

Non-compliance with this specification will result in the retainage of 2% of the total contract amount for a probationary period of one year from the completion of the contract. If within the one year probation period the Contractor exceeds the minority employment requirements by the number of man-hours previously deficient, on another City of Joliet contract, the retainage from the prior contract will be released to the Contractor. If the Contractor fails to make up the minority hours on another contract within the probation period, the Contractor will be penalized 2% of the original contract amount.

DEFINITION

Minority shall include:

1. Black (all persons having origins in any of the Black African racial groups not of Hispanic Origin).

2. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race).

3. Asian and Pacific Island (all persons having origin in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands).

4. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification.

NOTICE TO BIDDERS – ETHICS ORDINANCE AND INSPECTOR GENERAL COMPLIANCE

The City of Joliet has an Ethics Ordinance (Section 2-333 et seq. of the Code of Ordinances of the City of Joliet) which prohibits any appointed or elected official of the City of Joliet, or any employee of the City of Joliet from receiving or soliciting anything of value to influence that City official or employee in carrying out his or her official duties. The City of Joliet appreciates your anticipated cooperation in refraining from offering any official or employee any thing, item, service, or favor of value to influence that person's decision on any City business. With your cooperation, the City of Joliet will achieve its goal of maintaining a fair and competitive contract procedure that promotes the best interests of the citizens of the City of Joliet. You should report immediately any violation of the Ethics Ordinance to the Inspector General, including any solicitation of a thing of value by a City official or employee. A bidder or contractor's participation or encouragement in the violation of the Ethics Ordinance may result in the rejection of a bid, termination of contract, or declaration of ineligibility to bid on future contracts.

It is the duty of any bidder, proposer, consultant, subcontractor, applicant for pre-qualification for a City contract, applicant for local bidder certification, and all officers, directors, agents, partners and employees of any bidder, proposer, consultant, subcontractor, or such applicant to cooperate with the Inspector General in any investigation or hearing undertaken pursuant to City of Joliet Ordinance 2-180, et. seq.. Any of the aforementioned parties understands and will abide by all provisions of the aforementioned Ordinance. All contractors must inform subcontractors of the provision and require understanding and compliance with it.

A copy of the City of Joliet Ethics Ordinance and all other City Ordinances are available in the City Clerk's office or on the City website for your review.

LOCAL BIDDER

This contract is eligible for the Local Bidder Preference Ordinance.

Complete and sign this form **only** if you have been approved as a Local Bidder by the City of Joliet and wish to be qualified as a local bidder for this contract.

VENDOR NAME _____

VENDOR ADDRESS _____

CONTACT PERSON _____

SIGNATURE_____

PHONE_____

EMAIL ADDRESS _____

For more information about the Local Bidder Ordinance, as well as the Local Bidder Application, visit: https://www.joliet.gov/localbidder.

Please be aware there may be other prequalification requirements that apply to this contract. Carefully read what is required within the contract, as this form does not take the place of any of those required documents.

For questions, please contact Purchasing at purchasing@joliet.gov or (815) 724-3925.

This page intentionally left blank.

(NOTE: These affidavits must be completed by an authorized representative of the bidder)

AFFIDAVITS

Business Status of Bidder

BIDDER/APPLICANT:

_____
Name

_____
Principal place of business

_____
Address

_____
City, State, Zip Code

The Bidder is a:

_____ *Corporation*
_____ *Partnership*
_____ *Limited Liability Company*
_____ *Sole Proprietorship*
_____ *Other (please explain*: _____)

Corporation

The state of incorporation is: _____

The registered agent of the corporation in Illinois is:

Name _____

Address _____

_____

City, State, Zip _____

_____

The officers of the corporation are:

_____ _____
President *Secretary*

_____ _____
Vice President *Treasurer*

The Corporation is authorized to do business in the State of Illinois

Limited Liability Company

The state of registration is: _____

The registered agent of the Limited Liability Company in Illinois is:

*Name*_____

*Address*_____

*City State Zip*_____

The registered office of the Limited Liability Company in Illinois is:

*Address*_____

City,State,Zip_____

The managers and members of the Limited Liability Company are:

_____	_____
Name	*Name*
_____	_____
Address	*Address*
_____	_____
City, State	*City, State*

The LLC is authorized to do business in the State of Illinois

Sole Proprietorship

The address of the sole proprietor is:

_____

Address

_____

City, State

The sole proprietor transacts business in Illinois under the following assumed names:

_____

BID RIGGING AND BID ROTATING

Section 2: That in connection with this solicitation for bids/proposals:

A. The bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization or corporation;

B. The bidder has not in any manner directly or indirectly sought by consultation, communication or agreement with anyone to fix the bid price of said bidder or any other bidder or to fix any overhead profit or cost element of such bid price or that of any other bidder or to secure any advantage against the public body awarding the contract or anyone interested in the proper contract;

C. The bid is genuine and not collusive or sham;

D. The prices or breakdowns thereof and any and all contents which had been quoted in this bid have not been knowingly disclosed by the bidder and will not be knowingly disclosed by the bidder directly or indirectly to any other bidder or any competitor prior to opening;

E. All statements contained in such bid are true;

F. No attempt has been made or will be made by the bidder to induce any other person or firm to submit a false or sham bid;

G. 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;

Section 2a ***NON-COLLUSION***

A. No officer or employee of the City of Joliet has a direct or indirect pecuniary interest in this bid.

B. No officer or employee of the City of Joliet has disclosed to the bidder any information related to the terms of a sealed bid.

C. No officer or employee of the City of Joliet has informed the bidder that the bid will be accepted only if specified persons are included as subcontractors.

D. Only the bidder will be entitled to the proceeds of the contract if this bid is accepted by the City of Joliet.

E. This bid is made without the benefit of information obtained in violation of law.

Section 3. The undersigned further states that: (circle A or B)

A. He is the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein and that he has not participated, and will not participate, in any action contrary to paragraphs A through G above; or

B. He is not the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein 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 paragraphs A through G above and as their agent does hereby so certify; and

C. That he has not participated, and will not participate, in any action contrary to paragraphs A through G above.

Section 4. The undersigned certifies that the bidder has never been convicted for a violation of State laws prohibiting bid rigging or bid rotating.

THE REQUIREMENTS OF THE
ILLINOIS DRUG FREE WORKPLACE ACT

Section 5. The undersigned will publish a statement:

A. Notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the aforementioned company’s workplace;

B. Specifying the actions that will be taken against employees for violations of this prohibition;

C. Notifying the employees that, as a condition of their employment to do work under the contract with the City of Joliet, the employees will:

1. Abide by the terms of the statement; and

2. Notify the aforementioned company of any criminal drug statute conviction for a violation occurring in the workplace not later than five (5) days after such a conviction.

D. Establishing a drug free awareness program to inform the aforementioned company's employees about:

    1. The dangers of drug abuse in the workplace;

    2. The aforementioned company's policy of maintaining a drug free workplace;

    3. Any available drug counseling, rehabilitation, and employee assistance programs; and

    4. The penalties that may be imposed upon employees for drug violations.

E. Making it a requirement to give a copy of the statement required by Section 5. to each employee engaged in the performance of the contract with the City of Joliet and to post the statement in a prominent place in the workplace;

F. Notifying the City of Joliet within ten (10) days after receiving notice under Section 5.C.2. from an employee or otherwise receiving actual notice of such a conviction;

G. Imposing a sanction on, or requiring the satisfactory participation in a drug abuse assistance or rehabilitation program by, any employee who is so convicted, as required by Section 6., below;

H. Training personnel to effectively assist employees in selecting a proper course of action in the event drug counseling, treatment, and rehabilitation is required and indicating that an effectively trained counseling and referral team is in place;

I. Making a good faith effort to continue to maintain a drug free workplace through implementing these requirements.

J. Making a good faith effort to continue to maintain a drug free workplace through implementation of this policy.

Section 6. The undersigned further affirms that within thirty (30) days after receiving notice from an employee of a conviction of a violation of the criminal drug statute occurring in the aforementioned company's workplace he shall:

A. Take appropriate personnel action against such employee up to and including termination; or

B. Require the employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency.

TAX COMPLIANCE

Section 7. The undersigned on behalf of the entity making the foregoing proposal certifies that neither the undersigned nor the entity is barred from contracting with the City of Joliet because of any delinquency in the payment of any tax administered by the State of Illinois, Department of Revenue, unless the undersigned or the entity is contesting, in accordance with the procedures established by the appropriate revenue act, liability of the tax or the amount of tax.

Section 8. The undersigned or the entity making the proposal or bid understands that making a false statement regarding delinquency in taxes is a Class A Misdemeanor and in addition, voids the contract and allows the municipality to recover all amounts paid to the individual or entity under the contract in a civil action.

NON DISCRIMINATION AND EQUAL EMPLOYMENT OPPORTUNITY

Section 9. This EQUAL EMPLOYMENT OPPORTUNITY CLAUSE is required by the Illinois Human Rights Act and the Rules and Regulations of the Illinois Department of Human Rights published at 44 Illinois Administrative Code Section 750, et seq..

Section 10. In the event of the contractor's noncompliance with any provision of this Equal Employment Opportunity Clause, the Illinois Human Right Act, or the Rules and Regulations for Public Contracts of the Department of Human Rights (hereinafter referred to as the Department) the contractor may be declared nonresponsible 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 avoided in whole or in part, and such other sanctions or penalties may be imposed or remedies involved as provided by statute or regulation.

During the performance of this contract, the contractor agrees:

A. 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 any such underutilization.

B. 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 Department'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.

C. 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, marital status, national origin or ancestry, age, physical or mental handicap unrelated to ability, or an unfavorable discharge from military service.

D. 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 Human Rights Act and the Department's Rules and Regulations for Public Contract. If any such labor organization or representative fails or refuses to cooperate with the contractor in its efforts to comply with such Act and Rules and Regulations, the contractor will promptly so notify the Department and the contracting agency will recruit employees from other sources when necessary to fulfill its obligations thereunder.

E. That it will submit reports as required by the Department's Rules and Regulations for Public Contracts, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all respects comply with the Illinois Human Rights Act and the Department's Rules and Regulations for Public Contracts.

F. That it will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and the Department's Rules and Regulations for Public Contracts.

G. That it will include verbatim or by reference the provisions of this Equal Employment Opportunity Clause in every subcontract it awards under which any portion of the contract obligations are undertaken or assumed, so that such provisions will be binding upon such subcontractor. In the same manner as the other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply therewith. In addition, the contractor will

not utilize any subcontractor declared by the Illinois Human Rights Department to be ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

Section 11. For the purposes of subsection G of Section 10, "Subcontract" means any agreement, arrangement or understanding, written or otherwise, between a public contractor and any person under which any portion of the public contractor's obligations under one or more public contracts is performed, undertaken or assumed; the term "subcontract," however, shall not include any agreement, arrangement or understanding in which the parties stand in the relationship of an employer and an employee, or between a bank or other financial institution and its customers.

Section 12. It is expressly understood that the foregoing statements and representations and promises are made as a condition to the right of the bidder to receive payment under any award made under the terms and provisions of this bid.

Section 13. 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 Department upon request.

Section 14. In the event that this contract is subject to Executive Order 11246, Seller certifies that it (1) is in compliance with Section 202 thereof and the Rules and Regulations issued thereunder; (2) does not and will not provide or maintain at any of it’s establishments, or permit it’s employees to perform their services at any location under its control where there are maintained, segregated facilities, and (3) agrees that a breach of this Certification violates the Equal Employment clause of Executive Order 11246. “Segregated Facilities,” means facilities which are in fact segregated on a basis of race, color, creed, sex, religion or national origin, because of habit, local custom, or otherwise.

THE AMERICANS WITH DISABILITIES ACT

Section 15. As a condition of receiving this contract, the undersigned vendor certifies that services, programs and activities provided under this contract are and will continue to be in compliance with the Joliet Accessibility Code.

Signed by:_____
[name]

_____
[title]

Subscribed and Sworn to before me this _____ day of _____, 20___.

By: _____
Notary Public

-seal-

STATE OF ILLINOIS) * * *

Mix Surface							
Bituminous Aggregate Mix							
Aggregate Bases & Surface							
Structures							
Drainage							
Electrical							
Curb & Gutter							
Sewer							
Water							
Sidewalks							
Demolition							
Other/Explain							
Totals							

Date Equipment Available For Work							

_____
(SIGNATURE)

_____
(PRINT NAME)

_____
(TITLE)

Subscribed and Sworn to before me this

_____ day of _____, AD, **20**___**.**

_____
NOTARY PUBLIC

This page intentionally left blank.

BID FORM

This page intentionally left blank.

BID FORM

BIDDER_____
(name – typed or printed)

PROJECT IDENTIFICATION:

2024 Lift Station Replacement Program- Benton Lift Station and Greenfield Lift Station

DONOHUE PROJECT NUMBER: 14163
CITY CONTRACT NUMBER: 2809-0424

ARTICLE 1 – BID RECIPIENT

Attn: City Clerk
City of Joliet
150 West Jefferson Street
Joliet, IL 60432

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.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. Bidder has not added any conditions or qualifying statements to the Bid. The Bid will remain subject to acceptance for the bid withdrawal time stated in the Invitation to Bid or for such longer period of time that Bidder may agree to in writing upon request of Owner. 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 15 days after the date of Owner's Notice of Award.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

4.01 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.

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

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 carefully studied all: (1) reports of explorations and test of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities), if any, that have been identified in Paragraph 5.03 of the Supplementary Conditions as containing reliable Technical Data, and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph 5.06 of the Supplementary Conditions as containing reliable Technical Data.

E. Bidder has considered and correlated the information known to the Bidder; information commonly known to bidders doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and all additional or supplementary examinations, investigations, explorations, tests, studies, and data with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Bidder's safety precautions and programs.

F. 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.

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

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

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

J. The undersigned declares that he understands that the quantities mentioned are approximate only and that they are subject to increase or decrease; that he will take in full payment therefore the amount and the summation of the actual quantities, as finally determined multiplied by the unit price shown in the schedule of prices contained herein.

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

L. The undersigned further agrees to execute a contract for this work and present the same to the City of Joliet within fifteen (15) days after the date of the notice of the award of the contract to him.

M. The undersigned further agrees that he and his surety will execute and present within fifteen (15) days after the date of the notice of the award of the contract, a contract bond satisfactory to and in the form prescribed by the City of Joliet in the penal sum of one hundred percent (100%) of the full amount of the contract within the terms of the contract.

N. All bidders must furnish current financial statement with the bid.

O. All bidders must furnish a list of equipment available for and to be used on this project with their bid.

ARTICLE 4 – BIDDER'S CERTIFICATIONS

5.01 Bidder further represents that:

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

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

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

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 5.01.D:

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

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

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

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

ARTICLE 5 – BASIS OF BID

6.01 Bidder will complete the Work in accordance with the Contract Documents for the following price:

LUMP SUM BID PRICE _____

_____ ($_____)
(words) (figures)

A. Base Bid Material and Equipment:

1. Bidder has included Allowances listed in Section 01 21 00 in the Bid Price above.

2. Bidder has included in the Bid price, the installed cost of material and equipment furnished from Supplier A, B, or C, or subsequent listed materials and equipment; or from Supplier A if "No Substitute Allowed" is noted.

3. If a substitute not listed in the specifications is offered, Bidder agrees that the procedures for submission and consideration by Engineer for determining the acceptability of substitutes will be as set forth in the General Conditions and the Supplementary Conditions.

ARTICLE 6 – TIME OF COMPLETION

7.01 Bidder agrees that the Milestones are to be achieved and the Work will be substantially completed and completed and ready for final payment in accordance with paragraph 15.06.B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

7.02 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.

7.03 The Bidder further agrees to begin work not later than ten (10) days after the execution of the acceptance of the contract and contract bond, unless otherwise provided and to prosecute the work in such manner and with sufficient materials, equipment, and labor as will insure its completion within the time limit specified herein, it being understood and agreed that the completion within the time limit is an essential part of the contract.

ARTICLE 7 – ATTTACHMENTS TO THIS BID

8.01 The following documents are attached to and made a condition of this Bid:

B. Required Bid security in the form of _____
(Certified Check or Bid Bond)

in the amount of _____.
(Dollars or Percent of Bid Price)

C. Prevailing Wage Requirements as required in Section 00 30 50 in the Project Manual.

D. The City of Joliet Affidavits provided in Section 00 30 90.

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.

SUBMITTED ON _____, 20____.

State Contractor License No. _____. (If applicable)

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)
(Individual's signature)

Doing business as: _____

Business address: _____

_____

Phone No.: _____ FAX No.: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner – attach evidence of authority to sign)

Name (typed or printed): _____

Business address: _____

_____

Phone No.: _____ FAX No.: _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____

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

By: _____
(Signature – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(CORPORATE SEAL)

Attest: _____
(Signature of Corporate Secretary)

Business Address: _____

Phone No: _____ FAX No.: _____

Date of Qualification to do business is _____

A Joint Venture

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of joint venture partner – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ FAX No.: _____

Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of joint venture partner – attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Business address: _____

Phone No.: _____ FAX No.: _____

Phone and FAX Number, and Address for receipt of official communications:

_____

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

Sworn and subscribed to before me this

____ day of _____ , 20____.

Notary or other officer authorized to administer oaths

My commission expires: _____

GENERAL CONTRACTOR QUALIFICATIONS AND REFERENCES

The General Contractor shall provide three (3) references for projects completed satisfactorily, within the time of substantial completion, and within the project budget within the preceding five (5) years. These references must include similar pump station/lift station work, including at a minimum, but not limited to: excavation to depths similar to this project, trenching, underground piping, pre-cast structure installation, buried electrical, pump installation, concrete slab, asphalt paving, site grading and site restoration.

Reference #1:

Project Name: _____

Owner Name: _____

Owner Contact: _____

Owner Phone Number: _____

Contract Value: _____

Project Completion Date: _____

Reference #2:

Project Name: _____

Owner Name: _____

Owner Contact: _____

Owner Phone Number: _____

Contract Value: _____

Project Completion Date: _____

Reference #3:

Project Name: _____

Owner Name: _____

Owner Contact: _____

Owner Phone Number: _____

Contract Value: _____

Project Completion Date: _____

END OF BID FORM

BID BOND (PENAL SUM FORM)

Bidder	**Surety**
Name: **[Full formal name of Bidder]** Address *(principal place of business)*: **[Address of Bidder's principal place of business]**	Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner	**Bid**
Name: **[Full formal name of Owner]** Address *(principal place of business)*: **[Address of Owner's principal place of business]**	Project *(name and location)*: **[Owner project/contract name, and location of the project]** Bid Due Date: **[Enter date bid is due]**
Bond Penal Sum: **[Amount]** Date of Bond: **[Date]**	

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

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

Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

AGREEMENT

This page intentionally left blank.

AGREEMENT

THIS AGREEMENT is by and between the City of Joliet (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.

1.02 The Work for the Benton and Greenfield Lift Stations Replacement is generally described as follows:

Replacement of two sanitary lift stations, including wet well, two submersible pumps at each location, control panels, installation of Owner-furnished backup generator at one location, and associated piping, valves and electrical improvements.

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:

2024 LIFT STATION REPLACEMENT PROGRAM- BENTON LIFT STATION AND GREENFIELD LIFT STATION

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by Donohue & Associates, Inc. and subcontractors thereof. The Owner shall serve as the Engineer during construction and will assign an Owner's representative to 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 Days to Achieve Substantial Completion and Final Payment

A. The Work will be substantially completed within **249 days** after the date when the Contract Times commence to run as provided in paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with paragraph 15.06 of the General Conditions within **410 days** after the date when the Contract Times commence to run.

4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 2.3 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties

involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and Contractor agree that as liquidated damages for delay (but not as penalty):

Substantial Completion: Contractor shall pay Owner **$2,500** for each day that expires after the time (as duly adjusted pursuant to the Contract) for Substantial Completion until the Work is substantially complete. This amount is comprised of $2,300 per day for engineering, construction administration services, construction observation services, and inspections and $200 per day for administration, labor, expenses, and other costs that will be incurred by Owner.

Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner **$2,500** for each day that expires after such time until the Work is completed and ready for final payment. This amount is comprised of $2,300 per day for engineering, construction administration services, construction observation services, and inspections and $200 per day for administration, labor, expenses, and other costs that will be incurred by Owner.

B. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

C. The City may terminate the contract at any time if the contractor is not meeting the expected schedule or quality of work. Additional time may be granted by the City if a request is submitted in writing and approved. Significant additions to the quantities estimated by the City will be considered a valid reason for time extension if requested in writing.

4.04 Penalties - None

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 as follows:

_____ Dollars ($_____).
Words Numbers

ARTICLE 6 – PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

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

6.02 Progress Payments; Retainage

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as recommended by Engineer and upon each month during performance of the Work as provided below. All such payments will be measured by the schedule of values established in paragraph 2.05 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

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, in accordance with paragraph 15.01 of the General Conditions:

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.

C. 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 in accordance with paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer and upon approval of IEPA as provided in said paragraph 15.06.

ARTICLE 7 – INTEREST

7.01 By City of Joliet policy, all moneys not paid when due as provided in Article 15 of the General Conditions shall bear zero percent (0%) interest.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Agreement Contractor makes the following representations:

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

B. Contractor has visited the Site and become familiar with and is satisfied 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 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.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 00 52 33-1 to 00 52 33-__, inclusive);
2. Performance Bond (pages 00 61 00-1 to 00 61 00-__, inclusive);
3. Payment Bond (pages 00 61 50-1 to 00 61 50-__, inclusive);
4. General Conditions (pages GC 700-1 to GC 700-__, inclusive);
5. Supplementary Conditions (pages 00 73 00-1 to 00 73 00-__, inclusive);
6. Specifications as listed in the table of contents of the Project Manual;
7. Drawings, not attached hereto, as follows:
    a. Consist of a cover sheet and sheets numbered 2 through 43, inclusive, with each sheet bearing the following general title: **"Benton and Greenfield Lift Stations Replacement";**
8. Exhibits to this Agreement (enumerated as follows):
    a. Contractor's Bid (pages 1 to __, inclusive);
9. Wage Rates;
10. Federal, State, and Local Forms;
11. Documents in the Appendix;
12. 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. Change Orders;
    c. Work Change Directives;

d. Field Orders;

e. Engineer's written interpretations and clarifications.

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

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

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

ARTICLE 10 – MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

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

10.03 Successors and Assigns

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

10.04 Severability

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

10.05 Other Provisions

A. Contractor's Estimated Payment Request Schedule for Outlay Management:

1. Within 30 days of issuance of the Notice to Proceed, Contractor shall furnish Owner with a schedule of the estimated dollar value of work projected to be completed each month for the duration of the Contract. The schedule shall be updated monthly based on actual expenditures and shall be submitted along with Contractor's monthly application for progress payment. The schedule shall be detailed to allow separation of eligible and ineligible cost items and Innovative/Alternative cost items.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in triplicate. One counterpart each has been delivered to Owner, Contractor, and Engineer. All portions of the Contract Documents have been signed or identified by Owner and Contractor.

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

Owner:	Contractor:
City of Joliet, Illinois	_____
By:_____ City Manager	By:_____ (signature)
_____	_____ (typed name and title)
Attest _____ City Clerk	Attest _____ (signature)
Address for giving notices:	Address for giving notices:
City of Joliet	_____
150 West Jefferson Street	_____
Joliet, IL 60432	_____
	License No. _____ (where applicable)

NOTICE OF AWARD

DATED:

TO: _____
_____
_____

CONTRACT:

2024 Lift Station Replacement Program- Benton Lift Station and Greenfield Lift Station
Contract Number 2809-0424

for the
City of Joliet, Illinois

You are notified that your Bid dated _____ for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a Contract for providing the total Work of the Contract.

The Contract Price of your Contract is _____ Dollars ($_____).

Three copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award. Additional sets of Contract Documents and Drawings will be delivered separately at a later date.

You must comply with the following conditions precedent within fifteen (15) days of the date of this Notice of Award, that is by _____.

1. Deliver to the Owner three fully executed counterparts of the Contract Documents. Each of the Contract Documents must bear your signature on the appropriate page of the Agreement.

2. Deliver with the executed Contract Documents the Contract security (Bonds) as specified in the Instructions to Bidders (Article 20) and General Conditions (Article 6).

3. Deliver with the executed Contract Documents the certificates of insurance (with a copy to each additional insured) which you are required to purchase and maintain in accordance with the Contract Documents as specified in the General Conditions (paragraph 2.01.B).

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

Within fifteen (15) days after you comply with the above conditions, OWNER will return to you one fully executed counterpart of the Contract Documents.

City of Joliet, Illinois
(OWNER)

_____

_____
(Title)

CONTRACTOR shall return an acknowledgement original of this NOTICE OF AWARD to the OWNER.

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged,

By_____

This the _____day of_____, 20_____.

By_____

Title_____

NOTICE TO PROCEED

DATED: _____

TO: _____
_____
_____

CONTRACT:

2024 Lift Station Replacement Program- Benton Lift Station and Greenfield Lift Station
Contract Number 2809-0424

for the
City of Joliet, Illinois

You are notified that the Contract Times under the above Contract will commence to run on _____. By 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 start any Work at the Site, you must:

1. Submit schedule of submittals.
2. Submit schedule of values.
3. Submit construction schedule.
4. Submit emergency contact information.

City of Joliet, Illinois
(OWNER)

_____

_____
(Title)

ACCEPTANCE OF NOTICE

Receipt of this Notice to Proceed is hereby acknowledged and accepted by:

_____

this the _____ day of _____ , 20__

By: _____

Title: _____

This page intentionally left blank.

PERFORMANCE BOND

This page intentionally left blank.

PERFORMANCE BOND

Contractor	**Surety**
Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner	**Contract**
Name: **[Full formal name of Owner]** Mailing address *(principal place of business)*: **[Address of Owner's principal place of business]**	Description *(name and location)*: **[Owner's project/contract name, and location of the project]** Contract Price: **[Amount from Contract]** Effective Date of Contract: **[Date from Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

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

Modifications to this Bond form:

☐ None ☐ See Paragraph 16

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

14. Definitions

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

PAYMENT BOND

This page intentionally left blank.

PAYMENT BOND

Contractor	**Surety**
Name: **[Full formal name of Contractor]** Address *(principal place of business)*: **[Address of Contractor's principal place of business]**	Name: **[Full formal name of Surety]** Address *(principal place of business)*: **[Address of Surety's principal place of business]**
Owner	**Contract**
Name: **[Full formal name of Owner]** Mailing address *(principal place of business)*: **[Address of Owner's principal place of business]**	Description *(name and location)*: **[Owner's project/contract name, and location of the project]** Contract Price: **[Amount, from Contract]** Effective Date of Contract: **[Date, from Contract]**

Bond

Bond Amount: **[Amount]**

Date of Bond: **[Date]**

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

Modifications to this Bond form:

☐ None ☐ See Paragraph 18

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

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

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

EJCDC® C-615, Payment Bond.
Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

16. Definitions

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

        16.1.1. The name of the Claimant;

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared By

EJCDC®
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

NSPE
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed By

CSI
Building Knowledge
Improving Project Delivery

NUCA
We Dig America

EJCDC® C-700, Standard General Conditions of the Construction Contract.
Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Copyright© 2018

National Society of Professional Engineers

1420 King Street, Alexandria, VA 22314-2794

(703) 684-2882

www.nspe.org

American Council of Engineering Companies

1015 15th Street N.W., Washington, DC 20005

(202) 347-7474

www.acec.org

American Society of Civil Engineers

1801 Alexander Bell Drive, Reston, VA 20191-4400

(800) 548-2723

www.asce.org

The copyright for this EJCDC document is owned jointly by the three sponsoring organizations listed above. The National Society of Professional Engineers is the Copyright Administrator for the EJCDC documents; please direct all inquiries regarding EJCDC copyrights to NSPE.

NOTE: EJCDC publications may be purchased at www.ejcdc.org, or from any of the sponsoring organizations above.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

Page

Article 1—Definitions and Terminology 1
1.01 Defined Terms 1
1.02 Terminology 6
Article 2—Preliminary Matters 7
2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance 7
2.02 Copies of Documents 7
2.03 Before Starting Construction 7
2.04 Preconstruction Conference; Designation of Authorized Representatives 8
2.05 Acceptance of Schedules 8
2.06 Electronic Transmittals 8
Article 3—Contract Documents: Intent, Requirements, Reuse 9
3.01 Intent 9
3.02 Reference Standards 9
3.03 Reporting and Resolving Discrepancies 10
3.04 Requirements of the Contract Documents 10
3.05 Reuse of Documents 11
Article 4—Commencement and Progress of the Work 11
4.01 Commencement of Contract Times; Notice to Proceed 11
4.02 Starting the Work 11
4.03 Reference Points 11
4.04 Progress Schedule 12
4.05 Delays in Contractor's Progress 12
Article 5—Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions 13
5.01 Availability of Lands 13
5.02 Use of Site and Other Areas 14
5.03 Subsurface and Physical Conditions 15
5.04 Differing Subsurface or Physical Conditions 16

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

5.05 Underground Facilities 17
5.06 Hazardous Environmental Conditions at Site 19
Article 6—Bonds and Insurance 21
6.01 Performance, Payment, and Other Bonds 21
6.02 Insurance—General Provisions 22
6.03 Contractor's Insurance 24
6.04 Builder's Risk and Other Property Insurance 25
6.05 Property Losses; Subrogation 25
6.06 Receipt and Application of Property Insurance Proceeds 27
Article 7—Contractor's Responsibilities 27
7.01 Contractor's Means and Methods of Construction 27
7.02 Supervision and Superintendence 27
7.03 Labor; Working Hours 27
7.04 Services, Materials, and Equipment 28
7.05 "Or Equals" 28
7.06 Substitutes 29
7.07 Concerning Subcontractors and Suppliers 31
7.08 Patent Fees and Royalties 32
7.09 Permits 33
7.10 Taxes 33
7.11 Laws and Regulations 33
7.12 Record Documents 33
7.13 Safety and Protection 34
7.14 Hazard Communication Programs 35
7.15 Emergencies 35
7.16 Submittals 35
7.17 Contractor's General Warranty and Guarantee 38
7.18 Indemnification 39
7.19 Delegation of Professional Design Services 39
Article 8—Other Work at the Site 40
8.01 Other Work 40
8.02 Coordination 41
8.03 Legal Relationships 41

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Article 9—Owner's Responsibilities 42
9.01 Communications to Contractor 42
9.02 Replacement of Engineer 42
9.03 Furnish Data 42
9.04 Pay When Due 42
9.05 Lands and Easements; Reports, Tests, and Drawings 43
9.06 Insurance 43
9.07 Change Orders 43
9.08 Inspections, Tests, and Approvals 43
9.09 Limitations on Owner's Responsibilities 43
9.10 Undisclosed Hazardous Environmental Condition 43
9.11 Evidence of Financial Arrangements 43
9.12 Safety Programs 43
Article 10—Engineer's Status During Construction 44
10.01 Owner's Representative 44
10.02 Visits to Site 44
10.03 Resident Project Representative 44
10.04 Engineer's Authority 44
10.05 Determinations for Unit Price Work 45
10.06 Decisions on Requirements of Contract Documents and Acceptability of Work 45
10.07 Limitations on Engineer's Authority and Responsibilities 45
10.08 Compliance with Safety Program 45
Article 11—Changes to the Contract 46
11.01 Amending and Supplementing the Contract 46
11.02 Change Orders 46
11.03 Work Change Directives 46
11.04 Field Orders 47
11.05 Owner-Authorized Changes in the Work 47
11.06 Unauthorized Changes in the Work 47
11.07 Change of Contract Price 47
11.08 Change of Contract Times 49
11.09 Change Proposals 49
11.10 Notification to Surety 50

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Article 12—Claims 50
12.01 Claims 50
Article 13—Cost of the Work; Allowances; Unit Price Work 51
13.01 Cost of the Work 51
13.02 Allowances 55
13.03 Unit Price Work 55
Article 14—Tests and Inspections; Correction, Removal, or Acceptance of Defective Work 56
14.01 Access to Work 56
14.02 Tests, Inspections, and Approvals 56
14.03 Defective Work 57
14.04 Acceptance of Defective Work 58
14.05 Uncovering Work 58
14.06 Owner May Stop the Work 58
14.07 Owner May Correct Defective Work 59
Article 15—Payments to Contractor; Set-Offs; Completion; Correction Period 59
15.01 Progress Payments 59
15.02 Contractor's Warranty of Title 62
15.03 Substantial Completion 62
15.04 Partial Use or Occupancy 63
15.05 Final Inspection 64
15.06 Final Payment 64
15.07 Waiver of Claims 65
15.08 Correction Period 66
Article 16—Suspension of Work and Termination 67
16.01 Owner May Suspend Work 67
16.02 Owner May Terminate for Cause 67
16.03 Owner May Terminate for Convenience 68
16.04 Contractor May Stop Work or Terminate 68
Article 17—Final Resolution of Disputes 69
17.01 Methods and Procedures 69
Article 18—Miscellaneous 69
18.01 Giving Notice 69
18.02 Computation of Times 69

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

18.03 Cumulative Remedies 70
18.04 Limitation of Damages 70
18.05 No Waiver 70
18.06 Survival of Obligations 70
18.07 Controlling Law 70
18.08 Assignment of Contract 70
18.09 Successors and Assigns 70
18.10 Headings 70

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

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

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

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

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

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

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

10. *Claim*

a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.

b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.

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

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

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

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

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

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

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

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

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

30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

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

32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

46. *Technical Data*

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

1.02 *Terminology*

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

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

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

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

1. does not conform to the Contract Documents;

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

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

E. *Furnish, Install, Perform, Provide*

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

ARTICLE 2—PRELIMINARY MATTERS

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

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

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

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

2.02 *Copies of Documents*

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

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

2.03 *Before Starting Construction*

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

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

2. a preliminary Schedule of Submittals; and

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

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

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

2.05 *Acceptance of Schedules*

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

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

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

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

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

2.06 *Electronic Transmittals*

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

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

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

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

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

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

G. Nothing in the Contract Documents creates:

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

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

3.02 *Reference Standards*

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

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

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

B. *Resolving Discrepancies*

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

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

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

3.04 *Requirements of the Contract Documents*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

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

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

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

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

4.04 *Progress Schedule*

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

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

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

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

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

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

2. Abnormal weather conditions;

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

4. Acts of war or terrorism.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

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

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

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

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

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

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

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

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

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

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

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

5.01 *Availability of Lands*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

5.02 *Use of Site and Other Areas*

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

5.03 *Subsurface and Physical Conditions*

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

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

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

3. Technical Data contained in such reports and drawings.

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

5.04 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

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

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

E. *Possible Price and Times Adjustments*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

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

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

5.05 *Underground Facilities*

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

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

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

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

F. *Possible Price and Times Adjustments*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

5.06 *Hazardous Environmental Conditions at Site*

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

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

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

3. Technical Data contained in such reports and drawings.

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

6.02 *Insurance—General Provisions*

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

H. Contractor shall require:

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

6.03 *Contractor's Insurance*

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

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

1. include at least the specific coverages required;

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

6.04 *Builder's Risk and Other Property Insurance*

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

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

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

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

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

6.05 *Property Losses; Subrogation*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.

2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

6.06 *Receipt and Application of Property Insurance Proceeds*

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

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

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

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

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

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

7.02 *Supervision and Superintendence*

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

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

7.03 *Labor; Working Hours*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

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

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

C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

4) is not objectionable to Owner.

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

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

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

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

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

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

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

7.06 *Substitutes*

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

    a. will certify that the proposed substitute item will:

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

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

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

    b. will state:

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

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

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

    c. will identify:

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

7.07 *Concerning Subcontractors and Suppliers*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

7.08 *Patent Fees and Royalties*

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

7.09 *Permits*

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

7.10 *Taxes*

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

7.11 *Laws and Regulations*

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

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.

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

7.12 *Record Documents*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

7.13 *Safety and Protection*

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

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

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

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

7.14 *Hazard Communication Programs*

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

7.15 *Emergencies*

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

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

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

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

b. determine and verify:

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

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

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

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

2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

1. *Shop Drawings*

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

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

2. *Samples*

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

D. *Resubmittal Procedures for Shop Drawings and Samples*

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

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

7.17 *Contractor's General Warranty and Guarantee*

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

B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:

1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and

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

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

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

2. normal wear and tear under normal usage.

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

1. Observations by Engineer;

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

9. Any correction of defective Work by Owner.

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

7.18 *Indemnification*

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

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

7.19 *Delegation of Professional Design Services*

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

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

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

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

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

8.02 *Coordination*

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

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

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

3. The extent of such authority and responsibilities.

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

8.03 *Legal Relationships*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

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

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

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

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

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

9.12 *Safety Programs*

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

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

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

10.03 *Resident Project Representative*

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

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

10.04 *Engineer's Authority*

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

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

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

10.08 *Compliance with Safety Program*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

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

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

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

11.02 *Change Orders*

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

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

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

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

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

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

11.03 *Work Change Directives*

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

11.04 *Field Orders*

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

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

11.05 *Owner-Authorized Changes in the Work*

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

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

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

11.06 *Unauthorized Changes in the Work*

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

11.07 *Change of Contract Price*

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

1. A mutually acceptable fixed fee; or

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

11.08 *Change of Contract Times*

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

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

11.09 *Change Proposals*

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

B. *Change Proposal Procedures*

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

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

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

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

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

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

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

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

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

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.

D. *Mediation*

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

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

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

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

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

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

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

13.01 *Cost of the Work*

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

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

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

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.

5. Other costs consisting of the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work does not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

2. The cost of purchasing, renting, or furnishing small tools and hand tools.

3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

6. Expenses incurred in preparing and advancing Claims.

7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.

b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.

2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances*: Contractor agrees that:

1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.

C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.

2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

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

D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.

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

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.

C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

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

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

C. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work;

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;

    d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

    a. the Work is defective, requiring correction or replacement;

    b. the Contract Price has been reduced by Change Orders;

    c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

    d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

    e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:

    a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Contractor has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. The Contract Price has been reduced by Change Orders;

i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or

l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

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

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.

2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

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

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.

2. The final Application for Payment must be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents;

   b. consent of the surety, if any, to final payment;

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

d. a list of all duly pending Change Proposals and Claims; and

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Final Application and Recommendation of Payment*: If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Notice of Acceptability*: In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.

D. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.

E. *Final Payment Becomes Due*: Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

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

B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.

C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

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

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

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

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and

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

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

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

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

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

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

B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and

2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions;

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business;

2. by registered or certified mail, postage prepaid, to the recipient's place of business; or

3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

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

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

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

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

This page intentionally left blank.

SUPPLEMENTARY CONDITIONS

This page intentionally left blank.

SUPPLEMENTARY CONDITIONS

TABLE OF CONTENTS

ARTICLE		PAGE NO.
1	Definitions and Terminology……..	SC – 00 73 00-1
2	Preliminary Matters…….	SC – 00 73 00-2
3	Contract Documents: Intent, Amending, Reuse…….	SC – 00 73 00-2
4	Commencement and Progress of Work…….	SC – 00 73 00-3
5	Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions ……	SC – 00 73 00-4
6	Bonds and Insurance ……	SC – 00 73 00-6
7	Contractor's Responsibilities ……..	SC – 00 73 00-11
8	Other Work at the Site ……	SC – 00 73 00-14
9	Owner's Responsibilities ……..	SC – 00 73 00-14
10	Engineer's Status During Construction..……	SC – 00 73 00-15
11	Amending the Contract Documents; Changes in the Work…..…….	SC – 00 73 00-18
12	Claims……	SC – 00 73 00-18
13	Cost of the Work; Allowances; Unit Price Work……	SC – 00 73 00-18
14	Tests and Inspections; Correction; Removal or Acceptance of Defective Work…	SC – 00 73 00-19
15	Payments to Contractor; Set-Offs; Correction Period……	SC – 00 73 00-20
16	Suspension of Work and Termination……..	SC – 00 73 00-21
17	Final Resolution of Disputes…….	SC – 00 73 00-21
18	Miscellaneous…….	SC – 00 73 00-21

This page intentionally left blank.

SUPPLEMENTARY CONDITIONS

GENERAL

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2018 Edition). 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 stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC - 1.01

Delete subparagraph 1.01.A.18 in its entirety and insert the following in its place.

18. *Drawings* - The part of the Contract Documents that graphically shows the scope, extent, and character of the Work to be performed by the Contractor, as defined in the Agreement.

Delete subparagraph 1.01.A.46.c in its entirety and insert the following in its place.

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

Delete subparagraph 1.01.A.47 in its entirety and insert the following in its place.

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

Delete subparagraph 1.01.A.49 in its entirety and insert the following in its place.

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

Add the following paragraph after paragraph 1.01.A.50:

51. *Lump Sum* – A single price quoted for completing the Work. Also known as stipulated sum.

52. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the

Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

Add the following paragraph after paragraph 1.01.A.51:

53. *Startup* - - Coordinated operation of facilities by the Contractor, Subcontractors, Suppliers, and Owner after installation, testing, programming, and instructional services are complete and operation and maintenance data has been submitted and approved. Startup is considered complete when, in the opinion of the Engineer, the facilities have properly operated for 7 continuous days without significant interruption.

ARTICLE 2 – PRELIMINARY MATTERS

SC – 2.01

Delete Paragraph 2.01.C. in its entirety.

SC - 2.02

Delete paragraph 2.02.A. in its entirety and insert the following in its place:

A. Neither Engineer nor Owner will furnish to Contractor printed or hard copies of the Project Manual or printed or hard copies of Drawings. Contractor is responsible for printing his/her own documents for construction and use by for his/her suppliers and subcontractors..

B. One set of Drawings in AutoCAD electronic format will be provided to the Contractor provided a waiver is signed by the Contractor.

C. Upon award of the bid, the Engineer shall compile for and deliver to the Owner and Contractor a set of conformed construction documents including relevant portions of addenda. The conformed construction documents are issued for convenience only. The Contract Documents shall consist of the original bid documents and addenda. Should discrepancies exist between the conformed construction documents and the Contract Documents, the Contract Documents shall take precedence.

ARTICLE 3 –DOCUMENTS: INTENT, REQUIREMENTS, REUSE

SC – 3.01

Delete Paragraph 3.01.B. in its entirety and replace it with the following:

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 reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

SC – 3.03

Delete paragraph 3.03.A.3. in its entirety and replace it with the following:

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.

SC – 3.04

Add the following subparagraph after paragraph 3.04.A:

1. A request for written interpretation or clarification of the Contract Documents shall be submitted on the Request for Information (RFI) form provided in the Appendix of this Project Manual.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

SC - 4.01

Delete the last sentence of paragraph 4.01.A. in its entirety and insert the following in its place:

In no event will the Contract Times commence to run later than the 61st day after the day of Bid opening or the 30th day after the Effective Date of the Agreement, whichever date is earlier.

SC – 4.05

Delete paragraph 4.05.A in its entirety and replace with the following:

A. If Owner, Engineer, or other contractors or utility owners performing work for the Owner as contemplated by Article 8, or anyone for whom Owner is responsible delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete Work within the Contract Times. Except as provided for in paragraph 17.01, Contractor shall make no Claim for damages as delay in the performance of the Work occasioned by acts or neglect by Owner or any of its representatives, including Engineer, or because of any injunction which may be brought against Owner or its representatives, including Engineer, 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.

Add the following as paragraph immediately after paragraph 4.05.C.4:

5. Weather-Related Delays

   a. If "abnormal weather conditions" as set forth in Paragraph 4.05.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled.

Delete paragraph 4.05.D in its entirety and replace with the following:

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

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

2. Contractor shall not be entitled to an adjustment in Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

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

Delete paragraph 4.05.E in its entirety and replace with the following:

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

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

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

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

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

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

Add the following as paragraph immediately after paragraph 4.05.G:

H. Contractor must submit notification to Owner and Engineer of a potential delay which results in an adjustment in Contract Times under this paragraph within 10 days of the commencement of the delaying, disrupting, or interfering event.

Add the following as paragraph immediately after paragraph 4.05.H:

I. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors 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.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC – 5.03

Add the following new paragraphs immediately after paragraph 5.03.D.:

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

1. Soil Borings included in Appendix A

F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

None

SC – 5.04

Delete paragraph 5.04.E.3 in its entirety and replace it with the following:

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment shall be set forth in a Change Order. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall 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.

Delete paragraph 5.04.E.4 in its entirety and replace it with the following:

4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 10 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

SC – 5.05

Delete Paragraph 5.05.B in its entirety and replace it with the following:

B. Notice by Contractor: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

Delete Paragraph 5.05.C in its entirety and replace it with the following:

C. Engineer's Review: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

Delete Paragraph 5.05.F.2 in its entirety and replace it with the following:

2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment shall be set forth in a Change Order. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall 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.

Delete Paragraph 5.05.F.3 in its entirety and replace it with the following:

3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 10 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

Delete Paragraph 5.05.F.4 in its entirety and replace it with the following:

4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in field investigations. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

SC – 5.06

Add the following new paragraphs immediately after paragraph 5.06.A.2:

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

   None

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

   None

Delete Paragraph 5.06.G in its entirety and replace it with the following:

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 10 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

ARTICLE 6 – BONDS AND INSURANCE

SC – 6.01

Add the following language at the end of paragraph 6.01.E:

In addition, Owner will make no further progress payments under the Agreement until Contractor complies with the provisions of this paragraph.

SC – 6.02

Delete subparagraph 6.02.N in its entirety and replace it with the following:

N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 30 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

SC – 6.03

Add the following language immediately after paragraph 6.03.C:

D. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance, including, as applicable, United States Longshoreman and Harbor Workers' Compensation Act, Jones Act, stop-gap employer's liability coverage for monopolistic states, and foreign voluntary workers' compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

Workers' Compensation and Related Policies	**Policy limits of not less than:**
Workers' Compensation	
State	Statutory
Applicable Federal (e.g., Longshoreman's)	Statutory
Foreign voluntary workers' compensation (employer's responsibility coverage), if applicable	Statutory
Jones Act (if applicable)	
Bodily injury by accident—each accident	$1,000,000
Bodily injury by disease—aggregate	$2,000,000
Employer's Liability	
Each accident	$1,000,000
Each employee	$1,000,000
Policy limit	$2,000,000
Stop-gap Liability Coverage	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	$

E. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:

1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
2. damages insured by reasonably available personal injury liability coverage, and

3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

F. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.

   a. Such insurance must be maintained for three years after final payment.

   b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.

2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.

3. Severability of interests and no insured-versus-insured or cross-liability exclusions.

4. Underground, explosion, and collapse coverage.

5. Personal injury coverage.

6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.

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

G. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:

1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).

2. Any exclusion for water intrusion or water damage.

3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.

4. Any exclusion of coverage relating to earth subsidence or movement.

5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).

6. Any limitation or exclusion based on the nature of Contractor's work.

7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.

H. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	**Policy limits of not less than:**
General Aggregate	$5,000,000
Products—Completed Operations Aggregate	$3,000,000
Personal and Advertising Injury	$5,000,000
Bodily Injury and Property Damage—Each Occurrence	$2,000,000

J. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	**Policy limits of not less than:**
Bodily Injury	
Each Person	$2,000,000
Each Accident	$2,000,000
Property Damage	
Each Accident	$2,000,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	$3,000,000

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

Excess or Umbrella Liability	**Policy limits of not less than:**
Each Occurrence	$3,000,000
General Aggregate	$10,000,000

L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of $5,000 after accounting for partial attribution of its limits to underlying policies, as allowed above.

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

Contractor's Pollution Liability	**Policy limits of not less than:**
Each Occurrence/Claim	$1,000,000

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

Contractor's Professional Liability	Policy limits of not less than:
Each Claim	$1,000,000

SC – 6.04

SC-6.04 Immediately following paragraph 6.04.E, add the following paragraphs:

F. *Builder's Risk Requirements:* The builder's risk insurance must:

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

    a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.

    b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Contractor.

2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).

4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

5. extend to cover damage or loss to insured property while in transit.

6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.

7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.

8. include testing and start-up, if applicable.

9. be maintained in effect until final payment or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.

10 include as named insureds the Owner, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:

a. Donohue & Associates, Inc

H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk or other property insurance will be responsible for costs not covered because of the application of a policy deductible.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC – 7.03

Delete Paragraph 7.03.C in its entirety and replace it with the following:

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

SC - 7.04

Add the following new paragraphs after paragraph 7.04.C.:

D. Unless otherwise indicated, design of this Project is based upon the material and equipment named first in the list of Supplier's in a Specification section. Engineer has performed an evaluation of other listed Supplier's material and equipment and has determined it to be equal in quality, function and performance to that of the Supplier named first. When other Supplier's are listed, Contractor may be required to make modifications or adjustments, at Contractor's expense, to coordinate the installation of the furnished material and equipment with associated elements of Work, such as, but not limited to, piping and electrical connections, or support and mounting provisions.

E. For material or equipment listed on the Base Bid Material and Equipment Schedule, Contractor shall provide material and equipment furnished by Supplier A, B, or C as circled on the Bid Form, except Owner may select identified substitute, in lieu of circled Supplier A, B or C. Written application and supporting documentation for review of identified substitutes shall be submitted not later than 2 days after the Effective Date of the Agreement. If the Owner accepts any substitute, the substitute material and equipment shall be provided and the Contract Price will be adjusted by a Change Order executed within 30 days after the Effective Date of the Agreement, unless mutually agreed upon. The Change Order shall reflect the difference in cost between the installed price for material and equipment furnished by Supplier A, B, or C as circled on the Bid Form, and the installed cost for the substitute. If Owner selects the substitute, the procedures for submission and consideration by Engineer for determining the acceptability of substitutes are set forth in the General Conditions and Supplementary Conditions. Should the substitute not be acceptable, Contractor shall provide material and equipment furnished by Supplier A, B, or C as circled on the Bid Form for the price bid.

SC-7.05

Add the following as the last sentence to Paragraph 7.05.A.

> Where the specification or description does not contain or is not 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 for “substitute” items in GC – 7.06.

SC-7.06

Add the following new subparagraph immediately after paragraph 7.06.A.3.d:

E. 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 7.06.C 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 7.06.D. in its entirety and insert the following in its place:

D. Engineer’s Cost Reimbursement*:* Contractor will not reimburse Owner for the charges of Engineer for evaluating substitutes. Contractor will 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 any substitute.

Add the following new subparagraph immediately after paragraph 7.06.D.:

1. 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 will prepare redesign and revisions to Drawings and other Contract Documents. Contractor shall reimburse Owner for charges of Engineer for redesign and revisions to Drawings and other Contract Documents. Reimbursement of Engineer shall be based on Engineer’s direct labor costs, indirect labor costs, profit on total labor, and any direct non-labor expenses such as travel and per diem.

SC – 7.08

In the last sentence of paragraph 7.09 A. delete the word “Owner” and insert the word “Contractor” in its place.

SC – 7.10

Add the following new paragraph immediately after paragraph 7.10.A.:

B. Owner is exempt from payment of sales and compensating use taxes of the State of Illinois and of cities and counties thereof on all materials to be incorporated into the Work.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.

2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

SC – 7.13

Delete Paragraph 7.13.G. in its entirety.

SC – 7.15

Add the following new paragraph immediately after paragraph 7.15.A.:

B. 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 – 7.16

Delete Paragraph 7.16.D.3 and replace it with the following:

3. After Engineer has approved a shop drawing or sample, 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, or time of delivery will delay the construction progress. If Contractor requests a change of a previously approved submittal item under one of the above conditions, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

Delete the last sentence in subparagraph 7.16.E.1.b.

ARTICLE 8 - OTHER WORK AT THE SITE

SC – 8.02

In paragraph 8.02.A. delete the words "Supplementary Conditions" and insert the words "Specifications" in their place.

SC-8.03

Delete paragraph 8.03.A. in its entirety and insert the following paragraph as 8.03.A:

A. If, in the course of performing other work at or adjacent to the Site for Owner, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

Delete paragraph 8.03.C. in its entirety and insert the following paragraph as 8.03.C:

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, the Contractor (without involving Owner, Engineer, or construction coordinator) shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNERS RESPONSIBILITIES

SC – 9.13

Add the following new paragraph immediately after paragraph 9.12:

9.13 Site Representative

A. Owner will furnish a Site Representative, assistants, and other field staff to observe performance of the Work. The duties and responsibilities of Owner's Site Representative are described as follows:

1. Become familiar with the Contract Documents to observe the progress and quality of the executed Work, and to determine, in general, if the Work is proceeding in accordance with the Contract Documents.

2. Promptly forward to Engineer, reports from Contractor indicating conflict, error or discrepancy in the Contract Documents to enable Engineer to issue a written clarification or interpretation as provided for in paragraph 10.06 of the General Conditions.

3. Provide Engineer with copy of Site Representatives' daily log.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

Delete Paragraph 10.03.A. in its entirety and insert the following in its place:

A. Owner will provide a Site Representative whose responsibilities and duties are described in SC - 9.13.

SC – 10.03

Delete paragraph 10.03 in its entirety and insert the following in its place:

10.03 Project Representative

1. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.
2. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
3. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
4. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
5. Liaison:
    a. Serve as Engineer’s liaison with Contractor. Working principally through Contractor’s authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
    b. Assist Engineer in serving as Owner’s liaison with Contractor when Contractor’s operations affect Owner’s on-Site operations.
    c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
6. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
7. Shop Drawings and Samples:
    a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
    b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
    c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
8. Modifications: Consider and evaluate Contractor’s suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR’s recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.

9. Review of Work and Rejection of Defective Work:

    a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.

    b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

10. Inspections, Tests, and System Start-ups:

    a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.

    b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

11. Records:

    a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.

    b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.

    c. Maintain records for use in preparing Project documentation.

12. Reports:

    a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.

    b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

    c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

13. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

14. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in

accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

15. Completion:

    a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.

    b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.

    c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).

2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.

3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.

4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.

5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.

8. Authorize Owner to occupy the Project in whole or in part.

SC - 10.08

Add the following new paragraph immediately after Paragraph 10.08.A.:

B. 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 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. In the event Engineer observes situations which appear to have potential for immediate and serious injury to persons, Engineer may warn the persons who appear to be affected by such situations. Such warnings, if issued, shall be given based on general humanitarian concerns, and Engineer will not, by the issuance of any such warning, assume any responsibility to issue future warnings or any general responsibility for protection of persons affected by the Work.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

SC-11.02

Delete paragraph 11.02.B in its entirety and replace with the following:

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

Add the following new paragraph immediately after subparagraph 11.02.B.:

C. Change Orders will be prepared on the form included in the Appendix of this Project Manual.

SC – 11.07

Delete paragraph 11.07.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, then by a mutually agreed lump sum which includes an allowance for overhead and profit in accordance with Paragraph 11.07.C.2; or

SC – 11.08

Add the following new paragraph immediately after paragraph 11.08.B.:

C. Time extensions provided under paragraph 4.05 of the General Conditions will only be allowed for controlling items of Work (critical path).

SC – 11.09

Amend the first sentence of paragraph 11.09.B.1 by striking out the words “30 days” and inserting the words “10 days” in their place.

ARTICLE 12 – CLAIMS

SC – 12.01

Amend the first sentence or paragraph 12.01.B by striking out both instances of the words “30 days” and inserting the words “10 days” in their place.

ARTICLE 13 – COST OF WORK; ALLOWANCES; UNIT PRICE WORK

SC – 13.01

Delete paragraph 13.01.B.5.c.2) in its entirety.

Delete paragraph 13.01.E in its entirety and insert the following in its place:

D. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor’s accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor’s fee. Contractor shall preserve all such documents for a minimum period of three years or as required by state law in which Work is performed after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

SC – 13.03

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

E. *Adjustments in Unit Price:* Within 30 days of Engineer's written decision under the preceding paragraph, 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 12 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

ARTICLE 14 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC – 14.05

Delete Subparagraph 14.05.C.2. in its entirety and insert the following in its place:

2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 10 days of the determination that the Work is not defective.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

SC – 15.01

Amend the first sentence of subparagraph 15.01.B.1. by striking out the words "20 days" and inserting the words "30 days" in their place.

Add the following new subparagraphs immediately after paragraph 15.01.B.4.:

5. Payments requested for undelivered equipment or material specifically manufactured for this Project, excluding "off the shelf" or catalog items, will be made to Contractor for payment to the Supplier when the following conditions exist:

a. The equipment or material to be specifically manufactured for the Project could not be readily utilized on nor diverted to another project, and

b. A fabrication period of more than 6 months is anticipated.

6. Submission of a request for payment shall be accompanied by a certification furnished by the Supplier of the equipment or material that the amount of the payment claimed is in accordance with the progress of the fabrication of the equipment. The certification shall include a status report on the fabrication.

7. Payments for undelivered equipment or material meeting the requirements of subparagraph SC - 15.01.B.4. will be made in the following percentages of the Supplier's contract price of equipment or material with Contractor.

    a. 15% at the time the submittals, including shop drawings, product data, and operation and maintenance (O&M) data, are approved by Engineer.

    b. 5% additional each month thereafter until not more than 60% of the above noted price has been paid.

    c. Balance of payment, less retention, stipulated in the Agreement, upon delivery.

8. From the payment at submittal approval until delivery to the Project site, Contractor shall maintain in force multi-peril insurance to afford protection from losses that may occur to the equipment or material.

Amend the first sentence of paragraph 15.01.D.1. by striking out the words "Ten days" and inserting the words "Twenty days" in their place.

SC – 15.03

Add the following new subparagraph immediately after paragraph 15.03.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 completed the systems demonstrations, and delivered all guarantees, operation and maintenance data, certificates of installation services, certificates of instructional services, a complete set of marked up Drawings as specified in Division 1, General Requirements, and other documents. Engineer will not prepare a tentative certificate of Substantial Completion until systems demonstrations are satisfactorily completed in accordance with Section 01820, Systems Demonstrations, all operation and maintenance (O&M) data has been submitted and approved in accordance with Section 01785, Operation and Maintenance Data, and a satisfactory set of marked up Drawings has been submitted in accordance with Section 01789, Project Record Documents.

Add the following to the end of paragraph 15.03.F.

"The Contractor shall provide a listing of its property that it wishes to remove from the site and obtain Owner's approval before the property is removed. Only property approved by the Owner can be removed from the site. The Contractor shall schedule the removal of the property with the Owner, and shall obtain permission from the Owner to access the site. The Owner has the right to monitor the removal of the property."

SC – 15.06

Add the following new subparagraph immediately after paragraph 15.06.E:

1. In addition to the liquidated damages set forth in the Agreement, Contractor shall be liable for all additional costs for Engineer's services beyond Substantial and Final Completion dates.

Owner will deduct these costs from any monies due or that may become due Contractor or Surety and pay Engineer for said services.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

SC – 16.01

Amend paragraph 16.01.A. by striking out the words “30 days” in and inserting the words “ten days” in their place.

SC - 16.02

Add the following to end of paragraph 16.02.D.

“within no more than 30 days of receipt of said notice.”

SC-16.04

Amend paragraphs 16.04.A. and 16.04.B. by striking out the words “30 days” in four 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 17 – FINAL RESOLUTION OF DISPUTES

Delete paragraph 17.01.B. in its entirety and insert the following in its place:

B. Final Resolution of Disputes: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. agree with the other party to submit the dispute to another dispute resolution process.

2. give written notice of intent to the other party to submit the dispute to a court of competent jurisdiction, or

C. Notwithstanding any applicable statute of limitations, a party giving notice under paragraph 17.01.B shall commence an action on the Claim within one year of giving such notice. Failure to do so shall result in the Claim being time-barred and the action or denial shall become final and binding.

ARTICLE 18 – MISCELLANEOUS

SC – 18.01

Delete Paragraph 18.01.A. in its entirety and revise it to read the following:

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient’s place of business, and addressed to the specific intended recipient;

2. by registered or certified mail, postage prepaid, to the recipient's place of business, and addressed to the specific intended recipient; or

3. by e-mail to the specific intended recipient, with the words "Formal Notice" or similar in the e-mail's subject line. Written notice shall not be considered accepted until receipt is acknowledged by the intended recipient.

SC – 18.11

Add the following new paragraph immediately after paragraph 18.10:

18.11 Lien Waivers:

A. Owner may at any time require Contractor to furnish lien waivers for labor and materials covered by specified Applications for Payment.

END OF SUPPLEMENTARY CONDITIONS

SPECIFICATIONS

This page intentionally left blank.

DIVISION 01

GENERAL REQUIREMENTS

This page intentionally left blank.

SECTION 01 11 00
SUMMARY OF WORK

PART 1 – GENERAL

1.01 SUMMARY

A. The Work of this Contract is generally described as replacement of two sanitary lift stations, including wet well, two submersible pumps at each location, control panels, installation of Owner-furnished backup generator at one location, and associated piping, valves and electrical improvements.

B. At the Contractor's discretion, sewer and forcemain work shown to be trenchless installation at Greenfield Lift Station Site may be installed using open cut methods. Contractor shall be solely responsible for obtaining Project Agreements with impacted property owners along the route of the work, installing the work per City standards, restoring disturbed areas to equivalent or better condition after the Work, and shall be responsible for all costs associated with providing a complete and operating system as shown in the Contract Documents at no additional cost to the City.

1.02 SUPPLIED BY OWNER

A. The Owner, as "Buyer", has executed procurement contracts with Sellers of the following equipment and related services:

Item(s)	Specification No.
Natural Gas Generator	26 32 13.16

B. Specific items, sizes, and quantities as designated on drawings as Supplied by Owner.

C. The goods in each procurement contracted are to be furnished and delivered to the Project Site by Supplier, and installed by the Contractor of this Project.

D. Contact information for each Seller will be provided by Owner.

1.03 WORK BY OTHERS

A. Utilities

1. Natural Gas Service by Nicor. Contractor shall apply for service and coordinate with utility. It is expected that the fee for the new service will be zero.

1.04 WORK SEQUENCE

A. Construct Work in accordance with following requirements and to accommodate operation of existing facilities during construction period. Coordinate construction progress schedule and operations with Engineer and Owner. Owner reserves right to place facilities taken out of service by Contractor back into service on emergency basis upon notification to Contractor.

B. Bypassing of untreated or partially treated sewage to surface water of drainage courses is strictly prohibited during construction. In the event accidentally bypassing is caused by the Contractor's operations, the Owner shall immediately be entitled to employ others, at the Contractor's expense, to stop the bypassing without giving written notice to the Contractor.

C. Penalties imposed on the Owner as a result of any bypass caused by the actions of the Contractor, his employees, or subcontractors, shall be borne in full by the Contractor, including legal fees and other expenses to the Owner resulting directly or indirectly from the bypass.

D. Draining, Cleaning, and Dewatering of Wet Wells, Conduits and Piping

1. Unless specified otherwise, draining, cleaning, and dewatering of tanks, channels, conduits, piping, and other facilities and proper disposal of removed solids shall be performed by Contractor as required to complete Work.
2. Unless specified otherwise, Owner will not drain, clean, and dewater facilities to enable Contractor to complete Work.
3. Contractor shall be responsible for plugging/bulkheading the sewer to prevent flow from reaching wet well/lift station during bypass.
4. Contractor shall maintain facilities clean and dry as required to complete Work, including control and temporary pumping of leakage from isolation facilities, groundwater, and water resulting from precipitation.
5. Unless specified otherwise, the Contractor shall pump draining, cleaning, and bypass sewage to a sanitary manhole as indicated on the Drawings. Dewatering material shall be directed to stormwater collection systems after sediment control at a location as directed by the Engineer.

E. Bypass Pumping

1. The Contractor shall provide bypass pumping as required to complete removal and replacement work shown in the Contract Documents. Bypass pumping shall be installed and maintained solely by the Contractor. No electrical power is available onsite for bypass pumping operations. The Contractor shall supply all bypass pumping equipment, piping, hoses, connections, plugs, etc required for bypass operations. The Contractor shall provide contact information for emergency personnel to correct any failures in bypass operations 24-hours per day, 7-days a week. See Section 01 53 05 for additional requirements.

1.05 SHUTDOWNS

A. The Contractor shall request any planned shutdowns in written form not less than 7 days prior to the start of each shutdown. The Contractor's requests for planned shutdowns shall include a description of the Contractor's plans and approach to minimize the duration of each shutdown.

B. At no time shall pumping operations at either location be shutdown for more than one (1) hour.

1.06 CONTRACTOR'S USE OF PREMISES

A. Conduct operations to ensure least inconvenience to Owner and public and operation of existing facility. Cooperate with Owner and public officials during construction operations to minimize conflict and to facilitate public use and Owner's operations.

B. Employees of Contractor and Subcontractors involved in Work shall wear identifying button or badge when working in facilities occupied by Owner.

C. Contractor shall discuss and coordinate with Owner and Engineer prior to removing equipment from service in order to complete Work. Owner will, at Owner's discretion, request equipment to be placed back into service if out of service equipment will cause adverse effects on plant operation.

D. Obtain and pay for use of additional storage or Work areas needed for operations at no additional cost to Owner.

1.07 OWNER FURNISHED MATERIALS OR EQUIPMENT

A. Owner will furnish the following materials or equipment:

1. Natural Gas Generator

B. Owner's Responsibilities:

1. Deliver Shop Drawings, product data, and samples to Contractor.
2. Deliver Supplier's bill of materials to Contractor.
3. Arrange for manufacturer's warranties, bonds, service, and inspections as required.
4. Arrange for delivery of materials and equipment.

C. Contractor's Responsibilities:

1. Designate delivery and installation dates for materials and equipment in construction progress schedule.
2. Review Shop Drawings, product data, and samples.

a. Submit to Owner a list of discrepancies or problems anticipated in use of material or equipment.

3. Handle material and equipment at site, including unloading at site in accordance with manufacturer's instructions.
4. Inspect material and equipment jointly with Owner, record shortages and damaged or defective items.
5. Protect material and equipment from exposure to the elements, and from damage.
6. Assemble, install, connect, adjust, finish, and test in accordance with manufacturer's written instructions and Contract Documents.
7. Repair or replace items damaged by Contractor.

1.08 OWNER OCCUPANCY OF PREMISES

A. Owner will occupy site and existing facilities during entire construction period for conduct of normal operations.

B. Owner reserves right to partially occupy and to place and install equipment in completed areas of facilities, prior to Substantial Completion, provided that such occupancy does not interfere with completion of Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the Work.

1.09 PERMITS

A. Contractor shall comply with all provisions of permits as listed in Section 01 41 00 concerning construction of the work.

1.10 CONSTRUCTION LAYOUT

A. The Drawings indicate dimensions, distances, and elevations taken with sufficient accuracy to illustrate the character and extent of the work. Engineer is not responsible for laying out Contractor's work.

B. Before undertaking any work, the Contractor shall examine the project layout carefully and call to the attention of the Engineer any obvious error or significant discrepancy in conflict with the Drawings; otherwise the Contractor shall assume full responsibility for obvious departures from line, grade and dimension.

1.11 PROTECTION OF PROPERTY AND UTILITIES

A. Protection of the Work: Contractor shall take such means as are necessary to protect his own work until completed and accepted by the Owner. Further requirements are set forth under the Specifications.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION

SECTION 01 21 00
ALLOWANCES

PART 1 - GENERAL

1.01 SUMMARY

A. To provide adequate budget and bonding to cover items not precisely determined prior to bidding, include in the Contract Price the costs or quantities described in this Section.

B. Adjustment of Cost:

1. If cost or quantity is more or less than the specified allowance, Contract Price will be adjusted by Change Order.
2. Submit documentation for the actual costs or quantities after completion of Work. Documentation shall include billing statements and evidence of payment.
3. The City reserves the right to not utilize the below allowances.

C. Designate in schedule of values costs and quantities required under each allowance.

1.02 SPECIFIC ALLOWANCES

A. Allowance for unanticipated rock excavation at Greenfield site ($20,000). Unanticipated rock excavation is defined and presence of rock at a higher elevation than reasonably expected to be present based on the soil borings provided in the appendix.

B. Allowance for telemetry equipment and SCADA Integration by City supplier (Metropolitan Pump) ($60,000)

C. Allowance for City controlled contingency ($50,000) to be used only at the discretion of the City (example: unsuitable soil).

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION

This page intentionally left blank.

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SUMMARY

A. Provide a detailed breakdown of the Contract Price showing amounts and quantities allocated to each of the various parts of the Work, as specified herein and as required by General Conditions.

B. Upon request of Engineer, support amounts and quantities with data substantiating their correctness.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Schedule shall be typed on 8-1/2-in. by 11-in. white paper. Contractor's standard forms and automated printout will be considered for approval by Engineer upon request. Include following:

1. Project title.
2. Project location.
3. Owner.
4. Engineer.
5. Engineer's project number.
6. Name and address of Contractor.
7. Contract designation.
8. Date.

B. Identify installed value of Work in sufficient detail to serve as basis for computing values for progress payments during construction.

C. Provide a separate listing of general items, such as bonds, insurance, mobilization, field supervision, construction facilities, allowances, and record documents.

D. Follow Project Manual table of contents as format for listing component items. At a minimum, listing shall include material cost and total installed cost for each Specification Section for each structure as listed in this Section.

1. Identify each line item with number and title of respective Specification Division and Section.
2. Include directly proportional amount of Contractor's overhead and profit.
3. For items on which progress payments will be requested for stored materials, break down value into:

a. Cost of materials, delivered and unloaded.
b. Total installed value.

E. Provide listing of items for sitework and for each structure as follows:

1. Contractor's Overhead.

a. Bonds and Insurance
b. Mobilization
c. Office Support

d. Field Supervision
e. Demobilization

2. 100 – Benton Lift Station
3. 200/210 – Greenfield Lift Station/Existing Greenfield Lift Station

F. Sum of values listed shall equal total Contract Price.

G. Provide additional breakdown as required by Engineer.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Engineer will conduct preconstruction conference in accordance with the General Conditions and this Section.

B. To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Engineer shall conduct progress meetings, construction foreman's meetings, and specially called meetings throughout the construction period. Owner may attend meetings. Engineer shall:

1. Prepare agenda.
2. Distribute written notice of specially called meetings a minimum of 1 working day in advance of the meeting date. Notice by electronic mail is acceptable.
3. Make physical arrangements for meetings.
4. Preside at meetings.
5. Record meeting minutes.
6. Prepare formal minutes within 3 working days after meeting and distribute electronic copies to:

    a. Meeting participants.
    b. Affected parties.
    c. Contractor and Owner

1.02 QUALIFICATIONS

A. Representatives of Contractor, Subcontractors, and Suppliers attending the meetings shall be authorized to act on behalf of entity each represents.

B. Revisions to Minutes:

1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting; they will be accepted as properly stating the activities and decisions of the meeting.
2. Challenge to the minutes shall be settled at the regularly scheduled meeting.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 PRECONSTRUCTION CONFERENCE

A. Location: To be selected by Owner.

B. Attendance:

1. Contractor's Project Manager.
2. Contractor's Resident Superintendent.
3. Contractor's "hands-on" person designated to submit Shop Drawings to Engineer.

4. Subcontractors' or Suppliers' representatives Contractor may desire to invite or Engineer may request.
5. Owner's representatives.
6. Engineer's representatives.
7. Local utility representatives, if applicable.

C. Agenda:

1. Organizational arrangement of Owner's and Engineer's forces.
2. Organizational arrangement of Contractor's, Subcontractors', and material and equipment Suppliers' forces.
3. Contract Documents, including distribution of required copies.
4. Project safety.
5. Preliminary Construction Progress Schedule.
6. Check of required bonds and insurance.
7. Liquidated damages.
8. Preliminary schedule of Shop Drawing submissions.
9. Procedures for handling submittals.
10. O & M submittals.
11. Channels and procedures for communications, correspondence, and project coordination.
12. Weekly and monthly meetings.
13. Equal opportunity requirements.
14. Laboratory and field testing requirements.
15. Provisions for inventory of material stored on-site or off-site.
16. Schedule of values.
17. Application for progress payments.
18. Field Order and Change Order procedures.
19. Project Record Documents.
20. Posting of required signs and notices.
21. Other business.

3.02 PROGRESS MEETINGS

A. Schedule monthly progress meetings. If deemed necessary by the Engineer and Owner progress meeting frequency may be increased to biweekly.

B. Location: Contractor's field office.

C. Attendance:

1. Contractor's Project Manager.
2. Contractor's Resident Superintendent.
3. Affected Subcontractors.

D. Suggested Agenda:

1. Review of minutes of previous meeting.
2. Review of Work progress since previous meeting.
3. Project safety concerns.
4. Field observations, problems, conflicts.
5. Problems impeding Construction Progress Schedule.
6. Review of off-site fabrication, delivery schedules.
7. Corrective measures and procedures to regain conformance with Construction Progress Schedule.
8. Revisions to Construction Progress Schedule.

9. Issues raised by Owner and Engineer.
10. Proposed progress and schedule for succeeding Work period.
11. Coordination of schedules.
12. Review and update of submittal schedule.
13. Maintenance of quality standards.
14. Pending changes and Substitutions.
15. Effect of proposed changes on Construction Progress schedule.
16. Review of Project Record Documents.
17. Other business.

E. Agenda containing specific subjects to be discussed shall be provided to each attendee and to the Owner and Engineer at least 5 working days before the meeting.

3.03 CONSTRUCTION FOREMAN'S MEETING

A. Schedule weekly.

B. Location: Contractor's field office.

C. Attendance:

1. Resident Superintendent.
2. Subcontractors' foremen.

D. Suggested Agenda:

1. Review of Work progress since previous meeting.
2. Proposed progress and schedule for succeeding Work period.
3. Field observations, problems, conflicts.
4. Problems that affect Construction Progress Schedule.

END OF SECTION

This page intentionally left blank.

SECTION 01 32 16
PROGRESS SCHEDULE
(BAR CHART METHOD)

PART 1 – GENERAL

1.01 SUMMARY

A. Submit preliminary Progress Schedule in accordance with General Conditions.

1.02 SUBMITTALS

A. Three days before the conference to discuss schedules, submit, electronically, preliminary schedule, and subsequent revisions thereof, to Engineer and Owner for review.

B. Three days prior to monthly Project Meetings as required by Section 01 31 19, furnish 4 copies of proposed revised schedule to Owner and Engineer. Furnish revised schedule to Subcontractors as appropriate.

C. Failure to submit schedules on a timely basis shall be considered cause for withholding progress payments.

1.03 WORKING HOURS

A. Comply with requirements of General Conditions.

B. No Work shall be done between 6:00 p.m. and 7:00 a.m., nor on Saturdays, Sundays or legal holidays without written permission of Owner. Emergency work may be done without prior permission.

C. Such permission may be revoked at any time by Owner if Contractor fails to maintain adequate equipment and supervision for proper prosecution and control of Work. Revocation shall not entitle Contractor to change in Contract Price or Contract Time.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 FORM OF SCHEDULE

A. Prepare schedule in form of horizontal bar chart.

1. Provide separate horizontal bar for each trade, activity or operation.
2. Provide continuous vertical line to identify first working day of each week.
3. Scale and space to allow for notations and future revisions.

B. Format of Listings: Chronological order of start of each activity or operation.

3.02 CONTENT OF SCHEDULE

A. Show complete sequence of construction by activity or operation.

B. Show dates for beginning and completion of each major element of construction and installation dates for major equipment items. Include:

a. Each individual task of construction.
b. Procurement of equipment and systems including Shop Drawing submittals, Engineer's review of submittals, shop tests, and delivery dates.
c. Identification of Work that will affect existing plant operations.
d. Services of manufactures' representatives.
e. Startup dates for major equipment.
f. Field tests.
g. Dates of Substantial and Final completion.
h. Subcontractor Work items.
i. Allowance for inclement weather.
j. MBE, WBE, and SBE activities.
k. O&M data activities.
l. Contractor-provided training.

C. Show projected percentage of completion for each activity as of first day of each month.

3.03 REVISIONS TO SCHEDULE

A. Each month Contractor shall receive update information from Subcontractors and Suppliers which shall be included in current schedule. Revised schedule shall indicate changes such as:

1. Major changes in scope.
2. Activities modified since previous submittal.
3. Revised projections of progress and completion.
4. Other identifiable changes.

B. Provide narrative report to define following:

1. Problem area and anticipated delays and their impact on schedule.
2. Corrective action recommended and its effect.

3.04 MONTHLY PROGRESS MEETINGS

A. Once each month, in accordance with Section 01 31 19, Progress Schedule will be reviewed. Progress will be reviewed:

1. To identify those activities started and completed during previous period.
2. For remaining duration required to complete each activity started, but not completed.
3. For durations of selected activities not yet started.
4. For effect of Change Orders and proposed sequencing.

B. Update schedule accordingly.

3.05 DELAYS AND RECOVERY

A. If, at any time during the Project, Contractor fails to complete activity by its latest scheduled completion date, Contractor shall, within 5 working days, submit to Engineer written statement as to how and when work force will be reorganized to return to current Progress Schedule.

B. If, during schedule review meetings, it becomes apparent that milestone completion dates or times established in Section 01 11 00 or Contract completion dates will not be met due to a

delay, disruption, or interference caused by or within the control of Contractor, Contractor shall take some or all of the following actions:

1. Increase construction staffing in such quantities and crafts as shall eliminate backlog of Work.
2. Increase number of working hours per shift, shifts per day, Work days per week, amount of construction equipment or combination of foregoing sufficient to substantially eliminate backlog of Work.
3. Reschedule Work activities to achieve concurrency of accomplishment.

C. Under no circumstances will addition of equipment or construction forces, increasing working hours or other method, manner or procedure to return to current Progress Schedule be considered justification for Contract modification or treated as acceleration.

END OF SECTION

This page intentionally left blank.

SECTION 01 32 33
CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 SUMMARY

A. Provide digital-format photographs taken at the specified stages during construction, and in accordance with provisions of this Section.

B. Provide color video of existing facilities taken before commencement of construction.

1.02 SUBMITTALS

A. Submit digital photographs on electronic media acceptable to the Engineer. Digital photographs shall be common retrievable format as specified by Engineer during Preconstruction Conference. Submit with each application for payment.

B. Submit color video of existing facilities using electronic media and format acceptable to the Engineer. Submit prior to commencement of construction.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHS

A. Provide electronic color prints:

1. Electronic files shall be in JPG, TIFF, or other commonly used format. Files shall be named to adequately describe the photo without the need to open the file.
   a. Project name.
   b. Site Number (100/200/210)
   c. Orientation of view.
   d. Photograph number.
   e. Example: LiftStationReplacements_100_N_1

B. Submit approved electronic storage with the appropriate information shown under paragraph 2.01 A. above.

PART 3 - EXECUTION

3.01 PHOTOGRAPHIC REQUIREMENTS

A. Take photographs at each major stage of construction.

1. Before commencement of construction.
2. At intervals sufficient to record construction progress but no less than at monthly intervals during construction of facilities. Photographs need show only new Work for that month.

B. Make each photograph clear, in focus, with high resolution and sharpness, and with minimum distortion.

3.02 VIEWS

A. Make photographs from three separate locations around Work and for each major structure.

B. Select locations to provide diversified overall views of Work, from positions that are expected to remain accessible throughout progress of Work. Locations shall adequately illustrate condition of construction and state of Project.

C. When directed by Engineer, because of stage of construction, change one or more locations to new locations inside or outside structure.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Requirements for Work-related (non-administrative) submittals including Substitutes and "Or-Equal" items, Shop Drawings, product data, Samples, test results, operating and maintenance data, and other miscellaneous Work-related submittals.

1. Submittals for certification of installation, instructional, and post-startup services are specified in Section 01 61 00.
2. Submittals for record drawings are specified in Section 01 78 39.

B. Administrative Submittals: Procedures concerning items such as listing of manufacturers, Suppliers, Subcontractors, Progress Schedule, bonds, payment applications, insurance certificates, Schedule of Values, and photographs are specified elsewhere.

C. Work–Related Submittals:

1. Substitute and "Or-Equal" Items:

a. Includes material or equipment described in Paragraphs 7.05 and 7.06 of General Conditions, Article 7 of the Supplementary Conditions, and Section 01 61 00 which Contractor requests Engineer to accept, after Effective Date of the Agreement.

2. Shop Drawings:

a. As defined in Paragraph 1.01.A.37 of the General Conditions, and in particular includes technical data and drawings specifically prepared for this Project, including fabrication and installation drawings, diagrams, data sheets, schedules, templates, patterns, reports, instructions, design mix formulas, measurements, and similar information not in standard printed form.

3. Product Data:

a. Includes standard catalog type printed information on manufactured materials, equipment and systems that has not been specifically prepared for this Project, including manufactures' product specifications, catalog cut sheets, standard wiring diagrams, printed performance curves, mill reports, and standard color charts.

4. Samples:

a. As defined in Paragraph 1.01.A.34 of the General Conditions, and in particular includes fabricated and manufactured physical examples of materials, products, and units of Work, including complete units, partial cuts of manufactured or fabricated Work, swatches showing color, texture, and pattern, and units of Work to be used for independent inspection and testing.
b. Mock-ups are special forms of Samples too large or otherwise inconvenient for handling in manner specified for transmittal of Sample submittals.

5. Test Results:

a. Includes source and field quality inspection and test reports, actual performance curves, and certifications of results prepared specifically for equipment, material, and systems provided for this Project.

6. Operating and Maintenance Data:

a. Includes information and directions for operating and maintaining equipment provided and installed for this Project. May be standard for equipment or prepared specifically for this Project.

7. Miscellaneous Submittals:

a. Work-related submittals that do not fit in previous categories, including schedules, guarantees, warranties, certifications, maintenance agreements, workmanship bonds, survey data and reports, physical work records, copies of industry standards, field measurements, extra materials, keys, and similar information, devices, and materials applicable to Work.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 EMAIL SUBMITTALS

Contractor shall make submittals via electronic mail to Engineer. Email subject shall be as follows: "Joliet – Benton and Greenfield LS – Submittal: " and include submittal number and description. At project completion, a full record of all submittals and responses shall be submitted to Owner via flash drive or other acceptable file transfer. The Contractor shall maintain a log of submittal, dates of transmittal and receipt of response, and status.

3.02 SUBMITTAL PROCEDURES

A. Scheduling:

1. Provide preliminary and final schedule of submittals in accordance with the General Conditions indicating time requirements for coordination of submittals with performance of Work.

2. Adjust schedule of submittals periodically to reflect revisions to Progress Schedule.

B. Coordination:

1. Coordinate preparation and processing of submittals with performance of Work. Coordinate each submittal with other submittals and related activities such as substitution requests, testing, purchasing, fabrication, delivery, and similar activities.
2. Coordinate submission of different units of interrelated Work so submittal will not be delayed by Engineer's need to review related submittal. Engineer may withhold action on submittal requiring coordination with other submittals until related submittals are provided.
3. Prepare and transmit each submittal sufficiently in advance of scheduled performance of related Work and other applicable activities.

C. Submittal Preparation:

1. Stamp and sign each submittal certifying to review and approval of submittal, verification of material and equipment, field measurements, field construction criteria, and coordination of information with Contract Documents in accordance with paragraph 7.16 of the General Conditions.
2. Submittals shall contain sufficient detail to confirm compliance with the requirements of the respective specification section. Submittals shall not contain excessive, non-pertinent information.
3. Submittals shall be complete for all material and equipment specified in each section. Partial submittals are not acceptable.
4. Transmittal Form: Use CONTRACTOR'S SUBMITTAL TRANSMITTAL form included in Appendix. Identify following:
    a. Date
    b. Transmittal and Submittal number
    c. Project
    d. Name and signature of Contractor:
    e. If submittal is for substitute, identify as "Substitute" on transmittal.
    f. Specification section and/or Drawing numbers.
    g. Description of submittal (i.e. equipment identification numbers, motor numbers, etc.)
    h. Variations from Contract Documents

5. The electronic submittal shall be in searchable, bookmarked PDF format.
6. Electronic submittal document shall be created with OCR (Optical Character Recognition) to allow for full alphanumeric recognition of printed characters

D. Resubmittal Preparation:

1. Comply with requirements for Submittal Preparation above, and in addition:

    a. Identify on transmittal form submittal is a resubmission.
    b. Make corrections or changes in submittal required by Engineer's notations on returned submittal.
    c. On transmittal or separate page, answer or acknowledge in writing notations or questions indicated on Engineer's transmittal form of returned submittal.

        1) Identify each response by question or notation number established by Engineer.
        2) If Contractor does not respond to each notation or question, resubmission will be returned without action by Engineer until Contractor provides written response.

    d. Contractor-initiated revisions or variations:

        1) On transmittal form, identify variations or revisions from previously reviewed submittal.

3.03 SPECIFIC SUBMITTAL REQUIREMENTS

A. General:

1. Comply with requirements specified below for each indicated type of submittal. Specific submittal requirements for individual units of work are specified in applicable Specification section.
2. If Engineer has responded to Request for Information submitted by Contractor, include Engineer's response with submittal.

B. Requests for Substitutes:

1. Collect data for items to be submitted for review as Substitute into one submittal for each item of material or equipment in accordance with paragraph 7.06 of the General and Supplementary Conditions.
2. Include completed CONTRACTOR'S REQUEST FOR SUBSTITUTION form as required by Supplementary Conditions. Use the form included in the Appendix.
3. Submit with other scheduled submittals for material and equipment allowing time for Engineer to evaluate additional information required to be submitted.
4. If Contractor requests to substitute for materials or equipment specified, but not identified in Specification as requiring submittal, Contractor shall indicate substitution in Submittal Schedule.

C. Shop Drawings:

1. Maximum size 22 in. by 34 in.
2. Submit graphic information at accurate scale with name of preparer indicated.
3. Show dimensions and note which are based on field measurements.
4. Indicate compliance with standards and notation of coordination requirements.
5. Highlight, encircle or otherwise indicate variation from Contract documents or previous submittals and revisions on resubmittals.
6. Do not use Engineer's Drawings as Shop Drawings.
7. Provide blank space for Contractor stamps.
8. Provide 4-in. by 8-in. blank space for Engineer stamps.

D. Product Data:

1. Collect required data into single submittal for each unit of Work or system. Where product data includes information on several similar materials or equipment, some of which are not require for use in Project, mark copies to show which items are not applicable to Project.

E. Samples:

1. Provide Samples physically identical with proposed materials and equipment to be incorporated into work. Where variations in color, pattern, and texture are inherent in product, submit multiple units (not less than 3) showing approximate limit of variations.
2. Provide full set of option Samples where selection by Owner or Engineer is required.
3. Include information with Sample to show generic description, source, product name, manufacturer, limitations, and compliance with standards.
4. Submit Samples with other related elements of work.
5. Submit two (2) sets of Samples where Specifications indicate Engineer's selection of color, pattern, texture or similar characteristics from manufacturer's range of standard choices is necessary. Neither set will be returned.
6. Maintain set of Samples at Project site, in suitable condition and available for quality control comparisons throughout course of Work.

F. Test Results:

1. Identify each test by Specification section and type of test.
2. Submittal is to confirm that results of tests verify materials, products, and systems comply with Contract Documents and are not for approval.

G. Operating and Maintenance (O&M) Data:

1. Organize operating and maintenance information into suitable sets of manageable size, and bind into individual binders properly identified and indexed. Include emergency instructions, spare parts list, copies of warranties, wiring diagrams, recommended

"turn-around" cycles, inspection procedures, Shop Drawings, product data, and similar applicable information.
2. Submit one (1) copy in searchable, bookmarked PDF for review and approval.
3. Binders shall be heavy duty 3 ring, vinyl covered, with pocket folders for folded sheet material. Binders shall be of adequate size to easily hold required amount of sheets.
4. Submit after equipment submittal has been returned "Approved" or "Approved as Noted".
5. After approval, submit final versions including two (2) hard copies and one (1) copy in searchable, bookmarked PDF format. Electronic O&M document shall be created with OCR (Optical Character Recognition) to allow for full alphanumeric recognition of printed characters.

H. Miscellaneous:

1. Guarantees, Warranties, Maintenance Agreements, and Workmanship Bonds:

a. Refer to Specification sections for requirements.
b. Provide 2 executed copies. Provide 2 additional copies where required for operation and maintenance data.

2. Survey Data:

a. Refer to Specification sections for requirements of property surveys, building or structure condition surveys, field measurements, quantitative records of actual work, damage surveys, and similar data.

3. Certifications:

a. Refer to Specification sections for requirements.

4. Closeout Submittals;

a. Refer to Specification sections for requirements of spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar units to be submitted.

3.04 ACTION ON SUBMITTALS

A. General:

1. Except for submittals for record and similar purposes, where action and return is not required or requested, Engineer will review each submittal, mark the appropriate action, and return.
2. Where submittal must be held for coordination, Engineer will so advise Contractor without delay.
3. Engineer will stamp each submittal with uniform, self-explanatory action stamp, appropriately marked with submittal action.

B. Unsolicited Submittals:

1. Engineer will return unsolicited submittals without reviewing.

C. Action Stamp:

1. Marking: "Approved"

a. Work covered by submittal may proceed provided it complies with Contract Documents. Acceptance of Work depends on that compliance.

2. Marking: “Approved As Noted”

    a. Work covered by submittal may proceed provided it complies with Engineer’s notations or corrections on submittal and with Contract Documents. Acceptance of work depends on that compliance. Resubmittal not required.

3. Marking: “Revise and Resubmit”

    a. Do not proceed with Work covered by submittal.
    b. Revise submittal or prepare new submittal in accordance with Engineer’s notations.

4. Marking: “Not Approved”

    a. Work covered by submittal does not comply with Contract Documents. Do not proceed with Work covered by submittal.
    b. Prepare new submittal complying with Contract Documents.

5. Marking: “No Action Required”

    a. Document has not been reviewed and is only filed for record purposes.

D. General Distribution:

1. Unless required elsewhere, provide distribution of submittals to Subcontractors, Suppliers, governing authorities, and others as necessary for performance of Work.
2. Provide copies of submittals bearing Engineer’s action stamp to:

    a. Job site file.
    b. Record documents file.

END OF SECTION

SECTION 01 35 16
ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cutting and patching.
2. Alterations to existing buildings or structures.
3. Demolition, removal, and abandonment of existing facilities.

B. Work Includes:

1. Cutting, moving or removal of items as shown on Drawings.
2. Cutting, moving or removal of items as necessary to provide access to allow alterations and new Work to proceed.
3. Cutting, moving or removal of items not shown to be cut, moved or removed, but which must be cut, moved or removed to allow new Work to proceed.
4. Patching or reinstalling Work or items which are to remain in finished Work.
5. Removal of existing surface finishes as needed to install new Work and finishes.
6. Removal of abandoned items.
7. Salvage of material and equipment as noted.
8. Demolition of structures.
9. Removal of portions of structures or utilities.
10. Abandonment of utilities.

1.02 SUBMITTALS

A. Test Results:

1. Facility condition surveys.

B. Miscellaneous Submittals:

1. Alteration and demolition schedule and operational sequence.

C. Submit in accordance with Section 01 33 00.

1.03 QUALITY ASSURANCE

A. Conform to requirements of regulatory agencies and utility companies.

1.04 PROTECTION AND CONTINUITY OF OPERATIONS AND UTILITIES

A. Perform Work with trades qualified to perform Work in manner causing least damage to each type of Work.

B. Protect existing finishes, equipment, and adjacent Work which is to remain, from damage.

C. Protect existing and new Work from weather and extremes of temperature.

D. Do not pile material to endanger building or structure.

E. Structural stability of structures adjacent to or affected by Work shall be Contractor's responsibility. Provide shoring, needling, and bracing to keep buildings or structures structurally secure and free of damaging deflection or settlement.

F. Do not close or obstruct streets, walks, or other facilities occupied and used by Owner and public without prior written permission from Owner and others having jurisdiction.

G. Notify utilities prior to razing operations to permit them to disconnect, remove, or relocate equipment serving existing facilities.

H. Protect existing utilities so they will continue to function during and after construction. Where interference with facilities occurs, cooperate with owner of utility and, if necessary, alter utility or facility to eliminate interference.

I. Service Continuity:

1. Perform Work so as not to interfere with Owner's operations.
2. Provide and maintain continuous electrical, plumbing, and HVAC services to functioning portions of facilities during hours normally in use.
3. Temporary outages are permitted during cutover work at such times and places as can be pre-arranged with Engineer and Owner. Keep such outages to minimum number and length. Make no outages without prior approval.
4. Remove temporary equipment and materials when no longer required.

J. Plant Operation:

1. Maintain continuity of plant operation to functioning portions of existing plant.
2. Temporary shutoff is permitted during cutover Work at such times and places as can be pre-arranged with Engineer and Owner. Keep such shutoffs to minimum number and length. Once Work has started on temporary shutoff, continue until Work is complete. Make no shutoffs without prior approval.
3. Remove temporary equipment and materials when no longer required.

1.05 TEMPORARY ELECTRICAL AND MECHANICAL SERVICES

A. Comply with Section 01 52 00.

B. Electrical:

1. Maintain existing electrical service to existing equipment until removed from service.
2. Provide temporary electrical connections to new equipment if permanent wiring is not complete and equipment is required to be placed into service to continue operation of facility.
3. Provide temporary electrical connections to temporary equipment or existing equipment that has been relocated, but is required to continue operation of facility.

C. Mechanical:

1. Maintain existing interior work area above 60°F.
2. Provide weather protection, waterproofing, heat, and humidity control to prevent damage to remaining existing and new Work.
3. Where existing ventilation systems are to be replaced, either the supply or exhaust/return shall remain operational at all times to ensure minimum ventilation is provided. Where this is not possible, temporary ventilation shall be provided.

PART 2 – PRODUCTS

2.01 SALVAGED MATERIALS

A. Whenever used in the Documents, the term “salvage” shall indicate material or equipment to be retained by the Owner or to be reused in the Work.

B. Salvage sufficient quantities of cut or removed material to replace damaged Work of existing construction or patch new Work when material not readily obtainable on current market.

C. Prior to demolition, coordinate with the Owner to identify equipment or materials that the Owner wishes to salvage. Typical salvage items may include, but are not limited to:

1. Pumps
2. Valves
3. Castings
4. Instruments (meters, floats, level sensors)
5. Electrical components
6. Other items noted on Drawings.

D. Salvaged materials and equipment shall be turned over to the Owner on-site.

E. Prior to commencement of removal activities associated with the salvaging of equipment for either reuse by Owner, or reuse in Work, an inspection shall be completed by the Contractor, with the Owner and Engineer present. The inspection shall identify condition of components to be salvaged and itemize known or observed deficiencies. During the inspection, each component shall be photographically logged. A Salvaged Equipment Condition Report shall be submitted for approval by Owner and Engineer identifying condition of each component as “Good” or “Damaged”. Components identified as Damaged shall contain a description of extent of damage. Photo log shall be submitted electronically with file names matching equipment tag.

F. Items to be salvaged for either reuse by Owner, or reuse in Work shall be removed with care to protect the existing condition of the component and ensure component can be reused in a different service. To the greatest extent possible, individual salvaged items shall be removed in one piece. Large items that have bolted connections may be disassembled to facilitate removal, but must be reassembled to same condition at location of storage. If disassembled location contained a gasketing material, a new gasket shall be provided and installed, reuse of the existing gasket will not be permitted unless specifically approved by Engineer.

2.02 PRODUCTS FOR PATCHING, EXTENDING, AND MATCHING

A. Provide same products, salvaged materials, types of construction or finish as that in existing structure, as needed to patch, extend or match existing Work.

B. If requested by Engineer or Owner, Contractor to provide samples of materials and details of installation a minimum of thirty (30) days prior.

PART 3 – EXECUTION

3.01 PREPARATION

A. Prior to alteration or demolition of facilities, accomplish following:

1. Owner release of facility.
2. Electrical, HVAC, process, and plumbing services rerouted or shut off outside area of Work.

3. Salvage items scheduled for reuse in new Work or scheduled to be delivered to Owner.
4. Survey and record condition of existing facilities to remain in-place that may be affected by Work. After Work complete, survey conditions again and restore facilities to original condition at no additional cost to Owner. Conduct surveys in presence of Engineer.

B. Where new Work is to be installed or suspended concealing existing surfaces or spaces, Contractor shall remove foreign substances such as grease, sludge, and odoriferous material before starting Work.

C. Where surfaces are to remain exposed, Contractor shall remove foreign substances such as grease, sludge, and odoriferous material.

D. Coordinate alteration and demolition Work so new construction installed before, during, and after Work may commence without undue delay.

3.02 CUTTING AND PATCHING

A. Cut finish surfaces such as masonry, tile, plaster or metals, by methods to terminate surfaces in smooth, straight line at natural point of division. Make cuts parallel with walls and/or floors.

B. Make joints and finishes match adjacent or similar work.

C. Do not cut or notch structural members without specific written approval of Engineer.

D. At request of Engineer or Owner, Contractor shall prepare mockup of proposed materials to be used in locations adjacent to, connecting, or patching into existing surfaces to remain. Owner shall approve of appearance and match prior to Contractor's installation of permanent Work.

3.03 REMOVAL OPERATIONS

A. Remove concrete, steel and masonry to extent indicated on Drawings.

B. Remove equipment and appurtenances to extent indicated on Drawings.

C. Remove utilities and piping to elevations and locations shown on Drawings and plug and seal permanently with steel cap, concrete plug, or other approved method in accordance with specified abandonment procedures.

D. Remove abandoned utilities and underground piping within influence zone of proposed structures or piping.

E. Where existing materials and equipment are removed or relocated, remove materials no longer used such as studs, straps, conduits, ducts, junction boxes, pull boxes, wires, anchors, and supports. Remove or cut off concealed or embedded materials and equipment to at least 1 in. below final finished surface. Patch floors and walls to match existing.

F. Repair affected surfaces to conform to type, quality, and finish of adjacent surfaces.

G. Dispose of removed items as specified herein.

3.04 DEMOLITION OPERATIONS

A. Demolish existing structures including superstructure, foundation, footings, piles, utility drains, and other piping 18 in. below finished grade in landscaped areas, 36 in. below finished grade in paved areas, or as shown on Drawings.

B. Provide drainage for structures demolished by cutting openings in floors of structures remaining in-place. Holes shall be 6 in. dia minimum, spaced at 20-ft centers maximum (minimum of 2 each confined area). Notify Engineer prior to backfilling structure remaining. Fill in accordance with Section 31 23 00.

C. Demolish existing structures and their entire foundations when noted on the Drawings or when the existing structures fall within the influence zone of new structures as defined in Section 31 23 00.

D. Plug or cap utility drains and other piping in accordance with specified abandonment procedures.

E. Dispose of demolition debris as specified herein.

3.05 ABANDONMENT OPERATIONS

A. Abandon utilities and piping within limits noted. Fully disconnect from portions of utility or piping remaining in service.

B. Remove portions of utility or piping being abandoned within influence zone of proposed structures or piping.

C. Provide compatible cap for pressurized piping. Provide thrust blocks for caps unless piping has fully restrained joints.

D. Provide mechanical wing plugs with concrete caps for gravity piping. Plug shall be Class B concrete in accordance with Section 03 30 00.

E. For pipes greater than 15-inches internal diameter, pipes in the Illinois Department of Transportation Right of Way, and as noted on the Drawings, fill existing pipe to be abandoned with low viscosity flowable fill. The 28-day compressive strength of flowable fill shall not be less than 50 psi.

3.06 RESTORATION

A. Where existing partitions are removed, patch floors, walls, and ceilings with finish materials matching existing to provide smooth planes without breaks, steps, or bulkheads. Trim and refinish doors as necessary to clear new floors or flooring material.

1. Where change of plane of 2 in. or more occurs, notify Engineer and request direction.

B. Patch and replace portions of existing finished surface damaged by Contractor's operations.

1. Provide adequate support of substrate prior to patching finish.
2. Refinish patched portions of painted or coated surfaces to produce uniform color and texture over entire surface.
3. When existing surface finish cannot be matched, refinish entire surface to nearest intersection.

C. When new Work abuts or finishes flush with existing Work, transition shall match existing adjacent Work in texture and appearance so patch or transition is not visible at a distance of 6 feet.

D. When smooth transition is not possible, terminate existing surface along straight line at natural division, and provide appropriate trim.

E. Clean and repair damage caused by installation or by use of temporary facilities.

1. Remove foundations and underground installations used for construction aids.
2. Grade areas affected by temporary installations to required elevations and slopes.

F. Restore existing facilities used for temporary purposes to specified, or original, condition.

3.07 CLEANING

A. Perform periodic cleaning and final cleaning as specified in Section 01 74 00.

1. Clean Owner occupied areas daily.
2. Clean spillage, overspray, and heavy collection of dust in Owner occupied areas immediately.

B. At completion of alteration and demolition Work in each area, provide final cleaning and return space to condition suitable for use by Owner.

3.08 DISPOSAL

A. Remove debris from site each day.

B. Equipment and materials not scheduled to be salvaged or reused in new Work shall become property of Contractor to be disposed of in accordance with applicable laws.

C. Debris and other undesirable and unsalvageable material resulting from alteration and demolition operations shall be legally disposed offsite.

END OF SECTION

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 PERMITS

A. Contractor shall obtain the following permits:

1. Permits required for construction of the Work which are not listed as being provided by Owner.
2. Contractor shall be responsible for application fees, bond costs, coordination with permitting agencies and review or inspection fees charged by permitting agencies when Contractor obtains permit.
3. Annual or licensing fees which may be charged by permitting agencies for placement of facilities shall be paid for by the Owner.

B. Comply with requirements of permits obtained by Owner. Permits obtained by Owner include:

1. Illinois Environmental Protection Agency Construction and Operating Permit

1.02 NOTICES

A. Provide notices in accordance with requirements of General Conditions and applicable construction permits to following agencies or individuals and to others as required elsewhere in Contract Documents.

1. Engineer:

a. Notice: 10 working days prior to start of construction.
b. Notice: 5 days prior to start of additional crews.

2. Fire, Police, and Sheriff's Department:

a. Notice: 24 hr minimum, or as required by local agencies, prior to closing streets or performing operations affecting vehicular traffic.

3. Utilities: for work which requires excavation.

a. Notice: 72 hr minimum.

5. Others as required in Contract Documents.

1.03 REGULATIONS

A. Comply with local, state, and federal laws, rules, ordinances, and regulations. Give Engineer notice of variations in accordance with General Conditions.

END OF SECTION

This page intentionally left blank.

SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Testing and inspecting to be provided by the Contractor.

B. Provide the services of a testing laboratory approved by Owner.

C. Provide all tests and inspections required by governmental agencies having jurisdiction, and required by provisions of the Contract Documents.

D. Perform additional tests as required by Engineer.

E. Perform additional inspections, sampling, and testing required when initial tests indicate Work does not comply with Contract Documents.

F. Specified inspections and/or tests may be waived only by the specific approval of Engineer, and such waivers will result in credit to the Owner equal to normal cost of such inspection and/or test.

1.02 PAYMENT

A. Include within the Contract Price an amount sufficient to cover all testing and inspecting required under this Section, and to cover all testing and inspecting required by governmental agencies.

B. The Owner will pay for additional testing and inspecting specifically requested by the Engineer when such tests indicate conformance with Contract Documents.

C. When additional tests requested by Engineer, or initial tests, indicate noncompliance with the Contract Documents, all inspection, sampling, and testing and subsequent retesting occasioned by the noncompliance shall be performed by the testing laboratory and the costs thereof shall be paid by the Contractor.

1.03 SUBMITTALS

A. Upon completion of each test and/or inspection, promptly submit written report of each test and inspection; one copy each to Engineer, Owner, material supplier, and Contractor, and one copy to record documents file. Each report shall include following:

1. Date issued.
2. Project title and number.
3. Testing laboratory name, address, and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Temperature and weather conditions if test performed in field.
7. Date of test.
8. Identification of product and Specification section.
9. Location of sample or test in Project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.
12. Interpretation of test results, when requested by Engineer.

1.04 QUALIFICATIONS OF LABORATORY

A. Meet requirements of ASTM E329.

B. Authorized to operate in state where Project located.

C. Testing equipment calibrated at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards or other accepted values of natural physical constants.

PART 2 – PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 TAKING SPECIMENS AND TESTING

A. Except as may be specifically otherwise approved by Engineer, testing laboratory shall secure and handle all samples and specimens for testing and conduct testing.

B. Comply with specified standards.

3.02 COOPERATION WITH TESTING LABORATORY

A. Provide access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.

B. Notify laboratory sufficiently in advance of operations to allow laboratory assignment of personnel and scheduling of tests.

1. When tests or inspections cannot be performed due to lack of such notice, reimburse Owner for laboratory personnel, travel expenses, and cost of test normally incurred.

END OF SECTION

SECTION 01 52 00
CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Temporary construction facilities required for the Work, including, but not limited to:

1. Utilities including lighting and electricity, and water.
2. Sanitary facilities.
3. Fire protection.
4. Roads.
5. Security fencing.
6. Enclosures.
7. Parking.

B. Maintain temporary facilities in proper and safe condition throughout progress of Work.

C. Comply with federal, state, and local codes and regulations, and utility company requirements.

1.02 LAYOUT OF TEMPORARY FACILITIES

A. Before starting Work, submit to Engineer, for approval, proposed layout of temporary facilities.

B. Should Contractor require space in addition to that shown on Drawings, Contractor shall make arrangements for storage of materials and equipment in locations off Site.

PART 2 - PRODUCTS

2.01 TEMPORARY LIGHTING AND ELECTRICITY

A. General:

1. Temporary lighting shall be sufficient to enable Contractor and Subcontractors to complete Work and enable Engineer to observe Work. Illumination shall meet or exceed state code requirements.

B. Temporary single phase electric power may be obtained from Owner’s electrical system as follows:

1. Coordinate power arrangements with Owner prior to mobilization.
2. Power will not be provided by Owner for bypass pumping.
3. No charge will be made for single phase electricity obtained from Owner’s electrical system and used for construction.
4. Provide electrical protection to prevent disruption of power from over-current, ground faults, and short circuits.
5. If Contractor requires more than Owner’s supply available, Contractor shall obtain an additional source of electric power and pay all costs for power from additional source.

C. Contractor’s responsibilities:

1. Provide, maintain, and remove temporary electric service facilities.
2. Provide temporary electric systems and components in conformance with requirements of National Electric Code and local authorities.
3. Facilities exposed to weather shall be weatherproof type.
4. Enclosures shall be locked to prevent unauthorized access.
5. Provide lamps, wiring, switches, sockets, and similar equipment required for temporary lighting and power tools.

2.02 WATER FOR CONSTRUCTION

A. Contractor shall request a hydrant for use at each site to be reviewed by the Owner.

1. Provide temporary piping and pumping facilities required to bring water to point of use.
2. Contractor is responsible for renting a water meter from City Hall (contact 815-724-4230).

a. Owner shall install rented meter and backflow preventer and pay for water used. Current water rates for the City of Joliet can be found on the City of Joliet's website (https://www.joliet.gov/government/departments/public-utilities/news-information/water-sewer-rates).

2.03 WATER FOR TESTING

A. Unless specifically stated otherwise in Specifications, Contractor shall provide water necessary for testing. Comply with requirements specified under WATER FOR CONSTRUCTION in this Section.

2.04 SANITARY FACILITIES

A. Provide temporary sanitary facilities conforming to state and local regulations, in sufficient numbers for use of Contractor's and Subcontractor's employees.

B. Maintain in sanitary condition and properly supply with toilet paper.

2.05 TEMPORARY FIRE PROTECTION

A. Provide and maintain minimum of one fire extinguisher and other fire protection equipment and devices as would be reasonably effective in extinguishing fires during early stages by personnel at Site.

2.06 TEMPORARY SITE AND OTHER ROADS

A. Construct and maintain temporary roadways in snow free, ice free, driveable condition.

B. Maintain existing roads used during construction free from accumulation of dirt, mud and construction debris. Roads shall be considered "maintained" when material has been removed by a sweeper. Multiple sweeper passes may be required to clean the existing surfaces sufficiently in Engineers opinion. Aggregate surfaced roads and drives will be considered "maintained" when dirt and soil contaminants in excess of 1" diameter have been removed and the total volume of contaminants remaining is estimated to be less than ¼ cubic foot. Contractor shall control dust from operations in all circumstances. Comply with dust control provisions in Section 01 57 19.

C. Temporary granular paving used prior to final paving shall be maintained in smooth condition. Ruts, holes, washboarding, or other surface deformities shall be corrected immediately by filling or scraping. All maintenance work to maintain traffic on existing roads shall be finished with a vibratory roller to recompact the surface.

D. Contractor shall repair or replace existing roads to original or better condition prior to Final Completion. Survey and record condition of existing roads prior to construction.

2.07 CONTRACTOR'S STAGING AND WORK AREA

A. Construct and maintain staging area at location shown on Drawings.

B. Prepare staging area as specified in Section 31 10 00. Provide minimum of 4-inches crushed stone surface.

C. Work Area:

1. Limit construction operations and storage of equipment and materials to areas as noted below and as determined by Engineer.

    a. Benton – Temporarily stage materials and equipment in the ROW while allowing two way traffic at all times.
    b. Greenfield – Stage materials and equipment at Owner's property at southwest corner of Rowell Avenue and New Lenox Road.

2. Except as provided herein, no sidewalk, private property, or other area adjacent to Site shall be used for storage of Contractor's equipment and materials unless prior written approval is obtained from legal owner of the respective locations.
3. A reasonable amount of structural and other type material to be used during construction may, with written approval of agency having jurisdiction, be stored in streets or highways adjacent to Site, but only to an extent that is absolutely necessary to avoid delay in construction. A copy of written approval shall be submitted to Engineer. Such materials will not be allowed to accumulate but shall be replenished from day to day as required. Permission to store materials shall be revocable at any time. Contractor, if so ordered, shall immediately upon receipt of order, or within a time to be therein stated, remove such materials.
4. Contractor shall maintain staging areas during construction in a manner that will not obstruct operations on any street areas. Work shall proceed in an orderly manner, maintaining construction Site and staging area free of debris and unnecessary equipment or materials.

2.08 SECURITY

A. Security will not be provided by Owner.

B. Contractor shall be responsible for loss or injury to persons or property where Work is involved, and shall provide security and take precautionary measures to protect Contractor's and Owner's interests.

C. Provide and maintain temporary fencing of design and type needed to prevent entry onto Site by public.

2.09 ENCLOSURES

A. Provide and maintain all enclosures, scaffolds, tarpaulins, canopies, warning signs, steps, platforms, bridges, and other temporary construction necessary for proper completion of Work.

2.10 PARKING

A. Staging area and designated areas within construction limits may be used for parking of construction personnel's private vehicles and Contractor's lightweight vehicles. No parking within the ROW for private vehicles is allowed except as noted by local signage.

B. Do not allow heavy vehicles or construction equipment in parking areas.

C. Make arrangements for additional parking off site as required.

PART 3 – EXECUTION

3.01 GENERAL

A. Maintain and operate systems to ensure continuous service for duration of construction.

B. Modify and extend systems, as Work progress requires.

C. Material and Equipment provided as part of the project shall not be used for any temporary services.

3.02 REMOVAL

A. Completely remove temporary materials, equipment, signs, and structures when no longer required.

B. In unfinished areas, clean and repair damaged caused by temporary installations or use of temporary facilities, restore drainage, and evenly grade, seed or plant as necessary to provide appearance equal to or better than original.

C. In finished areas, restore existing or permanent facilities used for temporary services to specified, or original condition.

3.03 DAMAGE TO EXISTING PROPERTY

A. Contractor is responsible for replacing or repairing damage to existing buildings, structures, sidewalks, roads, parking areas, and other existing assets.

B. Contractor shall have option of having Owner contract for such Work and have cost deducted from Contract Price.

3.04 OWNER'S USE

A. Upon acceptance of Work, or portion of work defined and certified as Substantially Complete by Engineer, and Owner commences full-time successful operation of facility or portion thereof, Owner will pay cost for utilities used for Owner's operation. Contractor shall continue to pay for utilities used until final acceptance of Work, except as provided herein. However, heat for building as required for construction purposes shall still be paid by Contractor unless, due to occupancy by Owner, more heat shall be required due to increased temperature or lengthened duration, in which case Owner will bear difference in cost.

END OF SECTION

SECTION 01 53 05
TEMPORARY PUMPING SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Contractor is required to furnish all materials, labor, equipment, fuel, and maintenance to implement temporary pumping systems for the purpose of diverting flow around a work area for the duration of any Work requiring such a diversion or bypass. Contractor shall provide all bypass systems needed to complete the Work, including bypass systems for flows interrupted as a result of the main bypass.

B. Portions of the work anticipated to require temporary pumping systems include, but are not limited, to the following. Contractor shall provide all bypass systems as needed to complete the Work as shown on the Contract Documents.

1. System 1: Benton Lift Station

C. The design, installation, operation, maintenance, and removal of the temporary pumping system(s) shall be the Contractor's responsibility.

D. The temporary pumping system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

E. For temporary pumping systems to be installed for continuous operation for more than eight (8) hours, the Contractor shall provide services from a qualified source and shall provide the Engineer the qualifications of the individual(s) that will design and operate temporary pumping systems required to complete Work.

1.02 DEFINITIONS

A. Firm pump capacity: capacity of a pump system with the largest pump out of service.

B. Time durations identified in this section are to be consecutive, unless otherwise noted.

1.03 SYSTEM DESCRIPTION

A. Flow through all pump stations must be maintained at all times except as specified in Section 01 11 00. Contractor shall plan, schedule, and coordinate Work such that the degree of pumping capacity during construction equals or exceeds the degree of pumping capacity prior to construction.

B. The system shall provide firm pumping capacity equal to or exceeding the flow expected for the system or portion of the system being bypassed, unless otherwise approved by the Owner. Minimum firm pumping capacities are listed below:

1. Benton Lift Station: 170 gpm

C. Any temporary pumping system shall require staff on site 24 hours per day or a remote monitoring and alarming system is provided 24 hours per day. Remote alarms shall notify Contractor-provided on-call personnel qualified to respond and maintain the system as needed. On-call personnel shall be available to mobilize to the pump station in less than 60-minutes.

D. Power is available from Benton. Contractor is responsible for connections, programming, settings, etc. required to establish automatic, successful operation of the temporary pumping

system using the existing electrical system. Verify all connected loads with Engineer and Owner. Demonstrate operation of temporary pumping system on Owner's normal and backup power systems prior to implementation of the bypass.

E. Provide and maintain temporary fencing of design and type needed to properly protect temporary pumping system.

F. Coordinate temporary pumping hoses with Contractor designed traffic control if hoses will interfere with traffic patterns.

G. Performance Requirements:

1. There shall be no interruption in the wastewater flow for the duration of the Project, unless otherwise noted in Section 01 11 00. The Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, bulkheads, pumping equipment (both primary and back-up units as required), conduits, electrical distribution and control equipment, all necessary power and fuel, and all other labor and equipment necessary to intercept the wastewater flow before it reaches the point where it could interfere with the Work, carry it past the Work and return it to a location downstream of the Work.
2. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The temporary pumping system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
3. Once a temporary pumping system has been placed into operation, Contractor shall provide all necessary means to safely convey the flow past the work area.
4. Contractor shall maintain flow around the Work area in a manner that will not cause surcharging of sewers or treatment systems above levels acceptable to the Owner to protect public and private property from health hazards, damage, and flooding.
5. Contractor shall protect water resources, wetlands, and other natural resources.
6. Temporary facilities shall be located as not to impede wastewater treatment facility operations or access around the site unless otherwise coordinated with the Owner.
7. Pumping and generator equipment shall be operated to be in accordance with 45dB at the closest private residence. If equipment cannot meet requirement, provide proper control devices or infrastructure to lower the decibel level as required.

H. Operations Schedule:

1. For the duration of the bypass pumping system event, develop a daily operations schedule to identify each person in charge of operating the system, the times that each person is in charge of operating the system, and the contact phone number for each person.
2. Prior to operating bypass pumping systems, provide Owner and Engineer an operations schedule. Post a current operations schedule on the outside of the Engineer's trailer.
3. If any changes are made to the operations schedule, provide changes to the Owner and Engineer a minimum of 24 hours prior to making the change.

I. Penalties imposed on the Owner as a result of any bypass caused by the actions of the Contractor, his employees, or subcontractors, shall be borne in full by the Contractor, including legal fees and other expenses to the Owner resulting directly or indirectly from the bypass.

1.04 SUBMITTALS

A. Preliminary and Final Temporary Pumping Plan is required for each temporary bypass pumping system.

B. Preliminary Temporary Pumping Plan:

1. Prepare a general description of the proposed bypass pumping system(s) including capacity, temporary pumping intake and discharge piping layout, schedule, and proposed operating plan.
2. Provide information regarding the proposed temporary pumping system provider including pumping capabilities, past experience, and a minimum of five reference projects of similar size and complexity within the past three years.
3. Submit preliminary pumping plan(s) minimum 8 weeks prior to anticipated installation of temporary system.

C. Final Temporary Pumping Plan:

1. The Contractor shall submit detailed plans and descriptions outlining all provisions and precautions to be taken by the Contractor to convey the required flows, protect the Work area, protect public and private property, and preserve treatment facility performance. The plan shall be specific and complete, including such items as schedules, locations, elevations, sizes, capacities, materials, power strategies, monitoring strategies, respond-to-outage strategies, and maintenance strategies. No temporary pumping systems shall be placed in service before all provisions and requirements have been reviewed and accepted by the Engineer and Owner. The Temporary Pumping Plan will be reviewed to determine if the plan is organized, coordinated with the proposed Work and Owner's operation of facilities, and for conformance of the general requirements set forth in this specification. Acceptance will not impose on Engineer's responsibility for the Temporary Pumping Plan nor interfere with or relieve Contractor from Contractor's full responsibility.

2. The plan shall include but not be limited to the information listed below:

    a. Sewer plugging method and types of plugs/dams/bulkheads, when necessary;
    b. Staging areas for pumps and power generation equipment;
    c. Site security plan;
    d. Pump sizes, capacities, and power requirements;
    e. Number, size, material, location and method of installation of suction and discharge piping;
    f. Piping system drawings;
    g. Hydraulic system calculations: static lift, friction losses, minor losses, total dynamic head, pipeline suction and discharge velocities, pump curves and operating range;
    h. Pump operating strategy;
    i. Main power strategy;
    j. Backup power strategy;
    k. Remote monitoring and control strategy;
    l. List of alarms;
    m. Telemetry contact list;
    n. Method of protecting discharge and suction locations from damage;
    o. Thrust and restraint strategy;
    p. Temporary pipe supports and anchoring;
    q. Schedule for installation and operation;
    r. Maintenance program.
    s. Emergency response and spill plan.

3. Pumping and piping system calculations shall be stamped by a professional engineer registered in the State of Illinois.
4. Submit final temporary system pumping plan(s) minimum of 4 weeks prior to installation of the system.
5. No temporary pumping systems shall be placed in service before all provisions and requirements have been reviewed and accepted by the Engineer and Owner. The Temporary Pumping Plan will be reviewed to determine if the plan is organized, coordinated with the proposed Work and Owner's operation of facilities, and for

conformance of the general requirements set forth in this specification. Acceptance will not impose on Engineer's responsibility for the Temporary Pumping Plan nor interfere with or relieve Contractor from Contractor's full responsibility.

D. Submittals shall be in accordance with Section 01 33 00.

PART 2 – **PRODUCTS**

2.01 EQUIPMENT

A. All pumps used shall be suitable for service to be bypassed and suitable for the location of the pump. Provide pumps that are compatible with the power system and utilize properly-sized conductors and distribution equipment.

B. Provide instrumentation and controls required for the temporary pumping system to meet its performance requirements without human intervention.

C. Provide level indication in the pump suction wet well to serve as a high water level alarm, coordinate alarm setpoint with Owner. Upon tripping the high water level setpoint, alarm shall remotely notify Contractor-provided on-call person and shall respond to all alarms as needed while maintaining continuous, successful bypassing operations.

D. Back-up pump(s) shall be on line, isolated from the primary system by check valve and isolation valve as required to isolate pump from system.

E. Equipment pumping raw sewage shall be capable of passing a 3-inch spherical solid.

F. Discharge piping shall prevent accidental spillage of flows and all discharge systems shall be constructed of rigid pipe with positive, restrained joints. Under no circumstances will aluminum "irrigation" type piping be allowed. Discharge hose will only be allowed in short sections and by specific permission from the Engineer.

PART 3 – **EXECUTION**

3.01 PREPARATION

A. Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the temporary pipelines. The Contractor shall locate temporary pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the Owner and the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by Contractor.

3.02 INSTALLATION AND REMOVAL

A. Contractor shall make connection to the existing infrastructure and construct temporary pumping structures and perform excavation as required at access locations coordinated with Owner and reviewed by Engineer. Make connections in such a way to prevent damage to structures, equipment, material, etc.

B. Plugging or blocking of flows shall incorporate primary and secondary plugging device and shall only be done temporarily. Contractor shall coordinate preliminary and final bypass plans with Owner and Engineer prior to obstructing any flow. When plugging or blocking is no longer needed for performance and acceptance of Work, it is to be removed in a manner that permits the flow to slowly return to normal without surge or excessive debris scouring that could cause major downstream disturbances. If excessive debris buildup is present upstream of the plug or blockage, jet piping to remove debris from pipe prior to removing plug or blockage.

C. When installed temporary structures or excavation performed for temporary pumping systems are no longer needed, remove structures and restore site.

D. When working, the Contractor shall exercise caution to comply with OSHA requirements when working in the presence of sewer gases, combustible oxygen-deficient atmospheres, and confined spaces. Contractor shall provide all necessary ventilation and access equipment as needed.

E. Locate temporary piping away from access road, sidewalks, and areas that would impede facility operations unless otherwise approved by Owner and Engineer unless otherwise coordinated with Owner.

F. Prior to completion of the temporary pumping operations, Contractor is to notify Owner and Engineer of the intent to stop temporary pumping. After successful systems demonstration of new equipment or facilities requiring the bypass, the Contractor shall promptly remove the temporary pumping system.

3.03 FIELD QUALITY CONTROL AND MAINTENANCE

A. Test:

1. Contractor shall perform leakage and pressure tests of the temporary pumping piping using construction water prior to actual operation. Contractor shall coordinate the usage of water with the Owner. The Owner and Engineer shall be given 24 hour notice prior to testing.

B. Inspection:

1. At a minimum, Contractor shall inspect temporary pumping system every 24 hours or as needed to ensure that the system is working correctly.
2. Contractor is responsible to keep an inspection log that includes the following:

    a. Time and date of inspection
    b. Person inspecting equipment
    c. Inspector signature
    d. Deficiencies found and corrective action taken, if any.

C. Maintenance Service:

1. The Contractor shall ensure that the temporary pumping system is properly maintained and a designated operator is responsible for the system at all times the system is operating.

D. Extra Materials:

1. Spare parts for pumps and piping shall be kept on site as required.
2. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

END OF SECTION

This page intentionally left blank.

SECTION 01 55 26
TRAFFIC CONTROL

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes warning signs and devices, temporary traffic signals, temporary pavement markings, guardrails, handrails, temporary fencing, flagpersons, and other equipment and materials required to protect vehicular and pedestrian traffic from construction activities.

B. The Contractor shall be solely responsible for designing, layout out, installing, and maintaining traffic control systems consistent with their means, methods, and sequence of the Work as required to comply with City of Joliet standards.

C. Traffic regulations shall comply with chapters and Sections of the referenced documents. References to measurements and payments in the reference documents are superseded by this Section.

1.02 DEFINITIONS

A. IDOT Standard Specifications: Illinois Department of Transportation, "Standard Specifications for Road and Bridge Construction", Current Edition.

B. IDOT Traffic Safety Standards: Illinois Department of Transportation, “Illinois Highway Design Standards for Traffic Control”, Current Edition.

C. MUTCD: Federal Highway Administration, Manual on Uniform Traffic Control Devices.

D. Maintaining Agency: Agency having maintenance jurisdiction over roadway or existing signals and may include IDOT, Will County, and the City of Joliet.

E. IDOT: Illinois Department of Transportation.

1.03 SUBMITTALS

A. Traffic Control Schedule:

1. Schedule of lane closures, street closures and sidewalk closings, partial closings, and detours.
2. Update as necessary to keep Owner and Maintaining Agency informed of traffic routing.

B. Owner and Maintaining Agency will review schedules and updates for maintenance of adequate traffic patterns within and through construction areas in conformance with agreed to conditions.

1. Owner and Maintaining Agency review and acceptance shall not be construed as confirming adequacy of protection measures proposed.
2. Contractor will notify local residents of construction schedules and traffic plans. Contractor shall be solely responsible for full protection of public and Contractor’s own forces.

C. Submit in accordance with Section 01 33 00.

1.04 TRAFFIC CONTROL CONDITIONS

A. Keep Work areas open to pedestrian and vehicular traffic to maximum extent practical.

B. Provide minimum of 7-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. MUTCD.
2. IDOT Standard Specifications.
3. IDOT Traffic Safety Standards.

2.02 PERSONNEL

A. Flagpersons shall be trained in accordance with State of Illinois regulations.

PART 3 – EXECUTION

3.01 TRAFFIC CONTROL SCHEDULE

A. Traffic control plan and schedules for pedestrian and vehicular traffic control shall be compatible with construction procedures employed in each construction area as determined by Contractor.

1. Incorporate construction sequencing to form continuous traffic control schedule.
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. Schedule shall include:

a. Dates and duration of stages and closures.
b. Contractor's contact person(s) with 24-hour telephone number.
c. Contact agencies with telephone numbers as applicable: Owner, Maintaining Agency, Fire Department, Public Works Department, Police Department, Bus Companies, Schools, Hospitals, Transit Companies, Railroads, and other effected agencies.

3.02 GENERAL VEHICULAR TRAFFIC CONTROL REQUIREMENTS

A. Provide traffic control for Work in or adjacent to streets and highways.

B. Provide traffic control in following general locations:

1. Streets 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.

C. 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.
2. Flashing light barricades, Type III, to screen off disturbed areas and trenches from oncoming traffic.

D. Provide temporary traffic signals when permanent traffic signals are disturbed by construction operations. Temporary signals shall have same general signaling sequence and indicator arrangement as permanent signals removed except as necessary to be compatible with construction operations and traffic control plan.

E. Install temporary signals in other areas as necessary to protect public and aid travel of construction vehicles. Such installation shall be approved by Owner and appropriate Maintaining Agency.

F. Provide temporary type pavement markings on replacement pavement surfaces. Temporary markings shall match approved traffic control plan or existing marking patterns as appropriate. Place temporary markings on all pavement surfaces as soon as practicable but no later than 24 hours after completion of previous days paving.

G. 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 unless otherwise approved by Owner or Maintaining Agency.

H. Barricade and warning sign arrangements shall conform to IDOT Traffic Safety Standards, minimum.

3.03 SPECIFIC TRAFFIC CONTROL REQUIREMENTS

A. New Lenox Road

1. Traffic lane closures not permitted.
2. Work anywhere in right-of-way shall receive warning/barricading.

B. Rowell Avenue

1. One lane open with flagpersons or temporary traffic signals to alternate traffic flow during working hours.
2. Minimum of 1 lanes in each direction during non-working hours.

C. Maple Street

1. Minimum of one lane in each direction at all times.
2. Work anywhere in right-of-way shall receive warning/barricading.

D. East Benton Street

1. Close intersection to through traffic only.
2. Work anywhere in right-of-way shall receive warning/barricading.

E. Other Streets

1. 2-way traffic at all times.

2. One lane open with flagpersons or temporary traffic signals to alternate traffic flow during working hours.
3. Other times, all traffic lanes open

F. Driveways

1. Limited to maximum of one 8 hour closure.
2. Open to traffic to maximum practical extent.
3. Notify owner in writing a minimum three days before any closure.

3.04 PEDESTRIAN TRAFFIC CONTROL

A. Protect pedestrians and residents from construction operations and vehicular traffic traveling through construction area.

B. Stockpiled materials shall not block streets, drives, sidewalks, and crosswalks.

C. Grade backfilled trenches uniformly and install temporary pavements as required to permit safe crossing by vehicles. Install bridging and handrails where necessary for safe passage by pedestrians over sewer trenches or other disturbed surfaces.

END OF SECTION

SECTION 01 57 19
TEMPORARY ENVIRONMENT CONTROLS

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.

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. Continue operations in other areas.
3. 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.

B. Comply with procedures outlined in U.S. EPA manuals entitled “Guidelines for Erosion and Sedimentation Control Planning and Implementation”, Manual EPA-R2-72-015 and “Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity”, Manual EPA-430/9-73-007.

3.05 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 federal, state, and local regulations.

B. In accordance with the Illinois Environmental Protection Act, 415 ILCS 5/22.51, Contractor shall obtain all certifications required by federal, state, and local regulation and by owner/operator of off-site disposal sites certifying that the excess excavated and other waste materials are uncontaminated. Certifications shall be made by a licensed professional engineer in accordance with federal, state, and local regulations. Contractor shall conduct tests and analyses in order to certify that excess excavated material and other waste materials are uncontaminated.

C. 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.

3.06 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.

3.07 THAWING OF FROZEN GROUND

A. Obtain permit from appropriate authority before building fire to thaw frozen ground, and comply with conditions of permit.

B. Use fuel which does not create air pollution or inconvenience public

C. Engineer reserves right to prohibit fires for thawing frozen ground whenever deemed undesirable.

3.08 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.

3.09 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 6:00pm and 7:00am, nor on Saturdays, Sundays or legal holidays, unless approved by Owner.

3.10 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.

3.11 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.

END OF SECTION

This page intentionally left blank.

SECTION 01 61 00
COMMON PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.01 SUBSTITUTE AND “OR EQUAL” ITEMS

A. When equipment or material is specified by naming one or more manufacturers or suppliers followed by words “No Substitute is Permitted”, Contractor shall provide one of the named manufacturers or suppliers.

B. ”Or Equal” Items: For material or equipment specified by naming one or more suppliers or manufacturers followed by the words “Or Equal”, Contractor shall make submittal in accordance with Section 01 33 00. Engineer will review submittal in accordance with Supplementary Conditions.

C. Substitute Items:

1. For material or equipment specified by naming one or more suppliers or manufactures and not followed by the words “Or equal” or “No Substitute is Permitted”, Contractor shall submit “Request for Substitution” in accordance with General Conditions for material or equipment not specifically named.
2. Requests for Substitution will be considered by Engineer, subject to Contractor’s representations and review provisions of Contract Documents, when one or more of the following conditions are satisfied.

    a. Where required equipment or material cannot be provided within Contract Time, but not as result of Contractor’s failure to pursue Work promptly or coordinate various activities properly.
    b. Where packaging of several items of equipment from single source will provide maintenance and coordination advantages to Owner.
    c. When Contractor proposes to provide Owner with cost savings.

3. If Engineer approves Contractor’s Request for Substitution, Contractor shall make submittal in accordance with Section 01 33 00.

D. Conditions Which Are Not Substitutions:

1. Contractor options provided for in Specifications.
2. Revisions to Contract requested by Owner or Engineer.
3. Contractor’s determination of and compliance with governing regulations, except as provided for in Contract Documents.

1.02 REUSE OF EXISTING MATERIAL

A. Except as specifically indicated or specified, do not use removed materials and equipment in new Work. All material and equipment incorporated into the Work shall be new, and as specified, except as otherwise provided in the Contract Documents.

B. For material and equipment specifically indicated or specified to be reused in new Work:

1. Use special care in removal, handling, storage, and reinstallation to ensure proper function in completed Work.
2. Provide for transportation, storage, and handling of products which require off-site storage, restoration, or renovation.

1.03 MANUFACTURER'S INSTRUCTIONS

A. Installation of equipment and materials shall comply with manufacturer's written instructions. Maintain one set of complete instructions at job site. Distribute printed copies of instructions to parties involved in installation, including 1 copy to Engineer. Provide 1 electronic copy as a searchable, bookmarked PDF document to the Engineer.

B. Handle, store, install, connect, clean, condition, and adjust materials and equipment in accordance with manufacturer's written instructions and in conformance with Specifications.

C. If job conditions or specified requirements conflict with manufacturer's written instructions, consult Engineer for further direction. Do not proceed with Work without written instruction of Engineer.

1.04 TRANSPORTATION AND HANDLING

A. Arrange deliveries of material and equipment in accordance with Construction Progress Schedule.

B. Deliver materials and equipment in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

C. Protect bright-machined surfaces, such as shafts and valve faces, with heavy coat of grease prior to shipment.

D. Immediately upon delivery, inspect shipments to ensure compliance with Contract Documents and approved submittals, and products have been protected and are undamaged.

E. Provide equipment and personnel to handle materials and equipment by methods recommended by manufacturer to prevent soiling or damage to materials or equipment, or packaging.

1.05 STORAGE, PROTECTION, AND MAINTENANCE

A. Store, protect, and maintain material and equipment in accordance with manufacturer's written instructions.

B. Temporary storage areas and buildings shall conform to Section 01 52 00.

C. Owner assumes no responsibility for damage or loss due to storage of materials and equipment.

D. Interior Storage:

1. Store with seals and labels intact and legible.
2. Store materials and equipment subject to damage by elements in weather tight enclosures.
3. Maintain temperature and humidity within ranges required by manufacturer.

E. Exterior Storage:

1. Store fabricated materials and equipment above ground, on blocking or skids, to prevent soiling or staining. Cover materials and equipment subject to deterioration with impervious sheet coverings. Provide ventilation to avoid condensation.

2. Store loose granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter.
3. Store materials such as pipe, reinforcing steel, structural steel, and equipment on pallets or racks, off ground.

F. Inspection and Maintenance:

1. Arrange storage to provide easy access for inspection, maintenance, and inventory.
2. Make periodic inspections of stored materials and equipment to ensure materials and equipment maintained under specified conditions are free from damage or deterioration, and coverings are in place and in condition to provide required protection.
3. Perform maintenance on stored material and equipment in accordance with manufacturer's written instructions and in presence of Owner and Engineer.

a. Notify Engineer 24 hrs before performing maintenance.
b. Submit report of completed maintenance to Engineer with each Application for Payment.
c. Failure to perform maintenance, to notify Engineer, or to submit report may result in rejection of material or equipment.

G. Assume responsibility for protection of completed construction and repair and restore damage to completed Work.

H. Wheeling of loads over finished floors, with or without plank protection, not permitted in anything except rubber tired wheelbarrows, buggies, trucks or dollies. This applies to finished floors and exposed concrete floors, as well as those covered with other applied surfacing.

I. Where structural concrete is also finished surface, avoid marking or damaging surface.

1.06 SPECIAL TOOLS AND LUBRICATING EQUIPMENT

A. Furnish, in accordance with manufacturer's recommendations, special tools and lubricating equipment required for checking, testing, parts replacement, and maintenance.

B. Instruct Owner's operating personnel in operation, repair, and maintenance of equipment and use of special tools.

1.07 LUBRICATION

A. Where lubrication is required for proper operation of equipment, incorporate necessary and proper provisions in equipment in accordance with manufacturer's requirements. Where possible, lubrication shall be automated and positive.

B. Where oil is used, reservoir shall be of sufficient capacity to supply unit for 24-hr period.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Conform to applicable Specifications and standards. Comply with size, make, type, and quality specified or as approved on submittals.

B. Design, fabricate, and assemble in accordance with engineering and shop practices standard with industry.

C. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable. Two or more items of same kind shall be identical, by same manufacturer.

D. Material and equipment shall be suitable for service conditions. Design so working parts are readily accessible for inspection and repair, and easily duplicated and replaced.

E. Equipment capabilities, sizes, and dimensions shown or specified shall be adhered to, unless specifically approved in accordance with General Conditions.

F. Equipment shall be adapted to best economy in power consumption and maintenance. Parts and components shall be portioned for stresses occurring during continuous or intermittent operation, and for additional stresses occurring during fabrication or installation.

G. Do not use material or equipment for purpose other than for which it is designed or specified. Equipment shall not be used for any purpose, or any reason until manufacturer has completed installation services.

PART 3 – EXECUTION

3.01 GENERAL

A. Include and pay for Supplier's services, including, but not limited to, those specified.

B. Workday is defined as an 8-hr period during a calendar day. Workday for purposes of this section does not include travel to and from the Project Site.

3.02 INSTALLATION SERVICES

A. Where installation services are called for in Specifications, provide competent and experienced technical representatives of manufacturers' equipment and systems to resolve assembly or installation procedures attributable to, or associated with, equipment furnished.

B. After equipment installation, manufacturer's representative shall inspect equipment for proper installation in accordance with manufacturer's instructions, equipment has been serviced with the proper lubricants, applicable safety equipment has been properly installed, and that proper electrical and mechanical connections have been made.

C. Manufacturer's representative shall assist Contractor in performing functional testing.

D. Perform functional testing to determine if equipment has been installed correctly and operates as intended. Functional testing shall include, but not be limited to, checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. Equipment adjustment and calibration shall be performed to conform with Specifications, manufacturer's requirements and instructions, and industry standards.

E. Provide "Certificate of Installation Services" stating that equipment has been properly installed, that functional testing has been performed, that proper adjustment and calibration has been made, and that equipment is ready for Startup and Systems Demonstration. Use form in Appendix and furnish two copies to Engineer.

3.03 INSTRUCTIONAL SERVICES

A. Where training is called for in Specifications, provide competent and experienced technical representative of Supplier to provide detailed instruction to Owner's personnel for operation of equipment. Training services shall include maintenance of instrumentation, maintenance

of equipment, and operation of instrumentation and equipment in classroom setting on-site. Training shall include electrical, mechanical, and safety aspects of equipment.

B. Submit 30 days before scheduled training, for Engineer's review and approval, documentation identifying names of specific instructors, factory authorization, and background of individuals to conduct training.

C. Coordinate training with Engineer.

1. No training shall be conducted unless instructor has been approved by Engineer.
2. Notify Engineer at least 48-hrs in advance so Engineer can make arrangements with Owner's personnel.
3. Cancel training sessions at least 24-hrs in advance.
4. Reschedule canceled training sessions 48-hrs in advance.
5. Failure of instructors to appear for scheduled training, failure to notify Engineer 24-hrs in advance of need to cancel training session, or failure to arrive within 30 minutes of start of scheduled training session shall result in reimbursement to Owner for time lost by Owner's personnel in waiting for arrival of instructor.

D. Similar types of equipment differing in model, size or manufacturer shall require equal service time as specified.

E. Successful testing of components and systems required in Section 01 79 10 shall be completed before start of instruction.

F. Review O&M data contents with Owner's personnel in full detail to explain aspects of operations and maintenance.

G. Provide "Certificate of Instructional Services" cosigned by Owner and instructor, verifying training accomplished to satisfaction of all parties. Use form in Appendix and furnish 2 copies to Engineer.

3.04 SYSTEMS DEMONSTRATIONS SERVICES

A. Provide manufacturer's and Supplier's services as required to successfully complete the Work specified in SECTION 01 79 10 – SYSTEMS DEMONSTRATIONS.

3.05 POST STARTUP SERVICES

A. After equipment or system has been in operation for at least 2 months, but not longer than 3 months, each equipment manufacturer or authorized equipment representative shall make a final inspection where so required by Specifications. Final inspection will provide assistance to Owner's personnel in making adjustments or calibrations required to ensure equipment or system is operating in conformance with design, manufacturer, and specifications.

B. Provide "Certificate of Post Startup Services" cosigned by Owner and equipment representatives, verifying this service has been performed. Use form in Appendix and furnish 2 copies to Owner.

END OF SECTION

This page intentionally left blank.

SECTION 01 74 00
CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.01. SUMMARY

A. Perform cleaning throughout construction period and at completion of Work.

B. Refer to Specification sections for specific cleaning products or Work.

C. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 - PRODUCTS

2.01. CLEANING MATERIALS AND EQUIPMENT

A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

B. Use only those cleaning materials which will not create hazards to property and persons.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

A. Comply with general Conditions.

B. Provide on-site containers for collection and removal of waste materials, debris, and rubbish in accordance with applicable regulations.

C. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.

D. Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials are installed.

3.02 FINAL CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from exposed interior and exterior surfaces.

B. Wash and shine glazing and mirrors.

C. Polish glossy surfaces to clear shine.

D. Ventilating Systems:

1. Clean permanent filters and replace disposable filters if units were operating during construction.
2. Clean ducts, blowers, and coils if units were operated without filters during construction.

E. Electrical Systems:

1. Leave electrical equipment rooms broom clean.
2. Clean interior of panel cabinets, pull boxes, and other equipment enclosures.
3. Clean lighting fixtures, lamps, and other electrical equipment soiled during installation.
4. Touch-up paint or repaint finishes on electrical items delivered to Project with finished coat of paint. Engineer will make final determination of items to be repainted or touched-up.

F. Vacuum carpeted areas. Broom clean interior hard surface floors and exterior paved surfaces. Rake clean other surfaces of grounds.

G. Clean out existing or new sewers to remove sediment and other materials that have entered during construction.

H. Clean roads and streets used as haul roads during construction of accumulated material. Clean paved streets with water.

I. Prior to Final Completion or Owner occupancy, Contractor, with Engineer and Owner, shall conduct inspection of exposed interior and exterior surfaces and work areas to verify Work and Site is clean.

3.03 CLEANING DURING OWNER'S OCCUPANCY

A. Should the Owner occupy the Work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning shall be as determined by Engineer in accordance with the General Conditions.

3.04 CLEANING OF TANKS

A. Wet wells, tanks, and basins shall be washed down and swept before water is allowed to enter.

END OF SECTION

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Throughout progress of the Work, maintain an accurate record of changes in the Contract Documents.

B. Maintain at Site one record copy of:

1. Drawings.
2. Project Manual.
3. Addenda.
4. Change Orders and other modifications to Contract.
5. Engineer Field Orders, written instructions, or clarifications.
6. Approved Shop Drawings and other Work-related submittals.
7. Field modifications made to equipment by Contractor, Subcontractors and Suppliers.
8. Field test records.
9. Construction photographs.
10. Associated permits.
11. Certificates of inspection and approvals.

1.02 PAYMENTS

A. Progress payments will not be made until the Contractor has demonstrated to the Engineer that a marked up set of Drawings is being satisfactorily maintained on the site and is available for Engineer's review as specified herein.

1.03 SUBMITTALS

A. Prior to Substantial Completion, submit revised operation and maintenance data for field modifications made by Contractor, Subcontractors, and Suppliers.

B. Prior to Substantial Completion, submit revised copies of approved Shop Drawings and other Work-related submittals for equipment modified in field by Contractor, Subcontractors, and Suppliers.

C. Prior to submitting request for Substantial Completion, deliver one complete coordinated marked up set of Drawings to Engineer for use in preparation of record drawings.

D. Prior to submitting request for final payment, submit the remaining Project Record Documents to Engineer for Owner.

E. Accompany submittals with transmittal letter containing following:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title of record document.
5. Signature of Contractor or authorized representative.

F. Included with each Pay Application, submit up to date Record Drawings in PDF format for review by Engineer.

PART 2 – PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.01 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and Samples in Contractor's field office apart from documents used for construction.

1. Provide files and racks for storage of documents.
2. Provide secure storage space for storage of Samples.
3. Provide dedicated location for storage of flash drive that contains electronic documentation, including the most up to date Record Drawings. Flash drive shall be made available for Engineer's use to view files at all times.

B. Maintain documents in clean, dry, legible condition and in good order.

C. Do not use record documents for construction purposes.

D. Record documents shall only contain marks pertaining to recorded changes and should not contain notes, calculations, or other stray information.

E. Label each document "PROJECT RECORD" in neat, large letters.

F. Make documents and samples available for inspection by Engineer and Owner.

G. Failure to properly maintain record documents may be reason to delay a portion of progress payments until records comply with Contract Documents.

3.02 RECORD DRAWINGS

A. Maintain one record set of Drawings, in electronic PDF format (one PDF file for each drawing volume), legibly annotated to show all changes made during construction and the final location of all underground piping and utilities.

1. The marked up set of Drawings shall be a compilation of all of the changes made by all of the trades involved. Individual sets from the various subcontractors will not be accepted.
2. The marked up set of Drawings shall graphically show the changes. Reference to RFI's, Change Orders, Field Orders, etc. will not be accepted.
3. The marked up set of Drawings shall incorporate changes made to the primary drawings, and shall include the corresponding changes made to the ancillary drawings.
4. Changes made to the process drawings, electrical drawings, and I&C drawings shall be depicted on the P&ID's.

B. All annotations on Record Drawings shall be done electronically in PDF format.

1. The base drawing used for Record Drawing edits shall be in an original PDF file.
2. Using the following color scheme:

a. RED: For drawing additions or elements to be added to the drawing.
b. GREEN: For items to be removed or deleted from the drawing.
c. BLUE: For descriptive notes, dimensions, arrows, or other labels to provide

direction to drafters but that are not specifically intended to be added to the drawings.

3. Coloring scheme, labels, dimensions, and line work shall be consistent throughout the entire Record Drawing set.
4. Use a straight line drawing tool where appropriate.
5. Use text boxes with appropriately sized text for all text work.
6. Drawing changes shall be to scale.
7. All drawing comments shall be “flattened” prior to submitting any Record Drawings to prevent the inadvertent shifting or changing of any comment or mark-up and to provide final documentation of all mark-ups.

C. Record information concurrently with construction progress.

D. Drawings:

1. Graphically depict changes by modifying or adding to plans, details, sections, elevations, or schedules.
2. Note the following:

    a. Depths of various elements of foundation in relation to finished first floor elevation.
    b. Horizontal and vertical locations of underground cable, conduit, duct runs, underground utilities and appurtenances, and underground piping referenced to visible and accessible features. These features shall be located where they leave or enter any structure and at changes in horizontal or vertical direction. The invert elevation of piping and the top of conduit or duct banks shall be noted. GPS coordinates may be used.
    c. Field changes.
    d. Details not on original Drawings.
    e. Location and identification of exposed interior piping, including those shown schematically on Drawings.
    f. Location and size of equipment including connections.
    g. Departures from original Drawings.

END OF SECTION

This page intentionally left blank.

SECTION 01 79 10
SYSTEMS DEMONSTRATIONS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Before Substantial Completion is considered, Contractor shall demonstrate satisfactory operation of specific equipment systems and associated facilities. Prior to conducting system demonstrations, the Contractor shall prepare a start-up plan unique to each system. Conduct demonstrations on systems listed below. Each system shall include facilities listed and associated structures, channels, conduits, piping, valves, gates, electrical, instrumentation, water, and other utilities necessary for system operation.

1. System 1 – Benton Lift Station

a. Pumping Facilities shown on Drawing No. 009-N-1.

2. System 2 – Greenfield Lift Station

a. Pumping Facilities shown on Drawing No. 009-N-2.

B. Preliminary:

1. Before Contractor begins Systems Demonstrations, the following Work shall be complete:

a. Electrical systems testing as specified in Section 26 01 26.
b. Installation services specified in Section 01 61 00.
c. Process control system testing as specified in Section 40 61 21.
d. Application software programming.

2. Contractor shall provide services of qualified, certified representatives of Suppliers to be present at Project Site as necessary to successfully complete Systems Demonstrations.
3. Contractor shall submit evidence of the representative's certification and qualifications to the Engineer for review and approval 30 days prior to the start of Systems Demonstrations.

C. Coordination:

1. Designate representative of Contractor to be responsible for Systems Demonstrations.
2. Contractor shall submit schedule of Systems Demonstrations for review by Engineer and Owner 30 days prior to Systems Demonstrations.
3. Notify Engineer at least 7 days before Systems Demonstrations are to begin.
4. Reschedule cancelled Systems Demonstrations 7 days in advance.

1.02 SUBMITTALS

A. Start-up Plans

1. For each System identified in Paragraph 1.01.A above, Contractor shall prepare a system specific start-up plan. Submit each start-up plan no later than 2 weeks prior to the start date of each System's 7 day demonstration test.
2. Each system's start-up plan shall include a detailed step-by-step procedure addressing the requirements of this Section. Each plan shall identify the required activities that need to be completed, who will be responsible for completing each activity, the order in which

the activities need to be completed, and a schedule giving the dates for each activity. Each start-up plan shall describe the documentation that needs to be prepared to confirm that the activities have been successfully completed.

3. Each start-up plan shall identify the Contractor's representative that will be leading the Systems Demonstration during the 7 day testing period.

B. Reports:

1. Prepare report for each system on results and activities encompassing system demonstration. Submit report within two working days of completion of System Demonstration.
2. Report shall describe operational conditions; daily results of systems operation; dates and names of people involved and observing operation; and statement regarding system ability to meet operational criteria.

C. Submit in accordance with Section 01 33 00.

PART 2 – PRODUCTS

(Not Used)

PART 3 – EXECUTION

3.01 SYSTEMS DEMONSTRATIONS

A. Demonstrate operation and performance of each system for 7 consecutive days.

1. Where no specific performance requirements are stated in Specifications, demonstrate to show equipment operates in accordance with acceptable industry standards for application of equipment.
2. System Demonstration shall show equipment operates within manufacturer's tolerances for noise and vibration, equipment is responsive to manual and automatic controls, control and protective devices are properly set, and equipment operates on controlled or intermittent basis when such operation is intended.
3. Demonstrate proper function and process control for each control point, alarm, and safety lockout system.

B. Temporary facilities and services are Contractor's responsibility. Contractor shall provide temporary facilities and services as required to complete testing and systems demonstrations. Contractor shall also provide required equipment maintenance during the time between the systems demonstration testing and the issuance of a Certificate of Substantial Completion.

C. For each system, Engineer will consider system demonstration successful and complete when system operates properly for 7 consecutive days without significant interruption.

D. If, in Engineer's opinion, system is not operating properly at any time during System Demonstration, Contractor shall stop demonstration and adjust, calibrate, or replace material and equipment as required to correct problem. After corrections have been made, restart System Demonstration and operate system for 7 consecutive days without significant interruption.

E. If the system is not operating properly, and the Contractor opts to continue operating the system until the corrections to the system have been completed and the system can proceed to restarting the Systems Demonstration, the Contractor shall continue to be responsible for providing ongoing required equipment maintenance, temporary facilities and services.

3.02 SUBSTANTIAL COMPLETION

A. Engineer will not consider Work substantially complete until Systems Demonstrations have been successfully completed.

END OF SECTION

This page intentionally left blank.

DIVISION 03

CONCRETE

This page intentionally left blank.

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 – GENERAL

1.01 SUMMARY

A. Provide concrete reinforcement where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 REFERENCES

A. ACI: American Concrete Institute

B. ASTM: American Society for Testing and Materials

C. CRSI: Concrete Reinforcing Steel Institute

1.03 SUBMITTALS

A. Shop Drawings:

1. Conform to ACI SP-66 showing bending diagrams, assembly diagrams, location diagrams, splicing and laps of bars, shapes, dimensions, and details for reinforcing, and stirrup spacing, accessories, and additional reinforcing at openings.

B. Product Data:

1. Dowel Adhesive manufacturer's product data.

C. Submit in accordance with Section 01 33 00.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcement to site bundled and tagged.

B. Use necessary precautions to maintain identification after bundles are broken.

C. Store in a manner to prevent excessive rusting and fouling with dirt, grease, and other bond-breaking coatings.

PART 2 – PRODUCTS

2.01 REINFORCEMENT MATERIALS AND ACCESSORIES

A. Deformed Steel Bars: ASTM A615, Grade 60.

B. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place:

1. Comply with CRSI recommendations.
2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
3. Exterior exposed surfaces, surfaces in contact with earth or liquid, and interior exposed surfaces in humid areas shall have all plastic or stainless steel supports.

4. Interior exposed surfaces in dry areas shall have all plastic, stainless steel, or plastic tipped steel supports.
5. When supports bear directly on the ground and it is not practical to use steel or plastic supports, solid precast concrete blocks may be used to support only the bottom mat of reinforcement. Precast blocks must be of equal or greater strength than the concrete being placed.

C. Dowel Adhesive:

1. Epoxy or acrylic adhesive.
2. Manufacturers:

a. HIT-RE 500 V3 or HIT-HY 200-R V3 System by Hilti Corp.
b. Pure 110+, AC100+ Gold or PE 1000+ by Dewalt.
c. SET-XP Epoxy or AT-XP Acrylic Adhesive System by Simpson Strong-Tie Co., Inc.
d. Red Head A7+, G5+ or C6+ by ITW Commercial Construction.

2.02 FABRICATION

A. Fabricate reinforcing bars to conform to the required shapes and dimensions and in accordance with ACI 318 and CRSI Manual.

B. In case of fabricating errors, do not straighten or rebend reinforcement in a manner that will weaken or injure the material.

C. Reinforcement with any of the following defects will not be acceptable.

1. Bar lengths, depths, and/or bends exceeding the specified fabrication tolerances.
2. Bends or kinks not shown on the Drawings.
3. Bars with reduced cross-section due to excessive rusting or other causes.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.

B. Position, support, and secure reinforcement against displacement by formwork, construction, and concrete placing operations. Unless otherwise noted, provide clear cover as follows:

1. Cast against:

Earth: 3 inches

2. Exposed to earth, weather, or water:

a. Slabs:

#5 Bars and smaller: 1 ½ inches

#6 through #11 Bars: 2 inches

b. Walls: 2 inches

C. Correct displacement of reinforcement prior to and during concrete placement. Maintain clear cover as noted on Drawings. Tolerances shall be in accordance with ACI 117 and ACI 318, unless noted otherwise.

D. Support reinforcing steel in accordance with CRSI “Placing Reinforcing Bars” with maximum spacing of 4 feet.

E. Tie reinforcing steel at intersections in accordance with CRSI “Placing Reinforcing Bars”.

1. Spacing for Footings and Walls: Every third intersection, 3 feet maximum.
2. Spacing for Slabs and Other Work: Every fourth intersection, 3 feet maximum.
3. Tie each dowel in-place.

F. Reinforcement shall be continuous through construction joints.

G. Reinforcement may be sliced at construction joints provided that the entire lap is placed within only 1 pour.

H. Do not field bend bars, including bars partially embedded in concrete unless indicated.

I. Tack welding of, or to, reinforcement prohibited.

J. Placement of reinforcement shall be approved by Engineer before placing concrete.

K. Anchor dowels into drilled holes with epoxy dowel adhesive where noted. Conform to details shown.

3.03 SPLICES

A. Lap reinforcing at splices. Tie securely to prevent displacement of splices during placement of concrete.

END OF SECTION

This page intentionally left blank.

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 SUMMARY

A. Provide cast-in-place concrete where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 REFERENCES

A. ASTM: ASTM International

B. NRMCA: National Ready Mixed Concrete Association

C. ACI: American Concrete Institute

D. AASHTO: American Association of State Highway and Transportation Officials

1.03 SUBMITTALS

A. Shop Drawings:

1. Verification of Mix Design:

a. Proposed mix design for each class of concrete to be used as specified using designations indicated. Provide dry weight of cement, saturated dry weight of coarse and fine aggregate, brand name and quantities of admixtures when applicable, fly ash and other supplementary cementitious materials when applicable, gallons of water required for 1 cubic yard of concrete, and chloride ion content.
b. Source and material certificates of cement and fine and coarse aggregate, including sieve analysis that will be used in each class of concrete.
c. Admixture product data.
d. Source and test reports of fly ash and other pozzolans.
e. Source of slag cement and documented ability of supplier to consistently furnish these materials in accordance with applicable ASTM and AASHTO requirements.
f. Test data supporting proportions of design mixes based on laboratory trial batches or past field experience in accordance with ACI specification 301.
g. NRMCA certification, DOT certification, or letter stating plant and equipment complies with industry standard requirements.
h. Mix design shall be approved by Engineer before concrete delivered to site.

B. Product Data:

1. Curing and Sealing Compound, and Evaporation Retardant: Proposed rate of coverage and manufacturer’s literature.
2. Finishing Grout manufacturer’s literature.
3. Patching Mortar manufacturer’s literature.

C. Test Results:

1. Concrete test results.
2. Concrete delivery tickets: With each load of concrete delivered, provide duplicate tickets, one for Contractor, one for Engineer, with following information.

a. Serial number of ticket.
b. Date and truck number.
c. Name of supplier.
d. Class of concrete.
e. Type of cement and cement content in bags/cubic yard.
f. Admixture brand names.
g. Aggregate size.
h. Time loaded.
i. Amount of concrete in load.
j. Gallons of water added at site and slump of concrete after addition of water.
k. Temperature of concrete at delivery.
l. Time unloaded.

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Plant Certification: Plant or concrete supplier shall comply with requirements of NRMCA certification plan as regards material storage and handling, batching equipment, central mixer, truck mixers with counters, agitators, nonagitating units, and ticketing system.

B. Do not commence placement of concrete until mix designs have been reviewed and approved by Engineer.

C. Concrete Testing: Testing shall be provided by Contractor in accordance with Section 01 45 29 and this Section.

1. Conduct tests on sample material in accordance with methods listed below:

a. Slump: ASTM C143.
b. Air Content: ASTM C231.
c. Compressive Strength: ASTM C31 and ASTM C39.

1.05 PROJECT / SITE CONDITIONS

A. Hot Weather:

1. Comply with ACI 305.1.
2. Concrete temperature shall not exceed 95°F.
3. At air temperatures of 80°F or above, keep concrete as cool as possible during placement and curing.
4. When concrete temperature exceeds 80°F, water reducing, set-retarding admixtures shall be used.

B. Cold Weather:

1. Comply with ACI 306.1.
2. Cold weather is considered when air temperatures have fallen to, or are expected to fall below, 40°F.
3. Temperature of reinforcement, forms, fillers, and other material in contact with concrete at time of placement shall not be less than 35°F. Preheat if temperature below 35°F.
4. Maintain air and forms in contact with concrete sections having minimum dimension less than 12 inches at temperature above 50°F for at least 3 days and at temperature above 32°F for remainder of specified curing period.

5. Maintain air and forms in contact with concrete in more massive sections at temperature above 40°F for at least 3 days and at temperature above 32°F for remainder of specified curing period.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Cementitious Materials:

1. Portland cement conforming to ASTM C150.

a. Type I or II except tricalcium aluminate (C_3A) content of Type I shall not exceed 8%. If this type of Type I not available, Type I with C_3A content less than 12% shall be used in combination with fly ash.
b. Type II shall be used for mass concrete applications and where heat hydration is a concern.
c. Type III may be substituted for Type I when approved by Engineer and additional requirements for Type I are met.
d. When aggregates determined to be deleteriously reactive, as defined by ASTM C33, alkali content of cement defined by ASTM C150 shall not exceed 0.60%.

2. Blended hydraulic cement conforming to ASTM C595.

a. Type IL, IP, or IS may be used in replacement of ASTM C150 Type I.
b. Type IL (MS), IP (MS), or Type IS (MS) may be used in replacement of ASTM C150 Type II where moderate sulfate expose is anticipated.
c. Type IL (MH), IP (MH), or Type IS (MH) may be used in replacement of ASTM C150 Type II where heat of hydration is a concern.
d. Blended hydraulic cements may not be used in replacement of ASTM C150 Type III or V cements.

3. Fly Ash:

a. ASTM C618, Class C or F including requirements of Table 1A.
b. Supplemental Requirements:

i. Loss on Ignition (maximum): 3%.
ii. Water Requirement (maximum): 100% (as percent of control).
iii. Fineness (maximum retained on No. 325 sieve): 25%.

4. Slag Cement:

a. Slag cement shall conform to the requirements of ASTM C989 Grade 100 or 120.
b. Slag cement from different sources or of different grades shall not be mixed in the same construction.

5. Silica fume conforming to ASTM C1240, amorphous silica.

B. Aggregates:

1. ASTM C33, modified as follows:

a. Fine aggregate: Natural sand.
b. Coarse aggregate: Crushed gravel, crushed stone or gravel, Size 467 (1-1/2 inch maximum), size 67 (3/4 inch maximum), Size 8 (3/8 inch maximum).

2. Potential reactivity of aggregates shall be determined in accordance with ASTM C33.

C. Admixtures:

1. Shall be non-corrosive and shall not contain intentionally added chlorides.
2. Air-Entraining: ASTM C260.
3. Chemical Admixtures:

a. Water-Reducing: ASTM C494, Type A.
b. Mid-Range Water-Reducing: ASTM C494, Type A.
c. Retarding: ASTM C494, Type B or D.
d. Accelerating: ASTM C494, Type C or E.
e. High-Range Water-Reducing: ASTM C494, Type F.
f. Workability-Retaining: ASTM C494, Type S.
g. Corrosion-Inhibiting: A nominal 30 percent solution of calcium nitrite or an amine/ester-based organic corrosion-inhibiting admixture.

D. Fibrillated Synthetic Microfibers:

1. Manufacturers:

a. GCP Applied Technologies (W.R. Grace & Co.)
b. Fibermesh Co.
c. Euclid Chemical Co.
d. Master Builders Solutions

2. ASTM C1116 Type III.

E. Water: Potable.

F. Curing and Sealing Compound:

1. Manufacturers:

a. MasterKure CC 300SB by Master Builders Solutions.
b. Dress and Seal 30 by L&M Construction Materials, Inc.
c. Cure & Seal 1315 J22WB by Dayton Superior.
d. Or Equal

2. ASTM C309.
3. ASTM C1315, Type I, Class A.
4. Approved and compatible with scheduled finishes and coatings.

G. Finishing Grout

1. Manufacturers:

a. MasterSeal 581 by Master Builders Solutions.
b. Concrete Finisher with AKKRO-7T by Tamms Industries Co.
c. SikaTop Seal 107 by Sika Corp.

H. Cement Grout: Mixture of cement and fine sand in proportions used in concrete being finished.

I. Evaporation Retardant:

1. Manufacturers:

    a. Econ by L&M Construction Materials, Inc.
    b. MasterKure ER 50 by Master Builders Solutions.
    c. Sikafilm by Sika Corp.

J. Patching Mortar.

1. Manufacturers:

    a. SikaTop-122 Plus by Sika Corp.
    b. Concrete-Top Supremem by Euclid Chemical.
    c. MasterEmaco T 310CI by Master Builders Solutions.

2. Polymer modified cementitious fast setting mortar for repair of concrete surfaces. Consisting of polymer and selected Portland cements, aggregates, accelerator, admixtures for controlling set, water reducers for workability, and corrosion inhibitor. Shall contain no chlorides, nitrates, gypsum, or lime. Shall not produce vapor barrier. Shall be thermally compatible with concrete and shall be freeze-thaw resistant.

    a. Concrete gray.
    b. 5000 pounds per square inch minimum compressive strength.
    c. 400 pounds per square inch minimum bond strength.

2.02 CONCRETE MIX DESIGN

A. Concrete Mix: Measure and combine cement, aggregate, water, and admixtures in accordance with ASTM C94 and ACI PRC-211.1.

1. Cement: When used in exposed concrete shall be one brand from one source. Do not mix different cements in same element of Work.
2. Water-Cementitious Materials Ratio (if fly ash or slag cement is used, water-cement plus fly ash and slag cement ratio): 0.45 maximum for Class A concrete, 0.50 maximum for Class B concrete.
3. Air-Entrainment: Air-entrain all concrete, unless noted otherwise.
4. Chemical Admixtures: Use is optional to aid concrete properties and allow for efficient placement. Manner of use and amount shall be in accordance with manufacturer's written recommendations and as approved by Engineer. Do not use admixtures that increase early shrinkage or negatively affect finishing.
5. Fly Ash: Use is optional unless otherwise noted. Combine fly ash with cement at rate of 1 pound fly ash for each pound reduction of cement. Amount of fly ash shall not be less than 15% or more than 25% of weight of cementitious material.
6. Slag Cement: Use is optional unless otherwise noted. Combine slag cement with cement at a rate of 1 pound slag cement for each pound reduction of cement. Amount of slag cement shall not be greater than 50% of weight of cementitious material.
7. Fly Ash and Slag Cement Combination: Use is optional unless otherwise noted. Combine fly ash and slag cement with cement at a rate of 1 pound fly ash or slag cement for each pound reduction of cement. Amount of fly ash and slag cement combination shall not be greater than 50% of weight of cementitious material. Amount of fly ash shall not be greater than 25% of weight of cementitious material
8. Concrete for fillets shall include fibrillated synthetic microfibers:

    a. Dosage Rate: 1-1/2 pounds per cubic yard minimum or as recommended by the manufacturer.
    b. Use in strict accordance with manufacturer's written recommendation and ASTM C94.

9. Use no admixtures other than specified, unless approved by Engineer.

B. Class of Concrete:

1. Furnish in accordance with table. Cement contents listed are minimum values and shall be increased as required to attain other specified characteristics.
2. Slumps listed are maximum, except when the mix contains an approved admixture. Maximum slump when admixtures are used shall be 10 inches.
3. Chloride ion content shall not exceed values listed in ACI 318.
4. Mid-range water reducer required for Class A2 concrete.

Class	28-Day Compressive Strength (psi)	Coarse Aggregate (size no.)	Minimum Cementitious Material (lbs/cu yd)	Air Content (%)	Slump (in.)
A2	4500	67	564	6±1.5	3±1
B1	3000	467	423	5.5±1.5	3±1
B2	3000	67	446	6±1.5	3±1
B3	3000	8	470	7.5±1.5	4 max

psi = pounds per square inch
cu yd = cubic yard
in. = inch
max = maximum

C. Concrete Usage:

1. Class A: All locations, except where Class B specified.
2. Class B: Fence post piers, concrete fillets in tanks, and where specifically noted.
3. Class A2: Concrete curb and gutter and concrete sidewalk.
4. Do not use coarse aggregate Size 467 in sections 12 inches thick or less, where clear cover of reinforcement is less than 1-1/2 inches or where clear spacing between reinforcement bars is less than 3 inches.

2.03 MIXING AND DELIVERY

A. Use ready mixed concrete conforming to ASTM C94.

B. Deliver and complete discharge within 1-1/2 hours of commencing of mixing. Limitations may be waived by Engineer if concrete slump, after 1-1/2 hours, is sufficient so that concrete can be placed without addition of water. In hot weather, time criteria may be reduced by Engineer.

C. Do not add water on-site unless slump and water-cement ratio, after addition of water, is below maximum allowed.

D. Deliver concrete to site having temperature not less than 50°F or greater than 90°F.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 FORMS

A. Formwork design, detailing, and installation shall be Contractor's responsibility.

B. Type of forms used is Contractor's option, except as otherwise indicated or shown. Plywood and other wood surfaces shall have smooth, level surfaces treated with form oil or sealer to produce clean release of concrete from forms.

1. Where walls remain exposed use plywood, prefabricated metal or wood forms; do not use boards.
2. Form ties shall be plastic cone snap ties. Cone shall be min 3/4 inch diameter by 1 inch deep. Ties for liquid holding structures or dry structures below grade shall have integral waterstop. Taper tie through-bolt form ties may be used as an alternate to plastic cone snap ties; conform to details shown. Do not use wire ties on exposed concrete.
3. Removal of ties shall leave holes clean cut and without appreciable spalling at face of concrete.
4. Provide 3/4 inch chamfer on external corners of exposed concrete walls, equipment bases and exposed edges of construction joints. Do not chamfer edges flush with masonry walls.
5. Provide openings at base of vertical forms as access for cleaning and inspection of forms and reinforcing prior to depositing concrete.

C. Coat plywood and wood forms with non-staining form release agent. Apply release agent before reinforcement is placed.

D. Clean, patch, and repair form material before reuse.

E. Formwork shall prevent leakage of mortar, shall not deflect under weight of concrete and workmen, and shall withstand fluid pressure of concrete.

F. Conform to tolerances as specified in ACI specification 117.

3.03 SUBGRADE PREPARATION

A. Subgrade and bedding shall be compacted and free of frost. If placement occurs at temperatures below freezing, provide temporary heat and protection to remove frost. Do not place concrete on frozen material.

B. Remove standing water, ice, mud, and foreign matter before placing concrete.

3.04 PLACING CONCRETE

A. Notify Engineer 24 hours in advance of placing operations.

B. Place concrete, except as modified herein, in accordance with ACI specification 301.

C. Concrete will not be allowed to drop freely where reinforcing will cause segregation of mix.

1. Concrete containing high-range water reducer: 10 feet maximum drop.
2. Other Concrete: 5 feet maximum drop.

D. If pumping used, do not use aluminum piping for delivery system.

E. When placing concrete temporarily halted or delayed, provide construction joints as shown and as specified.

F. Place in lifts not exceeding 24 inches and compact with internal mechanical vibrator equipment.

G. When hot and/or wind conditions will result in evaporation of 0.2 pounds per square foot per hour or more, evaporation retardant shall be used in accordance with manufacturer's written recommendations to minimize plastic shrinkage cracking.

3.05 EMBEDDED ITEMS

A. Cast pipe and other embedded items into concrete as placement progresses. Do not provide blockouts.

B. Following restrictions shall be adhered to, unless otherwise noted.

1. Duct, conduit, pipe, and fittings, when placed within slabs or walls

a. Shall not be larger than 1/3 thickness of slab or wall.
b. Shall be placed within the middle 1/3 thickness of slab or wall where possible.
c. Shall not be placed closer than 3 outside diameter clear from each other when parallel.
d. Shall cross each other at right angles.
e. Shall be secured to prevent shifting or "floating" during concrete placement.
f. Multiple conduits shall not cross each other at the same location.
g. Except for conduits that must run up a column, keep conduits a minimum of 2 to 3 feet away from columns.
h. Where conditions require conduit to be tied to the inside face of the reinforcing mat, the conduit shall be galvanized steel or PVC, shall not be tied directly adjacent to a parallel reinforcement bar, and shall be placed 3 outside diameter clear away from the parallel reinforcement bar.

2. Reinforcing steel shall be in place before embedded items placed and reinforcing cut or removed shall be replaced with additional reinforcing as indicated.
3. Do not pass sleeves through columns without Engineer's approval.

C. Do not place ducts, conduit, and pipes in slabs on grade. Place minimum 4 inches below slab.

D. Set items such as bolts, anchors, piping, and frames in concrete as shown.

E. Place items constructed of dissimilar metals to avoid physical contact with reinforcing. Secure item and reinforcing to ensure they will not shift and come into contact during concrete placement. Contact between reinforcing steel and other metal, other than bare, coated, or plated carbon steel not permitted.

3.06 REPAIR OF SURFACE DEFECTS

A. General:

1. Prior to starting repair work, obtain Engineer's approval of proposed repair techniques and materials.
2. Method of repair shall not adversely affect the appearance of the finished structure.
3. Develop repair techniques on portion of as-cast surface selected by Engineer. Surface of repair remaining exposed to view shall match color and texture of adjacent surfaces.
4. Prepare surfaces, apply and install materials, and cure as recommended by material manufacturers.

B. Tie Holes: Fill plastic cone snap tie holes with Patching Mortar. Fill taper tie through-bolt form tie holes with Non-Shrink Grout.

C. Defective Areas:

1. Remove honeycombing, stone pockets, spalls, and other defective concrete down to sound concrete. If chipping required, make edges perpendicular to surface. Do not feather edges.
2. Fill defective area with Patching Mortar.

3.07 FINISHING SLABS AND FLATWORK

A. Slab Finishes:

Description	Concrete Finish
Surfaces to Receive Grout or Topping	Float
Exterior Exposed Slabs	Float and Broom Finish

B. After placement, screed concrete with straightedges, power strike-offs or vibrating screeds.

C. After screeding, bull float or darby surfaces to eliminate ridges and to fill in voids left by screeding.

D. Float:

1. Use magnesium or aluminum hand floats or power floats with slip on float shoes.
2. Float finish shall result in uniform smooth granular texture.

E. Broom Finish: Use fine, soft-bristled broom and broom at right angles to direction of traffic to give nonskid finish approved by Engineer.

F. Tolerances:

1. Concrete slabs shall be within 3/16 inch of 10 foot straightedge in all directions except where slabs are dished for drains. Deviations from elevation indicated shall not exceed 3/4 inch.
2. Pitch floor to floor drains minimum 1/8 inch per foot or as shown. Pitch bottom of slab to match top slope to maintain thickness or depth indicated. As an alternate, bottom of slab may be placed level provided that min thickness or depth is maintained.

3.08 FINISHING FORMED CONCRETE

A. As-Formed Finish: Finish resulting directly from formwork for surfaces which will be hidden from view by earth, submergence in water, or subsequent construction.

1. Repair surface defects as specified herein.
2. Where joint marks or fins on submerged surfaces exceed 1/4 inch, grind smooth.

B. Rubbed Finish: Exterior concrete surfaces permanently exposed to view extending to 6 inch below finished grade or liquid level.

1. Repair surface defects as specified herein.
2. Grind joint marks and fins smooth with adjacent surface. Remove stains and rinse.
3. Apply heavy coat of Finishing Grout. After first coat has set, apply second coat. When second coat has set, float to uniform texture.
4. Follow manufacturer's written recommendations.
5. Finish color shall be gray.

3.09 PROTECTION AND CURING

A. Protect concrete from frost and keep moist for min curing period of 7 days after placement in accordance with ACI specification 308.1.

B. Formed Surfaces:

1. Wet cure by spraying surfaces as frequently as drying conditions may require to keep concrete surfaces moist.
2. Surfaces may be cured by leaving forms in-place. For vertical surfaces, apply water to run down inside of forms, if necessary, to keep concrete moist.
3. After forms are removed, wet cure for remainder of curing period or apply curing compound.
4. Do not use curing compound where mortar, grout, concrete, or other coatings or adhesives will be applied.

C. Flatwork:

1. Cure using curing compound or wet cure.
2. Do not use curing compound where mortar, grout, concrete, or other coatings or adhesives will be applied.

D. Curing Compound:

1. Apply curing compound at uniform rate sufficient to comply with requirements for water retention as specified and as measured in accordance with ASTM C156.
2. Cover areas subjected to direct sunlight with ambient temperature expected to exceed 80°F with white pigmented compound, other surfaces may be covered with fugitive dye compound.

E. Protect from damaging mechanical disturbances, load stresses, heavy shock, and excessive vibration.

F. Protect finished concrete surfaces from damage caused by construction equipment, materials, and methods, and from rain or running water.

G. Do not load self-supporting structures to overstress concrete.

3.10 REMOVAL OF FORMING AND SHORING

A. Do not remove forming or shoring until member supported has acquired sufficient strength to safely support own weight and any imposed loads. Forming shall remain in place for at least min time recommended by ACI PRC-347. In addition, forming for horizontal members shall remain in place minimum 7 days. In no case shall forming for horizontal members be removed before concrete has reached 70% of specified design strength.

B. Reshore areas as required to carry additional imposed loads.

3.11 FIELD QUALITY CONTROL

A. Obtain samples of concrete in accordance with ASTM C172. Place cylinders on-site where they can be stored under conditions similar to concrete they represent without being disturbed for first 24 hours.

B. Make slump tests daily and when requested by Engineer, in accordance with ASTM C143. Make slump tests from same load from which strength tests are made.

C. Make air content tests daily and when requested by Engineer, in accordance with ASTM C231. Make air content tests from same load from which strength tests are made.

D. Make temperature tests daily and when requested by Engineer, in accordance with ASTM C1064. Make temperature tests from same load from which strength tests are made.

E. If measured slump, air content, or temperature falls outside specified limits, make check test immediately on another portion of same sample. In event of second failure, concrete shall be considered to have failed to meet requirements of Specifications and will be rejected.

F. Make strength test specimens for each of the following conditions for each class of concrete

1. Each day's pour.
2. Each change of source.
3. Each 100 cubic yards poured.

G. Strength test for each class of concrete consists of (5)-cured 4 x 8 in. standard cylinders or (4)-cured 6 x 12 in. standard cylinders made from composite samples secured from same load of concrete in accordance with ASTM C172. Make compressive strength tests on 1 cylinder at 7 days and (3)-standard 4 x 8 in. cylinders or (2)-standard 6 x 12 in. cylinders at 28 days. Test remaining cylinder if needed.

H. Strength of concrete considered satisfactory if following requirements met.

1. Every average of 3 consecutive strength tests equals or exceeds specified 28-day compressive strength (*fc'*).
2. No individual strength test falls below specified 28-day compressive strength by more than 500 psi if *fc'* is 5000 psi or less, or by more than 0.10*fc'* if *fc'* is greater than 5000 psi.

I. If analysis of strength tests indicate above requirements are not being met, make immediate adjustments to mix design and make additional tests as required by Engineer to determine strength of concrete in-place in portion of structure represented by deficient cylinders. If tests verify Work in-place is not in conformance with Specifications, Engineer will determine if Work in-place is adequate for intended use. If Work in-place is determined to be inadequate, Contractor shall follow such remedial or replacement measures which Engineer may require. Contractor shall bear costs associated with testing, engineering analysis, remedial work, and replacement required under terms of this paragraph.

END OF SECTION

This page intentionally left blank.

SECTION 03 62 00
NON-SHRINK GROUTING

PART 1 – GENERAL

1.01 SUMMARY

A. Cement based grout for setting equipment base plates.

1.02 RFERENCES

A. ASTM: American Society for Testing and Materials

1.03 SUBMITTALS

A. Product Data:

1. Manufacturer’s literature.

B. Submit in accordance with Section 01 33 00.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Manufacturers:

1. Five Star Grout by Five Star Products, Inc.
2. SET Grout by BASF.
3. Duragrout by L&M Construction Chemicals, Inc.
4. SikaGrout 212 by Sika Corp.

B. Grout:

1. Preblended, cement based, nonmetallic, nongas forming, nonshrink and shall not bleed.
2. Comply with ASTM C1107 and CRD C621, Grade B.
3. Moderate fluidity.
4. 5000 pounds per square inch minimum compressive strength.

C. Water: Potable.

PART 3 – EXECUTION

3.01 PREPARATION

A. Clean grout contact surfaces of oil, grease, scale, and other foreign matter.

B. Chip away unsound concrete leaving surface rough but level.

C. Clean base plates, rails, anchors, bolts, etc. in contact with grout of oil, grease, dirt, and coatings.

3.02 MIXING AND PLACING

A. Mix and place in accordance with manufacturer’s written instructions.

B. Provide forming materials where necessary to retain grout until hardened.

C. Work grout from one side. Avoid trapping air under base plate.

D. Do not load grout until it has reached a minimum of 3000 pounds per square inch compressive strength.

3.03 CURING

A. Cure as recommended by grout manufacturer.

END OF SECTION

DIVISION 05

METALS

This page intentionally left blank.

SECTION 05 50 00
METAL FABRICATIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Provide miscellaneous metal work shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

B. Section Includes:

1. Concrete anchors.
2. Metal frames.
3. Floor access hatches.
4. Safety grate.
5. Miscellaneous items.

1.02 DEFINITIONS

A. Submerged: At or below level 1 foot 6 inches above maximum water level in water holding structures.

1.03 REFERENCES

A. AISC: American Institute of Steel Construction

B. AA: Aluminum Association

C. AWS: American Welding Society

D. ASTM: American Society for Testing and Materials

E. AISI: American Iron and Steel Institute

1.04 SUBMITTALS

A. Shop Drawings:

1. Indicate materials, sizes, connections, anchors, and finishes.

B. Product Data:

1. Manufacturer’s catalog sheets on premanufactured items.

C. Miscellaneous Submittals:

1. Floor access hatch warranty.

D. Submit in accordance with Section 01 33 00.

1.05 QUALITY ASSURANCE

A. Perform shop and/or field welding required in connection with the work of this Section by certified welders in strict accordance with pertinent recommendations of AWS.

B. Conform to AISC and AA standards.

PART 2 – PRODUCTS

2.01 MATERIALS

A. In fabricating items which will be exposed to view, limit materials to those which are free from surface blemishes, pitting, and roughness.

B. Comply with following standards, as pertinent.

1. Structural Steel Shapes:

a.	W Shapes:	ASTM A992, 50 ksi.
b.	M Shapes:	ASTM A36.
c.	S, C and MC Shapes:	ASTM A36.
d.	L Shapes:	ASTM A36.
e.	HP Shapes:	ASTM A572 Grade 50.
f.	HSS Square and Rectangular Shapes:	ASTM A500, Grade B, 46 ksi.
g.	HSS Round Shapes:	ASTM A500, Grade B, 42 ksi
h.	Pipe Shapes:	ASTM A53, Grade B, 35 ksi.
i.	Plates and Bars:	ASTM A36.

2. Stainless Steel:

a. Exterior and submerged uses: AISI, Type 316.
b. Interior uses: AISI, Type 304 or Type 316.

3. Aluminum shapes and plates: Alloy 6061-T6 or 6063-T6.
4. Floor Plate: Checkered surface aluminum plate.
5. Connection Bolts:

a. For steel members: ASTM F3125 Grade A325, galvanized.
b. For aluminum and galvanized steel members: Stainless steel.

6. Cast-in-place Anchor Rods:

a. 1/2 inch minimum diameter.
b. Nonsubmerged: ASTM F1554, Grade 36, galvanized.
c. Submerged: Stainless steel.

7. Nuts and washers:

a. For carbon steel bolts and rods: ASTM A563 DH nuts and ASTM F436 washers.
b. For stainless steel bolts and rods: ASTM F593 nuts and washers shall match bolt/rod and nut material.

8. Malleable Iron: ASTM A47.
9. Cast Iron: ASTM A48, Class 35B.
10. Ductile Iron: ASTM A536, Grade 65-45-12.
11. Cast Aluminum: ASTM B26.

2.02 CONCRETE ANCHORS

A. Wedge Anchors:

1. Manufacturers:

    a. Power-Stud+ SD1, SD2, SD4 or SD6 by Dewalt.
    b. Kwik Bolt TZ or Kwik Bolt 1 by Hilti Corp.
    c. Strong-Bolt 2 by Simpson Strong-Tie Co., Inc.

2. Usage: In concrete.

    a. 316 stainless steel unless noted otherwise.
    b. Do not use when submerged or subjected to dynamic loads.

B. Expansion Anchors:

1. Manufacturers:

    a. Power-Bolt+ by Dewalt.
    b. HSL-3 by Hilti Corp.

2. Usage: In concrete.

    a. 316 stainless steel unless noted otherwise.
    b. Do not use when submerged, in overhead applications, or subjected to dynamic loads.

C. Adhesive Anchors (Concrete):

1. Manufacturers:

    a. HIT-RE 500 V3 or HIT-HY 200 V3 Adhesive Anchor by Hilti Corp.
    b. Pure 110+ or AC200+ by Dewalt.
    c. SET-3G or AT-XP Adhesive System by Simpson Strong-Tie Co., Inc.
    d. A7+, G5+ or C6+ by Red Head.

2. Adhesive with 316 stainless steel stud assembly.
3. Usage:

    a. In concrete, submerged.
    b. Do not use in overhead applications.

2.03 FINISHES

A. Primer: Conform to requirements of Section 09 96 00.

B. Galvanizing Repair Paint: High zinc-dust content paint complying with MIL-P-21035.

2.04 FABRICATION

A. Except as otherwise shown on the Drawings or the approved Shop Drawings, use materials of size, thickness, and type required to produce reasonable strength and durability in the work of this Section.

B. Provide clips, lugs, brackets, straps, plates, bolts, nuts, washers, and similar items, as required for fabrication and erection.

C. Fabricate with accurate angles and surfaces which are true to the required lines and levels, with projecting corners clipped, grinding exposed welds smooth and flush, forming exposed connections with hairline joints, and using concealed fasteners wherever possible.

D. Weld shop connections and bolt or weld field connections.

E. Prior to shop painting or priming, properly clean metal surfaces as required for the applied finish and for the proposed use of the item. Conform to Section 09 96 00.

1. Do not coat ferrous metal surfaces embedded in concrete.
2. Coating of cast iron or ductile iron floor access hatches and pressure relief valves not required.
3. On surfaces inaccessible after assembly or erection, apply two coats of the specified primer. Change color of second coat to distinguish it from the first.
4. Coat aluminum surfaces in contact with concrete in accordance with AA and Section 09 96 00. Under no circumstances shall aluminum contact dissimilar metal.

F. Galvanizing:

1. Galvanize after fabrication.
2. Galvanize by hot-dip process conforming to ASTM A123 and AHDGA specifications.

2.05 METAL FRAMES

A. Provide door, hatch, grille, louver, and other frames fabricated from structural shapes or plates.

B. Select sections for trueness of web and flange. Straighten members so finished frames are uniform, square, and true throughout length and depth of assembled units.

C. Miter or cope and join members with continuous welds.

D. Provide temporary spreader bars to prevent springing frames out of shape prior to and during erection.

2.06 FLOOR ACCESS HATCHES

A. H-20 Load Rated Type:

1. Manufacturers:

a. Bilco Type J or JD.
b. Halliday Type H1R or H2R.

2. Provide access hatches and frames of material, type, and size as shown on Drawings.
3. Door leaves shall be 1/4 inch minimum diamond pattern plate with reinforcing on underside to withstand H-20 loading with max deflection of 1/150 span.
4. Frames shall be 1/4 inch minimum thick channel to allow for adequate water drainage with anchor flange around perimeter.
5. Equip hatches with heavy stainless steel hinges with 3/8 inch minimum stainless steel pins bolted to underside and pivot so cover does not protrude into channel frame.
6. Provide compression spring operators enclosed in telescoping tubes for smooth, easy and controlled door operation.
7. Equip hatches with hold-open arm with positive locking device with conveniently positioned release handle for easy and controlled closing.
8. Provide 316 stainless steel snap lock mounted on underside of leaf with removable topside handle and socket recessed in cover.

9. Provide drainage channel coupling.
10. Pipe drain below.
11. Hardware shall be 316 stainless steel.
12. Factory finish on aluminum surfaces shall be mill finish with bituminous coating applied to surfaces in contact with concrete.
13. Manufacturer shall warranty in writing against defects in material and workmanship for 5 years.

2.07 SAFETY GRATE

A. Provide retractable safety grate across hatch openings, unless noted otherwise.

B. Metal Grating Type:

1. Manufacturers:

a. Bilco Fall Protection Grating System
b. Halliday Retro-Grate
c. Nystrom Safety Grating

2. Aluminum construction with safety orange powder coat.
3. Spring loaded lifting handle.
4. Stainless steel hold open arm with aluminum latch.
5. Stainless steel hardware throughout.
6. Load rated at 300 pounds per square foot.

2.08 MISCELLANEOUS ITEMS

A. Fabricate miscellaneous framing, supports, and items of structural shapes, plates, bars, and tubing of sizes and arrangements indicated and as required.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. General:

1. Set work accurately into position, plumb, level, true, and free from rack.
2. Tolerance: 1/8 inch in 10 feet.
3. Anchor firmly into position.
4. Where field welding is required, comply with AWS recommended procedures for appearance and quality of weld and for methods to be used in correcting welding work.
5. Grind exposed welds smooth, and touchup shop prime coats.
6. Do not cut, weld, or abrade surfaces which have been hot-dip galvanized after fabrication and which are intended for bolted or screwed field connections.
7. Perform cutting, drilling, and fitting as required for proper installation. Drill field holes for bolts, do not burn holes.
8. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint the exposed areas with same material used for shop priming.

B. Concrete Anchors:

1. Do not install until concrete or masonry has reached its design strength.
2. Do not install closer than 6 bolt dia to edge of concrete or masonry, or closer than 12 bolt diameter to another anchor unless otherwise shown.
3. Minimum embedment shall be 8 bolt diameter.
4. Install in accordance with manufacturer's recommendations.

3.03 ADJUSTING AND CLEANING

A. Clean exposed surfaces, removing dirt, dust, and other foreign matter.

B. Prepare surfaces for finished painting as specified is Section 09 96 00.

C. Field Repair of Damaged Galvanized Coatings:

1. Repair surfaces damaged during shipping, erection, or construction operations.
2. Use zinc rich paint.
3. Prepare surfaces and apply in accordance with ASTM A780, Annex A2.

END OF SECTION

DIVISION 07

THERMAL AND MOISTURE PROTECTION

This page intentionally left blank.

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Preparation of joint substrates and installation of joint sealants, joint backer materials and accessories needed to ensure a complete and durable weathertight seal at locations indicated.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

1.03 SUBMITTALS

A. Product Data:

1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
2. Manufacturer's recommended installation procedures.
3. Catalog illustrations in sufficient detail to show installation and interface of the Work of this Section with the Work of adjacent trades.
4. Standard color card showing full range of colors available for each product exposed to view.

B. Miscellaneous:

1. Written documentation of applicator's qualifications, including reference projects of similar scope and complexity, with current phone contacts of engineers and owners for verification.
2. Certification from sealant manufacturers that their products are suitable for the use indicated and comply with specification requirements.

C. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Applicator shall be approved by sealant manufacturer and shall have at least three years experience in installing materials of types specified and shall have successfully completed at least three projects of similar scope and complexity.

B. Obtain joint sealants from single manufacturer for each different product required to ensure compatibility.

1. Provide joint sealants, joint fillers and accessory joint materials that are compatible with one another and with joint substrates under Project conditions.
2. Provide joint sealants, joint fillers and related joint materials that are nonstaining to visible joint surfaces and surrounding substrate surfaces.
3. Manufacturer shall instruct applicator in procedures for intersecting sealants.

C. Perform Work in accordance with ASTM C1193 guidelines except where more stringent requirements are indicated or specified.

D. Schedule applications of waterproofing, water repellents, and preservative finishes after sealant installation unless sealant manufacturer approves otherwise in writing. Ensure that installed sealant is allowed to cure sufficiently prior to subsequent applications.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver the materials to Site in the manufacturer's unopened containers with all labels intact and legible at time of use.

B. Maintain the products in a dry condition during delivery, storage, handling, installation, and concealment.

1.06 SUBSTRATE CONDITIONS

A. Surfaces shall be broom clean, dry, sound, and free of voids, bugholes, rockpockets, honeycombs, protrusions, excessive roughness, foreign matter, frost, ice, and other contaminants which may inhibit application or performance of the sealant system.

B. Provide joints properly dimensioned to receive the approved sealant system.

1.07 WARRANTY

A. Furnish written warranties against adhesive and cohesive failure of the sealant and against infiltration of water and air through the sealed joint for a period of 3 years from date of substantial completion.

1. Manufacturer's standard warranty covering materials.
2. Installing Subcontractor's standard warranty covering workmanship.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Tremco.

B. Or Equal.

2.02 SEALANTS

A. The sealant products listed are set as a standard of quality. Sealants of other manufacturers shall meet or exceed the characteristics of the products listed.

B. Provide colors selected by Engineer from manufacturer's standard color range.

C. Sealant Type B:

1. For interior and exterior joints in vertical surfaces and non-traffic horizontal surfaces; such as:

a. Control and expansion joints in concrete unit or brick masonry.
b. Metal panel joints.
c. Joints around frames of doors, windows, louvers, and other similar openings.
d. Under metal thresholds.
e. Joints in sheet metal flashings.
f. Trim or finish joints.

2. Single-component or multi-component, non-sag polyurethane or hybrid sealant having 25% joint movement capability that is suitable for continuous immersion in water; comply with ASTM C920, Type S or M, Grade NS, Class 25.
3. Acceptable Sealants:

a. Tremco – Vulkem 116.
b. Tremco – Dymeric 240/240FC
c. Tremco – Dymonic FC

D. Sealant Type C:

1. For interior and exterior joints in horizontal and sloped traffic surfaces; such as control, expansion, and isolation joints in concrete pavement and sidewalks.
2. Single-component or multi-component polyurethane sealant having a Shore A hardness of not less than 25 or more than 50 and 25% joint movement capability that is suitable for continuous immersion in water; comply with ASTM C920, Type S or M, Grade P or NS, Class 25.
3. Acceptable Sealants:

a. Tremco – Vulkem 45/245.

2.03 ACCESSORIES

A. Joint Cleaner: As recommended by sealant manufacturer for substrates indicated.

B. Joint Primer: As recommended by sealant manufacturer for substrates, conditions and exposures indicated.

C. Bond Breaker: Polyethylene tape or other adhesive faced tape as recommended by sealant manufacturer to prevent sealant contact where it would be detrimental to sealant performance.

D. Joint Backer: Polyethylene foam rod or other compatible non-waxing, non-extruding, non-staining resilient material in dimension 25% to 50% wider than joint width as recommended by sealant manufacturer for substrates, conditions and exposures indicated.

E. Masking Tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces that is suitable for masking.

2.04 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor and approved by the sealant manufacturer as compatible, subject to the approval of the Engineer.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which Work of this Section will be performed.

1. Verify conformance with manufacturer's requirements.
2. Report unsatisfactory conditions in writing to Engineer.
3. Correct conditions detrimental to timely and proper completion of the Work.
4. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Prepare surfaces to receive sealants in accordance with sealant manufacturer's instructions and recommendations except where more stringent requirements are indicated.

B. Thoroughly clean joint surfaces using cleaners approved by sealant manufacturer whether primers are required or not.

1. Remove all traces of previous sealant and joint backer by mechanical methods, such as by cutting, grinding and wire brushing, in manner not damaging to surrounding surfaces.
2. Remove paints from joint surfaces except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer.
3. Remove wax, oil, grease, dirt, film residues, temporary protective coatings and other residues by wiping with cleaner recommended for that purpose. Use clean, white, lint-free cloths and change cloths frequently.
4. Remove dust by blowing clean with oil-free, compressed air.

C. Provide joint backer material to depth required by sealant manufacturer for proper joint design.

1. Fit securely by compressing backer material 25% to 50% so no displacement occurs during tooling.
2. Avoid stretching or twisting joint backer.

D. Provide bond-breaker where indicated or recommended by sealant manufacturer, adhering strictly to the manufacturer's installation requirements.

E. Prime joint substrates where required.

1. Use and apply primer according to sealant manufacturer's recommendations.
2. Confine primers to sealant bond surfaces; do not allow spillage or migration onto adjoining surfaces.

F. Taping:

1. Use masking tape where required to prevent sealant or primer contact with adjoining surfaces that would be permanently stained or otherwise damaged by such contact or the cleaning methods required for removal.
2. Apply tape so as not to shift readily and remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the Work of this Section.

B. Provide the approved sealant system where shown on the Drawings, and in strict accordance with the manufacturer's recommendations as approved by Engineer.

C. Install sealants immediately after joint preparation.

D. Mix and apply multi-component sealants in accordance with manufacturer's printed instructions.

E. Install sealants to fill joints completely from the back, without voids or entrapped air, using proven techniques, proper nozzles and sufficient force that result in sealants directly contacting and fully wetting joint surfaces.

F. Install sealants to uniform cross-sectional shapes with depths relative to joint widths that allow optimum sealant movement capability as recommended by sealant manufacturer.

G. Tool sealants in manner that forces sealant against back of joint, ensures firm, full contact at joint interfaces and leaves a finish that is smooth, uniform and free of ridges, wrinkles, sags, air pockets and embedded impurities.

   1. Dry tooling is preferred; tooling liquids that are non-staining, non-damaging to adjacent surfaces and approved by sealant manufacturer may be used if necessary when care is taken to ensure that the liquid does not contact joint surfaces before the sealant.
   2. Provide concave tooled joints unless otherwise indicated to provide flush tooling or recessed tooling.
   3. Provide recessed tooled joints where the outer face of substrate is irregular.

H. Remove sealant from adjacent surfaces in accordance with sealant and substrate manufacturer's recommendations as work progresses.

I. Protect joint sealants from contact with contaminating substances and from damages. Cut out, remove and replace contaminated or damaged sealants, immediately, so that they are without contamination or damage at time of Substantial Completion.

END OF SECTION

This page intentionally left blank.

DIVISION 09

FINISHES

This page intentionally left blank.

SECTION 09 96 00
HIGH-PERFORMANCE COATINGS

PART 1 – GENERAL

1.01 SUMMARY

A. Coating of surfaces as specified herein, including:

1. New surfaces.
2. Exposed interior and exterior ferrous metal, ductile iron, or cast iron piping, regardless of factory-applied finish.
3. Exterior and interior equipment, pumps, valves, motors, etc. and all appurtenances.

B. Labeling and directional arrows on piping, equipment, valves, and ducts whether coated or not coated is specified in Section 40 05 97.

C. Do not coat the following unless specifically noted otherwise:

1. Factory-finished electrical motor control center (MCC), main instrument panels (MIP), flow indicators, and related equipment.
2. Moving parts of operating units, electrical parts, linkages, sensing devices, and motor shafts.
3. Buried equipment and piping.
4. Surfaces above ceilings.
5. Factory-finished trim.
6. Stainless steel, chrome plate, copper, bronze, galvanized surfaces, and similar finished materials.
7. Aluminum ductwork or aluminum faced insulation.
8. Aluminum louvers and trim.
9. Concrete tanks.
10. Plastic and FRP piping, equipment, and ductwork.

D. Do not coat over any code-required labels such as UL and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

E. Equipment manufacturers are responsible for surface preparation and coating of equipment, motors, and appurtenances. Equipment to be coated and coating system is identified in the equipment specification sections.

1.02 DEFINITIONS

A. Definitions as used in Coating Schedule included herein.

1. Coatings: Paint or heavy duty finishes for use on surfaces subject to interior and exterior exposure, submergence, high moisture, splash, or chemical environment, including primers, sealers, fillers, and intermediate and finished coats.
2. Submerged NP: Surfaces submerged in non-potable liquid plus 1 foot-6 inches above high liquid level.
3. First Coat: Field primer, factory primer, or shop primer. When only one coat is required, first coat is the finished coat.
4. Second, Third, or Intermediate Coats: Successive finished coats applied over first coat.
5. DFT: Dry film thickness (mils/coat).
6. sfpg: Square feet per gallon (per coat).

1.03 SUBMITTALS

A. Product Data:

1. Manufacturer's literature including application recommendations and generic makeup for each coating scheduled.
2. Factory or shop-applied primer manufacturer's literature including application recommendations and generic makeup shall be submitted with all material and equipment submittals. All primers shall conform to the requirements of this Section.

B. Miscellaneous:

1. Schedules:

a. Schedule of proposed coating systems.
b. Schedule of proposed coating systems shall contain all information as indicated in Coating Schedule included herein.

C. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. All coatings shall conform to OSHA requirements for allowable exposure to lead and other hazardous substances.

B. Applicator Qualifications:

1. Engage an experienced applicator who has successfully completed coating system applications similar in material and extent to those indicated.

C. Single-Source Responsibility:

1. Provide coating material produced by same manufacturer for each system.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to site in original containers with labels intact and seals unbroken.

B. Protect and heat or cool material storage location to maintain temperature ranges recommended by coating manufacturers, but not less than 55°F.

C. Avoid danger of fire. Oily rags and waste must be removed from buildings each night or kept in appropriate metal containers. Provide fire extinguishers of type recommended by coating manufacturers in areas of storage and where finishing is occurring. Allow no smoking or open containers of solvent.

D. Empty containers shall have labels canceled and clearly marked as to use.

1.06 PROJECT / SITE CONDITIONS

A. Environmental Requirements:

1. Dry-heat and ventilate areas to obtain conditions recommended by coating manufacturer.
2. Relative humidity conditions as specified by coating manufacturer shall be adhered to.

3. No unprotected, unheated exterior coating shall be undertaken when cold, damp, foggy, or rainy weather appears probable, nor when the temperature of the substrate is below 55°F, unless approved in writing by coating manufacturer.
4. Maintain manufacturer's environmental requirements until coating is fully cured.
5. Apply no coating in areas where dust is being generated.
6. Testing and disposal of any waste and coating shall be the responsibility of the Contractor.

B. Protection:

1. Drop cloths shall be provided in all areas where coating is done to fully protect other surfaces.
2. Remove hardware, accessories, plates, lighting fixtures, and similar items or provide protection by masking. Upon completion, replace items or remove protection and clean.

C. It is the intent of this Section that all ferrous metal items scheduled for coating be shop-primed. If items are not shop-primed, surfaces shall be prepared and coated in the field as specified.

D. Upon Substantial Completion, remaining unused material will become property of Owner. Seal material as required for storage, mark contents with color, type, location, and shelf life, and store on Site where required by Owner. Provide minimum of two gallons of each system component and color used.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Tnemec

B. Carboline

C. Sherwin-Williams (systems as recommended by manufacturer)

2.02 MATERIALS

A. Coatings shall meet surface burning characteristics as required by code and established by ASTM E84.

B. Coating products listed in the Coating Schedule, are set as a standard of quality. Coatings of substitute manufacturers shall meet or exceed the characteristics of the products listed as established by the flowing ASTM standards; B117, C307, C413, C579, C580, C868, D870, D1014, D1653, D2047, D2240, D2370, D2794, D3363, D4060, D4141, D4541, D4585, D4587, and G85.

C. If the Contractor wishes to offer a substitute to the products specified, the request for a substitute shall conform to the requirements of Section 01 61 00.

D. The Contractor and top coat coating manufacturer shall verify the compatibility of their products with the various primers used on shop primed materials and equipment.

2.03 COLORS

A. Color shall be formed of pigments free of lead, lead compounds, or other materials which might be affected by presence of hydrogen sulfide or other gases likely to be present at Site.

B. Colors shall be as selected by Owner. System color-coding shall be as specified in Section 40 05 05.

C. Coat access doors of electrical distribution panels and grilles to match color of adjacent wall or ceiling surfaces.

D. In areas scheduled for finishing, coat exposed piping, conduit, and ducts to match color of adjacent or near surfaces, except for color-coding.

E. In areas where existing surfaces are finished, coat new exposed piping, conduit, and ducts to match color of adjacent or near surfaces, except for color-coding.

F. Equipment Colors:

1. Equipment includes pumps, blowers, valves, flow meters, etc, and associated motors, structural supports, hangers, and attached portions of electrical conduit, and other associated components.
2. Color of non-submerged equipment, including equipment with a manufacturer-applied finish coat, shall be same color as piping equipment serves; see Section 40 05 05.
3. Color of submerged equipment can be manufacturer's standard color.

2.04 THINNING, MIXING, AND TINTING

A. Where thinning is necessary, only the products of the manufacturer furnishing the coating will be allowed. All such thinning shall be done in strict accordance with coating manufacturer's recommendations.

B. Mix in accordance with manufacturer's recommendations.

C. Each coat shall be slightly darker than preceding coat, unless otherwise noted. Tint undercoats similar to finish coat.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work.

B. Materials removed and replaced to correct defects due to Work placed on unsuitable surfaces shall be at Contractor's expense.

3.02 SURFACE PREPARATION

A. General:

1. All surfaces to be coated shall be prepared as specified herein and in accordance with coating manufacturer's recommendations. The object shall be to obtain a uniform, clean, and dry surface.
2. Quality of surface preparation described herein is considered a minimum. If coating manufacturer requires a higher degree of preparation, comply with coating manufacturer's recommendations.
3. Where surface dryness is questioned, test with dampness indicating instrument. Do not apply coatings over surfaces where moisture content exceeds that permitted by coating manufacturer.
4. Shop primed surfaces shall be scarified before applying top coats. Conform to top coat manufacturers recommendations.

5. If recoat time between application of primer and second coat or between top coats is exceeded, scarify surface before applying coatings. Conform to top coat manufacturers recommendations.
6. Workmanship for surface preparation shall conform to the following SSPC specifications:

    a. Solvent Clean: SP-1.
    b. Hand Tool Cleaning: SP-2.
    c. Power Tool Cleaning: SP-3.
    d. White Metal Blast Cleaning: SP-5.
    e. Commercial Blast Cleaning: SP-6.
    f. Brush-Off Blast Cleaning: SP-7.
    g. Pickling: SP-8.
    h. Near-White Blast Cleaning: SP-10.
    i. Power Tool Cleaning to Bare Metal: SP-11.
    j. Surface Preparation by Water Jetting: SP-12.
    k. Surface Preparation of Concrete: SP-13.

B. Ferrous Metal:

1. Ferrous metal primed in the shop shall have all rust, dust, scale, and other foreign substances removed by abrasive cleaning conforming to SSPC SP-10. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent new rusting.
2. Ferrous metal not primed in the shop shall be abrasive blast cleaned in the field prior to application of primer, pretreatment, or coating. Blast cleaning shall conform to SSPC SP-10 for submerged service. Blast cleaning shall conform to SSPC SP-6 for non-submerged service.
3. Prior to finish coating, primed areas that are damaged shall be cleaned and spot primed.

C. Galvanized Metal:

1. Where galvanized metal items are not submerged or buried, they shall be abrasive sweep blast cleaned and then solvent cleaned in accordance with SSPC SP-1.

D. Copper:

1. Where copper piping is not submerged or buried, it shall be lightly sanded and then solvent cleaned in accordance with SSPC SP-1.

E. Plastic and FRP:

1. Where scheduled to coated, plastic and FRP shall be lightly sanded and then solvent cleaned in accordance with SSPC SP-1.

F. Aluminum:

1. Where scheduled to coated, aluminum shall be lightly sanded and then solvent cleaned in accordance with SSPC SP-1.

3.03 APPLICATION

A. Surfaces shall be dry at time of application.

B. The minimum surface temperature shall be 55°F and rising.

C. Apply in strict accordance with manufacturer's recommendations by brush, roller, spray, or other application method. The number of coats and thickness required is the same regardless of application method.

D. Each coat shall be allowed to dry in accordance with manufacturer's requirements. Drying time shall be construed to mean "under normal conditions". Where conditions other than normal exist, because of weather or because of confined space, longer times will be necessary. Units shall not be put in service until coatings are thoroughly dry and cured.

E. Surfaces to be coated that will be inaccessible in the completed work shall receive the final coat before enclosure.

F. Coatings shall be applied to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable. Areas cut-in by brush prior to rolling shall have uniform appearance in comparison with adjoining surfaces.

G. Make edges of coating adjoining other materials or colors sharp and clean without overlapping.

H. Crevices and other hard-to-apply areas shall be back-rolled/back-brushed in conjunction with application of field applied prime coat or intermediate coat. This includes, but is not limited to: between pipe flanges, pipe flange/barrel joints, equipment fittings, and other narrow openings.

I. Manufacturer-Applied Coatings:

1. Repair abraded areas on factory-finished items in accordance with equipment manufacturer's recommendations.
2. Blend repaired areas into original finish.

3.04 FIELD QUALITY CONTROL

A. Examination of Work on Site by coating manufacturer's representative shall be performed when requested by Engineer.

B. Sampling of Materials:

1. Engineer reserves the right to select unopened containers of materials furnished for the Project and have the materials tested at an independent laboratory. Owner will pay for first tests.
2. Retests of rejected materials and tests of replacement materials shall be paid for by Contractor.
3. Remainder of contents of containers not required for testing will be returned to Contractor.

C. Coverage:

1. Before beginning Work, finish one complete room, space, surface, and item of each color scheme required, showing selected colors, finished texture, material, and workmanship. After approval, sample room, space, surface, and item shall serve as standard for similar Work.
2. If coverage is not acceptable to Engineer, Engineer reserves the right to require additional application of coating at no extra cost to Owner.

D. Work at Site, where coat of material is to be applied, shall be observed by Engineer after surface has been prepared and before application of specified prime coat and each succeeding coat, otherwise no credit for applied coat will be given and Contractor automatically assumes responsibility to recoat Work in question. Surfaces coated without such observation shall be

abrasive blast cleaned, reprepared, and recoated at no addition cost to Owner. Notify Engineer when surface preparation complete, coat applied, and when ready for inspection to comply with above.

3.05 FINAL TOUCH-UP AND CLEANING

A. Prior to Substantial completion, examine coated surfaces and retouch or refinish surfaces to leave in condition acceptable to Engineer.

B. Remove masking, coatings, and other material from floors, glass, and other surfaces not scheduled to be coated.

3.06 COATING SCHEDULE

A. Scheduled thickness or coverage rate is minimum as recommended by manufacturer. Manufacturer's recommendations shall be followed, but in no case shall the thickness or coverage rate be less than scheduled.

B. Coatings shall conform to the following schedule and coating manufacturer's recommendations. Examples of surfaces to be coated may not be all inclusive.

COATINGS SCHEDULE

System No.	Generic Type	Application	Tnemec	Carboline
7	Modified Aromatic Polyurethane - Polyamidoamine Epoxy	Ferrous Metal, Cast Iron, Ductile Iron / Submerged NP / Satin	First Coat – Series N69 Hi Build Epoxoline II @ 3 mils DFT, touch-up primer prior to second coat Second Coat – Series N69 Hi-Build Epoxoline II @ 5 mils DFT Third Coat – Series N69 Hi-Build Epoxoline II @ 5 mils DFT	First Coat – Carbomastic 15 @ 3 mils DFT, touch-up primer prior to second coat Second Coat – Carboguard 635 VOC @ 5 mils DFT Third Coat – Carboguard 635 VOC @ 5 mils DFT
8	Modified Aromatic Polyurethane - Polyamidoamine Epoxy	Ferrous Metal, Cast Iron, Ductile Iron / Interior Non-Submerged / Satin	First Coat – Series N69 Hi Build Epoxoline II @ 3 mils DFT, touch-up primer prior to second coat Second Coat – Series N69 Hi-Build Epoxoline II@ 5 mils DFT Third Coat – Series N69 Hi-Build Epoxoline II @ 5 mils DFT	First Coat – Carbomastic 15 @ 3 mils DFT, touch-up primer prior to second coat Second Coat – Carboguard 890 VOC @ 5 mils DFT Third Coat – Carboguard 890 VOC @ 5 DFT
9	Modified Aromatic Polyurethane - Polyamidoamine Epoxy – Aliphatic Acrylic Polyurethane	Ferrous Metal, Cast Iron, Ductile Iron / Exterior Non-Submerged / Gloss	First Coat – Series N69 Hi Build Epoxoline II @ 3 mils DFT, touch-up primer prior to second coat Second Coat – Series N69 @ 4-6 mils DFT Third Coat – Series 1094 @ 2-3 mils DFT	First Coat – Carbomastic 15 @ 3 mils DFT, touch-up primer prior to second coat Second Coat – Carboguard 890 VOC @ 5 mils DFT Third Coat – Carbothane 134 MC @ 3 mils DFT

System No.	Generic Type	Application	Tnemec	Carboline
11	Polyamide Epoxy – Aliphatic Acrylic Polyurethane	Doors, Frames, Motors and other Equipment with Non-Epoxy Primer / Exterior / Gloss	Lightly Hand Sand Solvent Clean SP-1 First Coat – Series 27-1255 FC Typoxy Beige @ 3 mils DFT Second Coat – Series 1094 Endura-Shield @ 3 mils DFT	Lightly Hand Sand Solvent Clean SP-1 First Coat – Carboguard 890 VOC @ 3 mils DFT Second Coat – Carbothane 134 MC @ 3 mils DFT
12	Polyamidoamine Epoxy	Galvanized Metal, Copper, PVC / Non-Submerged / Interior / Satin	First Coat – Series N69-1255 Hi-Build Epoxoline II Beige @ 2 mils DFT, touch-up primer prior to second coat Second Coat – Series N69 Hi-Build Epoxoline II @ 3 mils DFT Third Coat – Series N69 Hi-Build Epoxoline II @ 3 mils DFT	First Coat – Carboguard 890 VOC tan @ 2 mils DFT, touch-up primer prior to second coat Second Coat – Carboguard 890 VOC @ 3 mils DFT Third Coat – Carboguard 890 VOC @ 3 mils DFT
13	Polyamidoamine Epoxy – Aliphatic Acrylic Polyurethane	Galvanized Metal, Copper, PVC / Non-Submerged / Exterior / Gloss	First Coat – Series N69-1255 Hi-Build Epoxoline II Beige @ 2 mils DFT, touch-up primer prior to second coat Second Coat – Series N69 Hi-Build Epoxoline II @ 3 mils DFT Third Coat – Series 1094 Endura-Shield @ 3 mils DFT	First Coat – Carboguard 890 VOC tan @2 mils DFT, touch-up primer prior to second coat Second Coat – Carboguard 890 VOC @ 3 mils DFT Third Coat – Carbothane 134 MC @ 3 mils DFT
20	Polyamide Epoxy Coal Tar	Dissimilar Metal Protection / Semi-Gloss	Scarify the Surface, SP-1 First Coat – Series 46H-413 Hi-Build Tneme-Tar @ 20 mils DFT	Scarify the Surface, SP-1 First Coat – Bitumastic 300M @ 20 mils DFT

Foot Notes:

1. Tnemec:
   a. Series 49 may be substituted for Series N69 in lower VOC and high solids options.
2. Carboline:
   a. In states who have not adopted Ozone Transport Commission guidelines, Carboguard 890 can be used in place of Carboguard 890 VOC.
   b. In states who have not adopted Ozone Transport Commission guidelines, Carbothane 134 HG can be used in place of Carbothane 134 MC.

END OF SECTION

DIVISION 22

PLUMBING

This page intentionally left blank.

SECTION 22 00 05
PLUMBING SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes plumbing equipment and piping systems, including:

1. Sump Pump and associated discharge piping.

1.02 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. Acronyms:

1. NPT: National Pipe Thread
2. PLC: Programmable Logic Controller, refer to Division 40 for interface requirements
3. PVC: Polyvinyl Chloride
4. TEFC: Totally Enclosed Fan Cooled

B. Unit Abbreviations:

1. °F: Degrees Fahrenheit
2. GPM: Gallons per Minute
3. HP: Horsepower
4. kW: Kilowatts
5. PSI: Pounds per Square Inch
6. RPM: Revolutions per Minute

1.03 REFERENCES

A. Code References:

1. ADA: Americans with Disabilities Act

B. Standard References:

1. ANSI: American National Standards Institute
2. ASME: American Society of Mechanical Engineers
3. ASSE: American Society of Sanitary Engineering
4. ASTM: American Society for Testing and Materials
5. AWWA: American Water Works Association
6. CISPI: Cast Iron Soil Pipe Institute
7. CDA: Copper Development Association Incorporated
8. CSA: Canadian Standards Association
9. MSS: Manufacturers Standardization Society
10. PDI: Plumbing and Drainage Institute
11. UL: Underwriters Laboratories Incorporated

1.04 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data: Submit manufacturer's technical data for all fixtures, drain, valves and equipment. Include in submittal, specifications, capacity ratings, pump curves showing scheduled operating point clearly identified, dimensions, weights, materials, accessories furnished, and installation instructions.

C. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, construction details, rough-in elevations, methods of assembly of components, and field connection details.

D. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to equipment. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

E. Maintenance Data: Submit maintenance data and parts list for piece of scheduled equipment, accessory, and control. Include this data and product data in maintenance manual in accordance with requirements of Division 1.

F. Submit in accordance with Section 01 33 00.

G. Operation and Maintenance (O&M) Data:

1. Operating instructions and maintenance data for materials and products for inclusion in O&M Manual.
2. Manufacturer's written instructions for periodic tests of equipment in service.
3. Submit in accordance with Section 01 33 00.

H. Submit in accordance with Section 01 33 00.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Provide plumbing equipment, fixtures, insulation and piping from firms regularly engaged in manufacture of same types and sizes of equipment required, whose products have been in satisfactory use in similar service for not less then 3 years.

B. Plumbing Code Compliance: Comply with all applicable portions of building codes pertaining to plumbing materials, construction and installation of products.

1. Illinois Department of Public Health:

a. Part 890: Illinois Plumbing Code.

2. All local plumbing codes.

C. PDI Compliance: Comply with applicable PDI standards pertaining to products and installation of soil waste piping systems.

D. Manufacturer Qualifications: Firms experienced in manufacturing equipment of types and capacities indicated that have record of successful in-service performance.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment and system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is made safe from such

hazards.

B. Store equipment in clean, dry location.

1.07 MAINTENANCE

A. Extra Materials:

1. Furnish extra materials matching products installed, packaged with protective covering for storage, and identified with labels describing contents.

PART 2 – PRODUCTS

2.01 GENERAL

A. Where more than one type is indicated, selection is Contractor's option or compliance with governing regulations

B. Size system drain piping as shown or, if not shown, as required to properly drain piping systems, including valves and equipment.

C. Manufacturer's equipment used as basis of design for project is name indicated in Specifications for particular type of equipment or application contained in these contract documents. If no manufacturer listed, basis of design is industry standard indicated.

2.02 SUMP PUMP PIPING

A. Size 3 inch or smaller:

1. Polyvinyl Chloride (PVC) Pipe:

a. Pipe Weight: Schedule 80, ASTM D1785.
b. Fittings: PVC Plastic, Schedule 80, socket type, ASTM 2466.
c. Joints: Solvent cement joints in accordance with ASTM D2855.

2.03 VALVES

A. General:

1. Valves installed in insulated piping systems shall be furnished with extended stem as required to allow operation of valve without damage to or interference with insulation system.
2. Provide valves meeting the requirements of Section 40 05 53 and as indicated below:

a. Ball Valves PVC piping systems: Type V355.
b. Swing Check Valves: Type V260.

2.04 EQUIPMENT

A. Sump Pump (200-SP-0230):

1. Manufacturer:

a. Zoeller Pump Company, Model DX161
b. Or Equal

2. Performance: 20 gpm at 50 feet of water column head.
3. 1/2 hp, 230 Volt/single-phase explosion-proof motor.
4. Floor mount sump pump.
5. Oil filled motor.
6. Cast iron construction with stainless steel shaft.
7. Carbon-ceramic mechanical shaft seal.
8. Non-Clogging Vortex Impeller Design
9. Provide 25' electrical power cord.
10. 1 1/2-inch discharge
11. Automatic controls:

    a. Integral mechanical float switch which shall require no adjustment, nor require additional equipment for operation

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which piping and equipment is to be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 GENERAL

A. All work to conform to state and local plumbing codes.

B. Install equipment in accordance with manufacturer's installation instructions.

C. Trench, backfill and compact in accordance with Section 31 23 33.

D. Install pipe hangers, supports and anchors in accordance with local plumbing code and Section 40 05 07.

E. Provide pipe identification in accordance with Section 40 05 97.

F. Install wall pipes, sleeves and seals in accordance with Section 40 05 09.

G. Install valves in accordance with Section 40 05 53.

3.03 PIPING INSTALLATION

A. General:

1. Install pipe, tube and fittings in accordance with recognized industry practices, local plumbing code and ANSI B31.9 - Building Service Piping.
2. Piping installations shall achieve permanently leakproof piping systems capable of performing each indicated service without piping failure.
3. Install each pipe run with minimum joints and couplings.
4. Provide unions at each valve and equipment connection unless equipment connection includes a flanged or grooved joint connection.
5. Reduce sizes, where indicated, by use of reducing fittings.
6. Align piping accurately at connections, within 1/16 inch misalignment tolerance.
7. Where equipment connections differ from pipe sizes indicated on Drawings, route piping full size as indicated on drawings to unit including isolation valve and provide reducer as required at point of connection.
8. Non-metallic piping systems buried outside of the foundation of a structure shall be installed with tracer wire in accordance with Section 33 05 05.

B. Pipe Locations:

1. Locate piping runs, except otherwise indicated, vertically and horizontally (pitched to drain), and avoid diagonal runs wherever possible.
2. Orient horizontal runs parallel with walls, building column lines and other piping.
3. Locate runs, as shown or described by diagrams, plans, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and equipment.
4. Hold piping close to walls, overhead construction, columns and other structural and permanent enclosure elements of building; limit clearance to 1/2 inch where furring is shown for enclosure for concealment of piping, but allow for insulation thickness, if any.
5. Where possible, locate insulated piping for 1.0 inch clearance outside insulation.
6. Wherever possible in finished and occupied spaces, conceal piping from view by locating in column enclosures, hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
7. Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures unless unavoidable or indicated to do so.
8. Install drip pan under piping that must be run through electrical spaces.

C. Piping System Joints:

1. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.
2. Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of tube fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.
3. Weld pipe joints in accordance with ANSI B31.
4. Hubless Cast-Iron Joints - Comply with CISPI 310.
5. Plastic Pipe/Tube Joints - Comply with manufacturer's instructions and recommendations, and with applicable industry standards, ANSI/ASTM D 2235, and ANSI/ASTM F 402.

3.04 EQUIPMENT

A. General:

1. Install in accordance with manufacturer's written installation instructions and with local plumbing codes.
2. Verify locations and coordinate with architectural designs and other devices and equipment, as approved by Engineer before roughing-in connections.
3. Operation of fixtures shall be tested for proper operation and adjusted for field connections and service use, as required.

B. Sump Pumps:

1. Install in accordance with manufacturer's written installation instructions and local plumbing code.
2. Provide union, check valve and isolation valve on sump pump discharge piping.
3. Provide offsets and transitions as required to connect to existing discharge piping.
4. Set float switches at Manufacturer recommended elevation for pump off. Wire switches to control panel.

5. After piping complete, startup shall be by Plumber.

3.05 VALVES

A. Install valves in accordance with manufacturer's written installation instructions and local plumbing code.

B. Shutoff Valves - Install on inlet of each piece of plumbing equipment, and on inlet of each plumbing fixture, and elsewhere as indicated.

C. Drain Valves - Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each riser or drop in piping system, and elsewhere where indicated or required to completely drain domestic water piping system.

3.06 TESTING PIPING SYSTEMS

A. Test piping system in accordance with Section 40 05 10 and local plumbing code.

END OF SECTION

DIVISION 26

ELECTRICAL

This page intentionally left blank.

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

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Building wires and cables and associated splices, connectors, and terminations for wiring systems rated 600 volts and less.

1.02 DEFINITIONS

A. Underfloor Conduits.

1. Conduits run underground within perimeter of building walls under building floor. This may consist of 1 conduit, or several conduits grouped together.

B. Duct Bank Conduits

1. Conduits run underground outside perimeter of building walls. This may consist of 1 conduit, or several conduits grouped together.

C. Underground Conduits

1. Underground conduits are both underfloor conduits and duct bank conduits.

1.03 SUBMITTALS

A. Conductor testing results.

B. Submittals are not required if Contractor supplies materials or equipment as specified. If Contractor proposes substitutions to material or equipment submittals identified below are required.

1. Product data.
2. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Items provided under this Section shall be listed or labeled by Underwriters Laboratories, Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

B. Regulatory Requirements:

1. National Electrical Code (NEC): Components and installation shall comply with National Fire Protection Association (NFPA) 70.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire and cable according to National Electrical Manufacturers Association (NEMA) WC 26.

PART 2 – PRODUCTS

2.01 BUILDING WIRES AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as required to meet application and NEC requirements.

B. Wire and cable for 600 volts and below: Soft drawn, copper wire with 600 volt insulation.

1. Conductors:

a. Annealed, copper in accordance with American Society for Testing and Materials (ASTM) B33.
b. Stranding: Class B in accordance with ASTM B8.

2. Insulations and Coverings:

a. Conform to NEMA WC 70

C. Control Circuits:

1. Single conductor Type THHN/THWN (90 degrees Celsius): Above ground and underfloor conduits.
2. 14 AWG minimum size (unless otherwise noted).
3. Single conductor Type XHHW-2: Duct bank conduits.

D. Non-shielded Instrumentation, Graphic Indication, and Other Control Wiring Operating at Less Than 120 volt: 14 AWG except as otherwise indicated with same insulation as control circuits.

1. Single conductor Type THHW/THWN (90 degrees Celsius), above ground and underfloor conduits.
2. Single conductor Type XHHW-2: Duct bank conduits.

E. Shielded instrumentation and Resistance Temperature Detector (RTD) wiring, above ground and underfloor conduits:

1. Polyvinyl Chloride (PVC) insulation, tinned copper (19 by 29) stranded, 16 AWG, twisted pair or triplet cabled with aluminum mylar shielding, stranded, tinned, 18 AWG copper drain wire, and overall black FR-PVC, 90 degrees C, 600 volt jacket.
2. Multi-wire cable assembly: duct bank conduits.

F. Multi-Wire Control and Instrumentation Cable Assemblies:

1. Multi-conductor, color-coded cable with number and size of conductors indicated.
2. Where spare conductors are not indicated provide 10% spare conductors. One pair minimum.
3. Control and non-shielded instrumentation.

a. Bare soft stranded 14 or 12 AWG copper in accordance with ASTM B3.
b. Class B stranded in accordance with ASTM B8.
c. Type XLPE insulation also meeting requirements of NEMA WC-57.
d. Color coded in accordance with ICEA Method 1, Table E-2.
e. Cabled with suitable fillers.

f. Overall black FR-PVC, 90 degrees Celsius, 600 volt sunlight resistant jacket.
g. UL listed for installation in cable trays in accordance with NEC Art. 336, Class I, Division 2 hazardous areas and in accordance with NEC 340 and for direct burial.

4. Shielded Instrumentation:

a. Bare soft stranded 16 AWG copper in accordance with ASTM B3.
b. Class B stranded tinned copper in accordance with ASTM B8.
c. PVC with nylon armor insulation.
d. Twisted pairs color coded in accordance with ICEA Method 1, Table E-2, and numbered.
e. Individual and overall aluminum mylar shields and seven strand tinned copper drain wires.
f. Overall black FR-PVC 90 degrees C 600 volt sunlight resistant jacket.
g. UL listed for installation in cable trays in accordance with NEC 336, Class I, Division 2 hazardous areas, and in accordance with NEC 340 and for direct burial.

2.02 CONNECTORS AND SPLICES

A. UL-listed factory-fabricated wiring connectors of size, ampacity rating, material, and type and class for application and for service indicated.

B. Select to comply with Project's installation requirements and as required to meet application.

C. Conductors 10 AWG and Smaller: 3M Electric Products, Skotchlok, or equal pre insulated spring connector. Comply with manufacturer's packaging requirements for number, size, and combination of conductors.

D. Conductors 8 AWG and Larger: Bronze 2-bolt type connectors with spacer.

E. Splices: Burndy Or Equal.

2.03 TERMINATIONS

A. Power Conductors: Compression crimp type or mechanical lugs.

B. Control and Instrumentation Conductors: Compression crimp type fork tongue, insulated support type lugs on terminal strips. Do not splice.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions and National Electrical Contractors Association (NECA) "Standard of Installation".

B. Run wire and cable in conduit unless otherwise indicated on Drawings. Pull conductors into raceway simultaneously where more than 1 is being installed in same raceway.

1. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation.
2. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
3. Do not draw conductor into conduits until building is enclosed, watertight, and work causing cable damage has been completed.

C. Install cable supports for vertical feeders in accordance with NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.

D. For panelboards, cabinets, wireways, switches, and equipment assemblies, neatly form, train, and tie cables in individual circuits.

E. Seal cable and wire entering building from underground between wire and conduit, where cable exits conduit, with non-hardening approved compound.

F. Install wire and cables in separate raceway systems as follows:

1. ac Control.
2. dc control.
3. Shielded instrumentation.
4. Intrinsically Safe.
5. Emergency system.
6. As required by NEC.

G. Where power cables, instrument/signal cables, and intrinsically safe cables enter and pass through same manhole, handhole, or distribution box, steel barrier or separate raceways shall continue through box manhole, handhole to isolate the cables from each other to avoid magnetic and physical interaction between power cables, instrumentation cables, and intrinsically safe cables. In manholes and handholes, provide Type C raceway outlet body with 3/16 inch holes drilled in bottom for drainage.

H. Do not run instrumentation cables into control cabinets or Motor Control Center (MCC) unless cables are terminated in cabinet or MCC.

I. Wiring at Outlets: Install with at least 12 inch (300 millimeter) of slack conductor at each outlet.

J. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL 486A.

K. Drawings do not designate number of conductors in conduit nor does location of branch circuits and switch legs indicated on Drawings designate location or routing. Route branch circuits and switch legs as dictated by construction and these Specifications.

3.02 TERMINATIONS AND SPLICES

A. Terminate control, instrumentation, and communication cables on terminal strips in separate terminal cabinets or as shown on Drawings.

B. Power Cable Splices (no splices in cables unless approved by Engineer):

1. Provide continuous lengths of cable without splices in motor circuits and feeders unless otherwise noted. Splices may be installed in motor circuits and feeders with prior approval by Engineer.
2. Install splices and taps that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
3. Use splice and tap connectors that are compatible with conductor material.
4. Where pre-insulated spring connectors are used for equipment connections, tape connector to wire to prevent loosening under vibration.

5. Each tap, joint or splice in conductors 8 AWG and larger shall be taped with two half-lap layers of vinyl plastic electrical tape and finish wrap of color coding tape where required by code.
6. Cable splices shall be made only in manholes, handholes, wireways, distribution boxes, and junction boxes.

C. Power Cable Terminations:

1. Termination of wires with full compression type or mechanical lugs installed with appropriate hand or hydraulic tool. Use proper dies to achieve the desired compression.
2. For screw type terminal blocks, terminations for stranded conductors shall be made with T & B lock-on fork connector with insulated sleeves.
3. Motor lead conductor terminations shall be made with a T & B or approved equal, full compression lug, full ring type, bolted, and taped as required. For connecting motor lead to service wiring fasten full ring lugs together with cadmium plated steel cap screws, and cover with a minimum of 2 layers 1/2 lap, 3M Scotch No. 33 tape; option: T & B "Motor Stub Splice Insulator".

3.03 CONTROL CIRCUITS

A. Control circuit home runs from same area for the same system returning to same panel, (e.g., Local Controls Panel (LCP), Control Station (CS), etc.,) may be combined provided signal and voltage types are not mixed.

B. Following types of home runs shall not be combined with other types:

1. 4-20 milliamp direct current analog; Type 2 shielded cable.
2. 24 volts direct current discrete (e.g., field or LCP powered dry contacts).

3.04 BRANCH CIRCUITS

A. Motor branch circuits and branch circuits for 3 phase circuits shall not be combined.

B. Branch circuits for single phase equipment devices from same Lighting Panel (LP) or Power Panel (PP) may be combined provided that such combining does not result in having to derate ampacity of conductors.

3.05 FEEDERS:

A. Extend feeders at full capacity from origin to termination.

B. Each conduit raceway shall contain only those conductors constituting single feeder circuit unless otherwise indicated.

C. Where multiple raceways are used for single feeder, each raceway shall contain conductor of each phase and neutral if used.

D. Where feeder conductors are run in parallel, conductors shall be of same length, material, circular-mil area, insulation type, and terminated in same manner.

E. Where parallel feeder conductors run in separate raceways, raceways shall have same physical characteristics.

F. Confine feeders to insulated portions of building unless otherwise shown.

G. On network systems, neutral shall be run with phase wires. Unbalanced neutral current shall not exceed normal or derated conductor capacity.

3.06 MOTORS AND EQUIPMENT WIRING

A. Provide motor circuits in accordance with diagrams and schedules on Drawings and code requirements, from source of supply to associated motor starter and starter to motor terminal box, including necessary and required intermediate connections.

B. Do not include associated control conductors in same conduit with power conductors, unless otherwise indicated.

C. Provide branch circuits to conform with NEC requirements and nameplate ratings. Contractor responsible for verification of ratings of motors and installing proper branch circuits.

3.07 COLOR CODING

A. Conductors for Lighting and Power Wiring:

Phase	208/120 volts	480/277 volts
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Travelers	Pink	Purple
Neutral	White	White with non-green stripe
Ground	Green	Green

B. Colored pressure-sensitive plastic tape.

1. Apply in half overlapping turns for minimum of three inches at terminal points, and in junction boxes, pull boxes, troughs, manholes, and handholes.
2. 3/4 inch wide with colors as specified.
3. Apply last two laps of tape with no tension to prevent possible unwinding.
4. Where cable markings are covered by tape, apply tags to cable stating size and insulation type.

C. Color code for insulated power system wiring shall be in accordance with NEC.

D. Color code for intrinsically safe systems shall be light blue.

3.08 CONTROL, COMMUNICATION AND SIGNAL SYSTEM IDENTIFICATION

A. Install permanent wire marker at termination.

B. Identifying numbers and letters on wire markers shall correspond to those on terminal blocks or wiring diagrams used for installing systems.

C. Plastic sleeve or self adhesive vinyl cloth.

D. In each manhole and handhole, install embossed brass tags to identify system served and function.

E. Comply with Section 26 05 53.

3.09 FEEDER IDENTIFICATION

A. Manholes, handholes, pullboxes, and junction boxes, install metal tags on circuit cables and wires to clearly designate circuit identification and voltage.

B. Provide tags of embossed brass type, in manholes and handholes showing cable type and voltage rating. Attach tags to cables with slip-free plastic cable lacing units.

C. Comply with Section 26 05 53.

3.10 DIRECT BURIAL

A. Direct bury cables only when indicated on Drawings.

B. Trench and backfill in accordance with Section 31 23 33.

C. Top of cable shall be minimum 24 inch below final grade with 3-inch sand fill above and below cables.

D. Roads and Paving:

1. Where direct burial cable crosses under roads or paving, install cable in galvanized steel conduit sleeves a minimum of 30 inch below surface.
2. If paving is in-place when cable is to be installed, wrought iron pipe or galvanized steel conduit may be driven under paving.
3. Extend conduit or pipe 1 foot beyond each side of paving unless otherwise shown on Drawings.

E. Provide horizontal slack in cables for contraction during cold weather.

F. Install cable in continuous lengths without splices, unless otherwise shown on Drawings.

G. Submersible type connections and terminations designed for cables being installed, when indicated.

H. Install underground line marking tape along and above buried cable in accordance with Section 26 05 53.

1. Bury 1 foot below surface before final backfilling.

3.11 FIELD QUALITY CONTROL

A. Visual and Mechanical Inspection:

1. Inspect cables for physical damage and proper connection in accordance with single-line diagram.
2. Test cable mechanical connections to manufacturer's recommended values using calibrated torque wrench.
3. Check cable color coding with specifications and NEC standards.

B. Electrical Tests:

1. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 1000 volts direct current for 1 minute.
2. Perform continuity test to insure proper cable connection.
3. Perform tests on the following conductors:

a. Incoming service conductors.
b. Power transformer conductors.
c. Generator feeder conductors.

C. Test Values:

1. Evaluation results by comparison with cables of same length and type. Investigate any value less than 50 megohms.
2. Submit reports summarizing the results of the testing.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1– GENERAL

1.01 SUMMARY

A. Section Includes:

1. Grounding of electrical systems and equipment and basic requirements for grounding for protection of life, equipment, circuits, and systems.
2. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.02 SUBMITTALS

A. Report of Field Tests and Observations: Certified by Contractor.

B. Test Results:

1. Certified field tests and observation reports indicating and interpreting test reports for compliance with performance requirements.

C. Submit in accordance with Section 01 33 00.

1.03 QUALITY ASSURANCE

A. Comply with Underwriters Laboratories, Inc (UL) 467.

B. Items provided under this section shall be listed or labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

C. Regulatory Requirements:

1. NEC: Components and installation shall comply with National Fire Protection Association (NFPA) 70.

PART 2– PRODUCTS

2.01 GROUNDING AND BONDING PRODUCTS

A. Governing Requirements: Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, more stringent requirements and greater size, rating, and quantity indications govern.

2.02 WIRE AND CABLE GROUNDING CONDUCTORS

A. Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.

1. Material: Copper.

B. Equipment Grounding Conductors: Insulated with green color insulation.

C. Grounding-Electrode Conductors: Stranded cable.

D. Underground Conductors: Bare, tinned, stranded, except as otherwise indicated.

E. Bare Copper Conductors:

1. Solid Conductors: American Society for Testing and Materials (ASTM) B3.
2. Assembly of Stranded Conductors: ASTM B8.
3. Tinned Conductors: ASTM B33.

2.03 MISCELLANEOUS CONDUCTORS

A. Grounding Bus: Bare, annealed-copper bars of rectangular cross section.

B. Braided Bonding Jumpers: Copper tape, braided No. 3/0 American Wire Gauge (AWG) bare copper wire, terminated with copper ferrules.

C. Bonding Straps: Soft copper, 0.05 inch (1 millimeter) thick and 2 inches (50 millimeters) wide, except as indicated.

2.04 CONNECTOR PRODUCTS

A. Pressure Connectors: High-conductivity-plated units.

B. Bolted Clamps: Heavy-duty type.

C. Exothermic-Welded Connections: Provided in kit form and selected per manufacturer's written instructions for specific types, sizes, and combinations of conductors and connected items.

2.05 GROUNDING ELECTRODES AND TEST WELLS

A. Grounding Rods: Copper-clad steel.

1. Size: 3/4 inch by 120 inches (19 by 3000 millimeters).

B. Test Wells: Fabricate from 30 inch long, square-cut section of 12-inch diameter, Schedule 80, Polyvinyl Chloride (PVC) pipe with end bell and cast iron cover as detailed on Drawings. Harger 362PS30CILS80 or approved equal.

PART 3– EXECUTION

3.01 APPLICATION

A. Equipment Grounding Conductors: Comply with NEC Article 250 for types, sizes, and quantities of equipment grounding conductors, except where specific types, larger sizes, or more conductors than required by NEC are indicated.

1. Install equipment grounding conductor with circuit conductors for items below in addition to those required by Code:

a. Feeders and branch circuits.
b. Receptacle circuits.

c. Single-phase motor or appliance branch circuits.
d. Three-phase motor or appliance branch circuits.

B. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding-electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on 1/4 by 2 by 12 inches (6 by 50 by 300 millimeter) grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

C. Separately Derived Systems: Where NEC requires grounding, ground according to NEC Paragraph 250-30.

D. Piping Systems and Other Equipment: Comply with NEC Article 250 for bonding requirements.

3.02 INSTALLATION

A. Ground electrical systems and equipment according to NEC requirements, except where Drawings or Specifications exceed NEC requirements.

B. Grounding Rods: Locate minimum of 1 rod length from each other and at least same distance from any other grounding electrode.

1. Drive until tops are 6 inches below finished floor or final grade, except as otherwise indicated.
2. Interconnect with grounding-electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make these connections without damaging copper coating or exposing steel.

C. Grounding Conductors: Route along shortest and straightest paths possible, except as otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

D. Underground Grounding Conductors: Use bare tinned copper wire. Bury at least 24 inches (600 millimeters) below grade.

E. Metal Water Service Pipe: Provide insulated copper grounding conductors, sized as indicated, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding-clamp connectors. Where dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Do not install grounding jumper across dielectric fittings. Bond grounding-conductor conduit to conductor at each end.

F. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding-clamp connectors.

G. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.

H. Test Wells: One for each driven grounding electrode system, except as otherwise indicated. Set top of well flush with finished grade or floor.

3.03 CONNECTIONS

A. Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells. Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding-Wire Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: Where metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors, except as otherwise indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and grounding rods.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A and UL 486B.

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make visible indication that connector has been adequately compressed on grounding conductor.

H. Moisture Protection: Where insulated grounding conductors are connected to grounding rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.04 FIELD QUALITY CONTROL

A. Testing:

1. Subject completed grounding system to megger test at each location where maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.

a. Measure ground resistance not less than 2 full days after last trace of precipitation, and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by 2 point method according to Section 9.03 of Institute of Electrical And Electronics Engineers (IEEE) 81.

2. Maximum grounding to resistance values are as follows:

   a. Equipment Rated 500 kilovolt amps (kVA) and Less: 10 ohms.
   b. Equipment Rated 500 to 1000 kVA: 5 ohms.
   c. Equipment Rated More than 1000 kVA: 3 ohms.
   d. Unfenced Substations and Pad-Mounted Equipment: 5 ohms.
   e. Manhole Grounds: 10 ohms.

3. Excessive Ground Resistance: Where resistance to ground exceeds specified values, notify ENGINEER promptly and include recommendations to reduce ground resistance and to accomplish recommended work.

4. Report: Prepare certified test reports, of ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

3.05 RESTORATION

A. Restore disturbed surfaces in accordance with Section 32 92 00.

END OF SECTION

This page intentionally left blank.

SECTION 26 05 29
HANGERS AND SUPPORTING FOR ELECTRICAL SYSTEMS

PART 1– GENERAL

1.01 SUMMARY

A. Section Includes:

1. Supports from building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

1.02 QUALITY ASSURANCE

A. Items provided under this section shall be listed and labeled by Underwriters Laboratories, Inc. (UL) or other Nationally Recognized Testing laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

B. Regulatory requirements:

1. NEC: Components and installation shall comply with National Fire Protection Association (NFPA) 70.

PART 2– PRODUCTS

2.01 MATERIALS

A. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which hangers and supports are to be installed. Refer to Material Schedule on Drawings for material type to be utilized within each Exposure type.
B. As otherwise indicated and as required by NEC.

2.02 MANUFACTURED SUPPORTING DEVICES

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.

B. Fasteners: Types, materials, and construction to match support materials as indicated in the environmental schedule.

C. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

D. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers.

E. U-Channel Systems: Channels, with 9/16-inch diameter holes, at minimum of 8 inch on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of same manufacture.

2.03 FABRICATED SUPPORTING DEVICES

A. Shop- or field-fabricate supports or manufacture supports assembled from U-channel components.

B. Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports. Comply with Section 05 50 00.

C. Pipe Sleeves: Provide pipe sleeves of one of following:

1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from following gage metal for sleeve diameter noted:

a. 3 inch and smaller: 20 gauge
b. 4 inch to 6 inch: 16 gauge
c. Over 6 inch: 14 gauge

2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.
3. Plastic Pipe: Fabricate from Schedule 80 PVC plastic pipe.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with structural system and with other electrical installation. Coordinate with light fixtures to ensure hangers and supports are not mounted lower or below light fixtures causing shadows.

C. Raceway Supports: Comply with NEC and following requirements:

1. Conform to manufacturer's recommendations for selection and installation of supports.
2. Strength of each support shall be adequate to carry present and future load multiplied by safety factor of at least four. Where this determination results in safety allowance of less than 200 pounds, provide additional strength until there is minimum of 200 pounds safety allowance in strength of each support.
3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
4. Support parallel runs of horizontal raceways together on trapeze-type hangers.
5. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1 inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4 inch diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.
6. In vertical runs, arrange support so load produced by weight of raceway and enclosed conductors is carried entirely by conduit supports with no weight load on raceway terminals.

D. Vertical Conductor Supports: Install simultaneously with installation of conductors.

E. Miscellaneous Supports: Support miscellaneous electrical components as required to produce same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

F. Sleeves: Install in concrete slabs and walls and other fire-rated floors and walls for raceways and cable installations. For sleeves through fire rated-wall or floor construction, apply UL listed firestopping sealant in gaps between sleeves and enclosed conduits and cables.

G. Conduit Seals: Install seals for conduit penetrations of slabs below grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal.

H. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to building structure, including but not limited to conduits, raceways, cables, cable trays, busways, cabinets, panelboards, transformers, boxes, disconnect switches, and control components in accordance with following:

1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Threaded studs driven by powder charge and provided with lock washers and nuts may be used instead of expansion bolts and machine or wood screws. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.
2. Holes cut in concrete shall not cut main reinforcing bars. Fill holes that are not used.
3. Load applied to any fastener shall not exceed 25% of proof test load. Use vibration- and shock- resistant fasteners for attachments to concrete slabs.

END OF SECTION

This page intentionally left blank.

SECTION 26 05 33.13
CABINETS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Outlet and device boxes.
2. Pull and junction boxes.
3. Floor boxes and service fittings.
4. Cabinets.
5. Hinged door enclosures.
6. Boxes and fittings for hazardous locations.

B. Conduit-body-type electrical enclosures and wiring fittings are specified in Section 26 05 33.16.

1.02 DEFINITIONS

A. Cabinets: Enclosure designed either for surface or for flush mounting and having frame, or trim in which door or doors may be mounted.

B. Device Box: Outlet box designed to house receptacle device or wiring box designed to house switch.

C. Enclosure: Box, case, cabinet, or housing for electrical wiring or components.

D. Hinged Door Enclosure: Enclosure designed for surface mounting and having swinging doors or covers secured directly to and telescoping with walls of box.

E. Outlet Box: Wiring enclosure where current is taken from wiring system to supply utilization equipment.

F. Wiring Box: Enclosure designed to provide access to wiring systems or for mounting of indicating devices or of switches for controlling electrical circuits.

1.03 SUBMITTALS

A. Product Data: Submit for cabinets and enclosures with classification higher than National Electrical Manufacturers Association (NEMA) 1.

B. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Items provided under this section shall be listed or labeled by Underwriters Laboratories, Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

B. Regulatory Requirements:

1. NEC: Components and installation shall comply with National Fire Protection Association (NFPA 70).

PART 2 – PRODUCTS

2.01 CABINETS, BOXES, AND FITTINGS, GENERAL

A. Electrical Cabinets, Boxes, and Fittings: Of indicated types, sizes, and NEMA enclosure classes. Where not indicated, provide units of types, sizes, and classes appropriate for use and location. Provide items complete with covers and accessories required for intended use. Provide gaskets for units in damp or wet locations.

2.02 MISCELLANEOUS MATERIALS AND FINISHES

A. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.

B. Fasteners for Exterior or Wet Locations: Stainless steel screws and hardware.

C. Fittings for Boxes, Cabinets, and Enclosures: Conform to UL 514B. Malleable iron or zinc plated steel for conduit hubs, bushings and box connectors.

D. Finishes:

1. Exterior Finish: Galvanized or Gray baked enamel for items exposed in finished locations except as otherwise indicated.
2. Interior Finish: Where indicated, white baked enamel.

2.03 METAL OUTLET, DEVICE, AND SMALL WIRING BOXES

A. General:

1. Conform to UL 514A and UL 514B.
2. Boxes shall be of type, shape, size, and depth to suit each location and application.

B. Steel Boxes: Conform to NEMA OS 1. Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.

C. Galvanized Cast-Iron Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices and closure plugs.

2.04 PULL AND JUNCTION BOXES

A. General: Comply with UL 50 for boxes over 100 cubic inch volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.

B. Galvanized Steel Boxes: Flat rolled, code gauge, sheet steel with welded seams. Where necessary to provide rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be gasketed.

C. Stainless-Steel Boxes: Fabricate of stainless steel conforming to Type 316 of American Society for Testing and Materials (ASTM) A167. Where necessary to provide rigid assembly, construct with internal structural stainless steel bracing. Cover shall be gasketed.

D. Boxes Approved for Classified Locations: Cast metal or cast nonmetallic boxes conforming to UL 886 listed and labeled for use in specific location, classification, and with specific hazardous material encountered. Conduit entrances shall be integral threaded type. When located outdoors or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.

2.05 STEEL ENCLOSURES WITH HINGED DOORS

A. Comply with UL 50 and NEMA ICS 6.

B. Construction:

1. Sheet steel, 16 gauge, minimum, with continuous welded seams. NEMA class as indicated; arranged for surface mounting.

C. Doors: Hinged directly to cabinet and removable, with approximately 3/4 inch flange around each edge, shaped to cover edge of box. Provide handle operated, key locking latch. Individual door width shall be no greater than 24 inch. Provide multiple doors where required.

D. Mounting Panel: Provide painted removable internal mounting panel for component installation.

E. Enclosure: NEMA 12 except as otherwise indicated. Where door gasketing is required, provide neoprene gasket attached with oil-resistant adhesive, and held in place with steel retaining strips. For enclosures of class higher than NEMA 1, use hubbed raceway entrances.

2.06 TERMINAL STRIPS

A. Manufacturers:

1. Square D.
2. Buchanan.
3. Or equal.

B. Channel mount snap-on type.

C. Individual gangable with nylon bases.

D. Solderless box lug type rated at 600 volts to accommodate No. 22 to 8 American Wire Gauge (AWG) wire or as otherwise indicated.

E. Provide 50% spare terminals.

PART 3 – EXECUTION

3.01 INSTALLATION, GENERAL

A. Locations: Install items where indicated and where required to suit code requirements and installation conditions.

B. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.

C. Support and fasten items in accordance with Section 26 05 29.

D. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated.

E. Remove sharp edges where they may come in contact with wiring or personnel.

3.02 APPLICATIONS

A. Hinged Door Enclosures:

1. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which hinged door enclosure is to be installed. Refer to Material Schedule on Drawings for material and NEMA enclosure type to be utilized within each Exposure type.
2. NEMA 7 in Class I hazardous classified locations. When located in exterior locations or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.
3. NEMA 9 in Class II hazardous classified locations. When located in exterior locations or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.
4. As otherwise indicated and as required by NEC.

B. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types for each location in conformance with following requirements unless otherwise noted:

1. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which box is to be installed. Refer to Material Schedule on Drawings for material and NEMA enclosure type to be utilized within each Exposure type.
2. NEMA 7 in Class I hazardous classified locations. When located in exterior locations or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.
3. NEMA 9 in Class II hazardous classified locations. When located in exterior locations or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.
4. Metal Door Jambs: Narrow partition boxes with internal ears.
5. As otherwise indicated and as required by NEC.

C. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types for each location in conformance with following requirements unless otherwise noted:

1. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which box is to be installed. Refer to Material Schedule on Drawings for material and NEMA enclosure type to be utilized within each Exposure type.
2. NEMA 7 in Class I hazardous classified locations. When located in exterior locations or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.
3. NEMA 9 in Class II hazardous classified locations. When located in exterior locations or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.
4. As otherwise indicated and as required by NEC

3.03 INSTALLATION OF OUTLET BOXES

A. Outlets at Windows and Doors: Locate close to window or door trim.

B. Column and Pilaster Locations: Locate outlet boxes for switches and receptacles on columns or pilasters so centers of columns are clear for future installation of partitions.

C. Locations in Special Finish Materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install boxes without plaster rings. Saw cut recesses for outlet boxes in exposed masonry walls.

D. Gasketed Boxes: At following locations use cast metal, threaded hub type boxes with gasketed weatherproof covers:

1. Exterior locations.
2. Where surface mounted on unfinished walls, columns or pilasters. (Cover gaskets may be omitted in dry locations).
3. Where exposed to moisture laden atmosphere.
4. Where indicated.

E. Mounting: Mount outlet boxes for switches with long axis vertical or as indicated. Mount boxes for receptacles vertically. Gang boxes shall be mounted with long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on side opposite hinges and close to door trim, even though electrical floor plans may show them on hinge side.

F. Ceiling Outlets: For fixtures, where wiring is concealed, use outlet boxes 4 inch sq by 1-1/2 inch deep, minimum with raised plaster or tile cover. Provide 3/8 inch fixture stud.

G. Cover Plates for Surface Boxes: Use plates sized to box front without overlap.

H. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed.

I. Concrete Boxes: Use extra deep boxes to permit side conduit entrance without interfering with reinforcing, but do not use such boxes with over 6 inch depth.

J. Secure boxes rigidly to substrate upon which being mounted or solidly embed boxes in concrete or masonry. Do not support from conduit, mechanical ductwork or piping.

K. Set boxes in concealed conduit runs, flush with wall surfaces, with or without covers as required.

L. Do not install boxes back to back or through wall. Offset outlet boxes on opposite sides of wall minimum 12 inch

M. Set outlet boxes parallel to construction, securely mounted and adjusted to set true and flush with finished surface.

N. Do not burn holes, use knockout punches or saw.

O. Use handy boxes only where specifically indicated.

P. Provide outlet box divider barriers between 277/480 volt and 120/240 volt devices as required per NEC.

Q. Where emergency switches occur adjacent to normal light switches, install in separate boxes in accordance with NEC and device plate color coding separation.

3.04 OUTLET BOX LOCATIONS

A. Locate flush mounted wall boxes in corner of nearest brick or block to keep cutting to minimum.

B. Location of outlets and equipment as shown on Drawings is approximate and exact location to be verified and shall be determined by:

1. Construction or code requirements.
2. Conflict with equipment or other trades.

3. Equipment manufacturer's drawings.

C. Minor modification in location of outlets and equipment considered incidental up to distance of 10 feet with no additional compensation, provided necessary instructions given prior to roughing in of outlet.

D. Mounting heights for devices and equipment to be measured from finished floor to centerline of device and unless otherwise noted on Drawings as follows.

1. Switches: 48 inch above floor.
2. Alternating Current Receptacles and Telephone Outlets: 15 inch above floor or 6 inch above counters, counter backsplashes, and baseboard radiators in finished areas; 48 inch above floor in unfinished areas.
3. Wall Bracket Lighting Fixtures: 8 inch above mirrors or 6 feet 6 inch above floor.
4. Pushbuttons: 48 inch above floor.
5. Motor Starters and Disconnect Switches: 60 inch above floor
6. Thermostats: 60 inch above floor.
7. Bells and Horns: 8 feet 0 inch above floor.
8. Clocks: 8 feet 0 inch above floor.

3.05 INSTALLATION OF PULL AND JUNCTION BOXES

A. Box Selection: For boxes in main feeder conduit runs, use sizes not smaller than 8 inch sq by 4 inch deep. Do not exceed 6 entering and 6 leaving raceways in single box. Quantities of conductors (including equipment grounding conductors) in pull or junction box shall not exceed following:

Size of Largest Conductors in Box	Maximum No. of Conductors in Box
No. 4/0 AWG	30
250 Kcmil	20
500 Kcmil	15
Over 500 Kcmil	10

1. Cable Supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30 inch inside boxes.
2. Mount pull boxes in inaccessible ceilings with covers flush with finished ceiling.
3. Size: Provide pull and junction boxes for telephone, signal, instrumentation, control, and other systems at least 50% larger than would be required by the NEC for boxes smaller than 24 inch by 24 inch, or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.

3.06 INSTALLATION OF CABINETS AND HINGED DOOR ENCLOSURES

A. Mount with fronts straight and plumb.

B. Install with tops 78 inch above floor.

C. Set cabinets in finished spaces flush with walls.

D. Terminate wires and cables on terminal strips.

3.07 GROUNDING

A. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes grounding conductor, provide grounding terminal in interior of cabinet, box or enclosure.

3.08 CLEANING AND FINISH REPAIR

A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks.

B. Galvanized Finish: Repair damage using zinc-rich paint recommended by manufacturer.

C. Painted Finish: Repair damage using matching corrosion inhibiting touch-up coating.

END OF SECTION

This page intentionally left blank.

SECTION 26 05 33.16
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1– GENERAL

1.01 SUMMARY

A. Section includes:

1. Raceways:

a. Polyvinyl chloride (PVC) externally coated galvanized rigid steel conduit (CGRS).
b. Liquidtight flexible metal conduit (LFMC).
c. Hazardous Flexible Metal Conduit.
d. Rigid nonmetallic polyvinyl chloride conduit (PVC).
e. Reinforced Thermosetting Resin Conduit (RTRC)(Fiberglass Conduit)
f. Wireway (WW).

1.02 DEFINITIONS

A. Duct Bank Conduits

1. Conduits which run under ground outside perimeter of building walls. This may consist of one conduit, or several conduits grouped together.

B. Underground Conduits

1. Underground conduits are both underfloor conduits and duct bank conduits.

1.03 SUBMITTALS

A. Submittals are not required if Contractor supplies materials or equipment as specified. If Contractor proposes substitutions to material or equipment submittals identified below are required.

1. Product data.
2. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Items provided under this section shall be listed or labeled by Underwriters Laboratories, Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

B. Regulatory Requirements:

1. NEC: Components and installation shall comply with National Fire Protection Association (NFPA) 70.

C. Comply with National Electrical Contractors Association (NECA) "Standard of Installation."

PART 2 – PRODUCTS

2.01 METAL CONDUIT

A. Plastic-Coated Steel Conduit and Fittings: National Electrical Manufacturers Association (NEMA) RN 1 and ETL Verified Polyvinyl Chloride-001 Labeled.

B. Liquidtight Flexible Metal Conduit: Flexible steel conduit with Polyvinyl Chloride (PVC) jacket.

C. Hazardous Flexible Metal Conduit: Stainless steel braid.

2.02 NONMETALLIC CONDUIT

A. Rigid Nonmetallic Polyvinyl Chloride (PVC) Conduit: NEMA TC 2, PVC Chloride

1. Concrete Encased: Schedule 40.
2. Direct Buried: Schedule 80.

B. PVC Conduit Fittings: NEMA TC 3; match to conduit type and material.

2.03 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)(fiberglass conduit)

A. Manufacturer: Champion Fiberglass or equal.

B. Manufacturing:

1. Single circuit filament winding process.
2. E-glass grade “A” roving.
3. Carbon black ultraviolet inhibitor. Conduit and elbows shall be black in color.
4. Internal conduit and elbows walls shall be smooth and all fibers embedded in the epoxy.

C. Mechanical Characteristics:

1. ASTM D2105: Tensile strength, axial, 11,000 psi.
2. ASTM D695: Compressive strength, axial, 12,000 psi.
3. API 15LR: Glass content, 65-75%.
4. ASTM D2583: Barcol Hardness, 52-56.
5. ASTM D2444: Impact resistance.
6. ASTM D2412: Stiffness at 5% deflection.

D. UL Listed:

1. UL 2515 Above Ground Standard
2. UL 2420 Below Ground Standard.

2.04 FITTINGS

A. Fittings and conduit bodies for steel conduits:

1. Steel or malleable iron, zinc galvanized or cadmium plated.
2. Do not use set screw or indentor type fittings.
3. Do not use aluminum or die cast fittings.
4. GRS Connectors and Couplings:

a. Threaded.
b. Insulated throat.
c. Gland compression type.
d. Rain and concrete type.

5. Comply with NEMA FB 1, compatible with conduit materials.

B. Fittings for flexible metal conduit.

1. Insulated throat type.
2. Threaded.
3. Grounding type.
4. Liquidtight: 1 piece sealing "O" rings with connectors when entering boxes or enclosures.
5. Hazardous Locations: Stainless steel.

C. Fittings for liquidtight flexible non-metallic conduit.

1. Insulated throat type.
2. Threaded.
3. Non-metallic nylon type.
4. One piece sealing "O" rings with connectors when entering boxes or enclosures.

D. PVC Conduit Fittings:

1. NEMA TC 3; match to conduit type and material.

E. RTRC Conduit Fittings:

1. NEMA TC 14:

a. Watertight: Conduit joints and fitting joints shall use manufacturer's epoxy adhesive for a permanent watertight bond.

F. Expansion Joints:

1. Conduit expansion fittings complete with copper bonding jumper, Crouse-Hinds Type XJ.
2. Conduit expansion/deflection fittings with copper bonding jumper, Crouse-Hinds Type XD.

G. Seals:

1. Wall entrance, OZ/Gedney Type FSK or FSC.

H. Drain Fittings:

1. Automatic Drain Breather:

a. Explosionproof.

1) Safe for Class I Division 1, Groups C and D.

b. Capable of passing minimum 25 cubic centimeters of water per minute and minimum 0.05 cubic feet of air per minute at atmospheric pressure.
c. When located exterior or in wet locations provide drain suitable for outdoor use.

2. Condensate Drain:

a. Conduit outlet body, Type T.
b. Threaded, galvanized plug with 3/16 inch drilled holed through plug.

I. Hazardous Areas:

1. Explosionproof.

2. Horizontal seal fittings, Crouse-Hinds Type EYS.
3. Vertical seal fittings, Crouse-Hinds Type EYD.
4. Vertical seal fittings shall have drain plug. When located exterior or in wet locations provide drain suitable for outdoor use.

2.05 WIREWAYS

A. Wireways larger than 18” long by 6” deep by 6” high and used as anything but a below panelboard pull point is not allowed without prior approval by Engineer.

B. Material: Sheet metal sized and shaped as indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireway as required for complete system.

D. Select features where not otherwise indicated, as required to complete wiring system and to comply with NEC.

E. Wireway Covers:

1. Hinged type for dry locations.
2. Bolted cover with gasket for wet locations.
3. Provide internal, metal partition to separate power and control conductors.

F. Finish: Manufacturer's standard enamel finish unless otherwise noted.

2.06 RACEWAY/DUCT SEALING COMPOUND

A. Nonhardening, putty-like consistency workable at temperatures as low as 35^{o}F.

B. Compound shall not slump at temperature of 300 ^{o}F and shall readily adhere to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.

PART 3– EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive raceways, wireways, and fittings for compliance with installation tolerances and other conditions affecting performance of raceway system.

B. Coordinate layout and installation of raceway and boxes with other construction elements to ensure adequate headroom, working clearance, and access. Coordinate layout and installation of raceway and boxes with light fixtures to ensure raceway and boxes are not mounted lower or below light fixtures causing shadows.

3.02 WIRING METHODS

A. Exterior or Wet Locations:

1. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which conduit is to be installed. Refer to Material Schedule on Drawings for conduit material to be utilized within each Exposure type.
2. Underground Power, Single Run: Rigid nonmetallic (PVC) conduit or RTRC fiberglass conduit.
3. Underground Power, Grouped: Rigid nonmetallic (PVC) conduit or RTRC fiberglass conduit.

4. Underground Shielded Instrumentation Cables, Single Run or Grouped: PVC-coated steel conduit.
5. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquidtight flexible metal conduit

B. Indoor Dry Locations:

1. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which conduit is to be installed. Refer to Material Schedule on Drawings for conduit material to be utilized within each Exposure type.
2. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquidtight flexible metal conduit.

C. Hazardous classified locations:

1. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which conduit is to be installed. Refer to Material Schedule on Drawings for conduit material to be utilized within each Exposure type.
2. Exposed flexible conduit: Stainless steel braid suitable for the hazardous classified location.

D. Use 3/4 inch minimum size unless otherwise noted except conduit runs to room light switches may be 1/2 inch.

E. Underground conduits:

1. PVC-coated steel conduit may be used without encasing in concrete for underfloor shielded instrumentation cables or where specifically indicated on Drawings.
2. PVC conduit may be used without encasing in concrete for underfloor power and control conduit or where specifically indicated on Drawings.
3. Underground conduit shall be minimum of 1 inch outside of the building and minimum 3/4 inch within the building, buried at depth of not less than 24 inch below grade.
4. Provide conduits or ducts terminating below grade with means to prevent entry of dirt and moisture.
5. When using underfloor and/or concrete encased PVC conduit or RTRC fiberglass conduit provide either:

    a. PVC coated galvanized rigid steel elbows.
    b. RTRC fiberglass elbows with factory installed PVC couplings when connecting to PVC conduit.

F. In precast areas, run conduits in insulation space or in floor topping without crossing conduits, using 3/4 inch maximum conduit size.

G. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, and leave at least 1 inch (25 millimeter) concrete cover.

1. Use PVC-coated steel conduit for shielded instrumentation cables.
2. Use PVC conduit for power and control cables.
3. When using PVC conduit provide either:

    a. PVC coated galvanized rigid steel elbows.
    b. RTRC fiberglass elbows with factory installed PVC couplings when connecting to PVC conduit.

4. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
5. Space raceways laterally to prevent voids in concrete.

6. Run conduit larger than 1 inch trade size parallel to or at right angles to main reinforcement and spaced on center of at least 3 times conduit trade diameter with minimum 2 inch concrete covering. Conduits over 1 inch may not be installed in slab without approval of Engineer.
7. When at right angles to reinforcement, place conduit close to slab support.
8. Conduits embedded in concrete frame shall comply with applicable provisions of American Concrete Institute (ACI) 318.

3.03 WIREWAYS

A. Use wireways only where indicated on drawings.

B. Do not use wireways without prior approval from Engineer.

C. Do not install wireways through walls or floors.

3.04 INSTALLATION

A. Conceal raceways by enclosing within finished walls, ceilings, and floors, unless otherwise indicated.

B. Provide watertight conduit system where installed in wet places, underground or where buried in masonry or concrete.

1. Use threaded hubs when entering top of enclosures.
2. Use sealing type locknuts when entering sides or bottom of enclosures.

C. Install two spare 1 inch conduits from top of each flush mounted panelboard to area above ceiling for future use. On flush mounted panelboards located on first and higher level floors, provide two spare 1 inch conduits from bottom of panelboard to ceiling area of floor below for future use.

D. Keep raceways at least 6 inch (150 millimeter) away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.

E. Install raceways level and square and at proper elevations. Provide adequate headroom.

F. Complete raceway installation before starting conductor installation.

G. Support raceway as specified in Section 26 05 29.

H. Use temporary closures to prevent foreign matter from entering raceway.

I. Run concealed raceways with minimum of bends in shortest practical distance considering type of building construction and obstructions, except as otherwise indicated.

J. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members and follow surface contours as much as practical.

1. Mount exposed horizontal runs as high above floor as possible, and in no case lower than 7 foot above floors, walkways, or platforms in passage areas.
2. Run parallel or banked raceways together, on common supports where practical.
3. Make bends in parallel or banked runs from same center line to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.

K. Join raceways with fittings designed and approved for purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
2. Use insulating bushings to protect conductors.

L. Terminations: Where raceways are terminated with locknuts and bushings, align raceway to enter squarely, and install the locknuts with dished part against the box. Use two locknuts, one inside and one outside the box. Use insulating bushings. Provide insulated grounding bushings to terminate ground wire.

M. Where terminating in threaded hubs, screw raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to box, and tighten chase nipple so no threads are exposed.

N. Install pull wires in empty raceways. Use monofilament plastic line having not less than 200 pound (90 kilogram) tensile strength. Leave not less than 12 inch (300 millimeter) of slack at each end of pull wire.

O. Telephone and Signal System Raceways 2 inch Trade Size and Smaller: In addition to above requirements, install in maximum lengths of 150 foot (45 meters) and with maximum of two 90 degree bends or equivalent. Install pull or junction boxes where necessary to comply with these requirements.

P. PVC Externally Coated Galvanized Rigid Steel Conduit: Use only fittings approved for use with that material. Patch nicks and scrapes in PVC coating after installing conduit.

3.05 CONDUIT STUB-UPS

A. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above finished slab.

B. Transition under floor conduit to PVC coated galvanized rigid steel conduit before rising above floor. Under floor conduit elbows shall be PVC coated galvanized rigid steel conduit. Extend the PVC coated galvanized rigid steel conduit portion of the stub-up minimum 12 inch above floor or slab.

3.06 CONDUIT BENDS

A. Make bends and offsets so inside diameter is not reduced. Unless otherwise indicated, keep legs of bend in same plane and straight legs of offsets parallel.

B. Provide NEMA standard conduit bends, except for conduits containing medium voltage cable, fiber optic cable, or conductors requiring large radius bends.

C. Provide large radius conduit bends for conduits containing 5 kilovolt and 15 kilovolt cables as follows:

Conduit Trade Size	Bend Radius
2 inch - 2-1/2 inch	24 inch
3 inch - 4 inch	36 inch
5 inch	48 inch

1. Where physical limitations do not permit use of above, conduit bends with radius of at 8 times diameter of largest cable passing through conduit may be used.

3.07 FLEXIBLE CONNECTIONS

A. Use maximum of 6 foot (1830 millimeter) of flexible conduit for recessed and semi-recessed lighting fixtures.

B. Terminate conduits at motor terminal boxes, motor operated valve stations or pipe-mounted instruments and other equipment subject to vibration with maximum of 3 foot (915 millimeter) liquidtight flexible metal conduit unless other wise indicated.

C. Use liquidtight flexible conduit in wet, damp, and corrosive locations.

D. Use flexible conduit and connections suitable for hazardous classified locations in hazardous classified locations.

E. Install separate ground conductor inside flexible conduit connections.

F. Do not route flexible conduit through walls, floors, ceilings, or roofs.

3.08 FITTINGS

A. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at following points and elsewhere as indicated:

1. Where conduits enter or leave hazardous locations.
2. Where conduits pass from warm locations to cold locations, such as boundaries of refrigerated spaces and air-conditioned spaces.
3. Where otherwise required by NEC.

B. Use raceway fittings compatible with raceway and suitable for use and location. For GRS, use threaded conduit fittings, except as otherwise indicated.

C. Install automatic breather drain fittings according to manufacturers written instructions. Locate fittings to drain conduit system and prevent condensate from entering device enclosures. Install automatic breather drain fittings at following points and elsewhere as indicated.

1. Where vertical seals are installed.
2. Low points in conduit system.
3. Below field instruments at junction of flexible and rigid conduit.
4. Where otherwise required by NEC.

D. Install wall entrance seal as dictated by application where conduits pass through foundation walls below grade.

E. Install conduit expansion fittings complete with bonding jumper in following locations.

1. Conduit runs crossing structural expansion joint.
2. Conduit runs attached to 2 separate structures.
3. Conduit runs where movement perpendicular to axis of conduit may be encountered.

F. Where conduit passes from inside of building to outdoors, it shall be firmly packed at fitting nearest wall line with Johns-Manville Duxseal to depth of at least 1 inch after wires and cables are pulled in; or, if conduit enters directly into equipment, it shall be fitted with seal and drain fitting to prevent water entering equipment.

3.09 GROUNDING

A. Ground in accordance with Section 26 05 26.

B. Provide grounding connections for raceway, boxes, and components as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL 486A.

3.10 PROTECTION

A. Provide final protection and maintain conditions, in manner acceptable to manufacturer and Installer, to ensure that coatings, finishes, and cabinets are without damage or deterioration at Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touch-up coating recommended by manufacturer.

3.11 CLEANING

A. Upon completion of installation of system, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION

This page intentionally left blank.

SECTION 26 05 43
UNDERGROUND DUCTS AND MANHOLES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Ducts.
2. Duct banks.
3. Handholes.

1.02 DEFINITIONS

A. Duct: General term for electrical conduit and other raceway, either metallic or nonmetallic, specified for use underground, embedded in earth or concrete.

B. Duct Bank: Group of 2 or more ducts in continuous run between two points.

C. Duct Bank Conduits

1. Conduits which run underground outside perimeter of building walls. This may consist of 1 conduit, or several conduits grouped together.

D. Underground Conduits

1. Underground conduits are both underfloor conduits and duct bank conduits.

E. Handhole: Below-the-surface enclosure in connection with ducts into which people reach, but do not enter, for purpose of installing, operating, or maintaining equipment or wiring.

1.03 SUBMITTALS

A. Submittals identified below are required.

1. Product data.
2. Duct entrances to buildings detailing conduit materials and a sketch showing elevations of conduits in relation to the building floor slabs, footings and frost walls.
3. Buoyancy calculations for each handhole and manhole documenting the following buoyancy criteria is met:

a. Minimum safety factor 1.1
b. Surface friction with backfill materials shall not be included.
c. Submerged soil weight of 55 pounds per cubic foot where soil is used to help hold down the manhole. Only soil above manhole or any anti-flotation devices may be included.
d. Water table to grade.
e. No water weight to be included inside structure.
f. Weight for castings, all precast components and any manufacturer supplied fillets in bottom of manhole may be included.

4. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Items provided under this section shall be listed or labeled by Underwriters Laboratories, Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.

2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

B. Regulatory Requirements:

1. NEC: Components and installation shall comply with National Fire Protection Association (NFPA) 70.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store precast concrete units at site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.

B. Lift and support precast concrete units only at designated lifting or supporting points.

1.06 SEQUENCING AND SCHEDULING

A. Coordination of Work:

1. Coordinate layout and installation of manholes and handholes with final arrangement of ducts as influenced by actual final location of other utilities in field.
2. Coordinate elevations of duct and raceway entrances into manholes and handholes with final profiles of ducts and raceways as determined by coordination with other utilities, underground obstructions, and buildings.
3. Establish locations and elevations to suit field conditions and assure duct runs drain to manholes, handholes, or as shown on Drawings.

PART 2 – PRODUCTS

2.01 DUCTS AND FITTINGS

A. Comply with Section 26 05 33.16.

2.02 DUCT BANK ACCESSORIES

A. Duct Supports: Rigid Polyvinyl Chloride (PVC) spacers selected to provide minimum duct spacings and concrete cover depths indicated, while rigidly supporting ducts during concreting.

2.03 PRECAST MANHOLES AND HANDHOLES

A. Factory fabricated of reinforced concrete in conformance with ANSI C2 and applicable requirements of American Society for Testing and Materials (ASTM) C478. Design manhole structure in accordance with requirements of American Association of State Highway and Transportation Officials (AASHTO) publication "Standard Specifications for Highway Bridges." AASHTO H20 highway loading shall apply with 30% loading added for impact.

B. Precast Units: Interlocking, mating sections, complete with accessory items, hardware, and features as indicated including concrete knockout panels for conduit entrance and sleeve for ground rod.

C. Joint sealant for joints between precast sections shall be continuous extrusion of asphaltic butyl material compounded for adhesion, cohesion, flexibility, and durability properties required for permanent seal against maximum hydrostatic pressures theoretically attainable at installation location with ground water level at grade.

2.04 RACEWAY/DUCT SEALING COMPOUND

A. Compound:

1. Nonhardening, putty-like consistency workable at temperatures as low as 35 degrees Fahrenheit.
2. Compound shall not slump at temperature of 300 degrees Fahrenheit and shall readily adhere to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.

PART 3 – EXECUTION

3.01 WIRING METHOD

A. General: Install ducts for wiring runs indicated. Provide sizes as indicated.

B. Underground Power and Control, Single Run: Rigid nonmetallic PVC conduit or RTRC fiberglass conduit

C. Underground Shielded Instrumentation Cables, Single Run: PVC coated steel conduit.

D. Duct Banks:

1. Power and Control Conduits: Rigid nonmetallic conduit, Schedule 40, encased in concrete or RTRC fiberglass conduit encased in concrete. When using concrete encased PVC conduit or RTRC fiberglass conduit provide either:

a. PVC coated galvanized rigid steel elbows.
b. RTRC fiberglass elbows with factory installed PVC couplings when connecting to PVC conduit.

2. Instrumentation Conduits: PVC-coated steel conduit encased in concrete.

3.02 EXCAVATION AND BACKFILL

A. Conform to Section 31 23 00 except as modified below:

1. Do not use heavy-duty, hydraulic-operated compaction equipment.
2. Excavation: Cut trenches neatly and uniformly, and slope uniformly to required pitch.
3. For direct-buried, nonencased ducts prepare trench bottoms free from stones, soft spots, and sharp objects. Where necessary, add 3 inch layer of stone-free sand or earth to trench bottom and compact to density of adjacent undisturbed soil to provide suitable bearing for ducts. Backfill over and around ducts on bottom of trench with stone-free sand or earth to 6 inch minimum above tops of ducts and compact by hand or pneumatic tamper to density of adjacent undisturbed earth.
4. For each additional layer of direct-buried ducts above bottom ducts, backfill over and around each layer of ducts with stone-free sand or earth to 12 inch minimum above tops of ducts and compact by hand or pneumatically to density of adjacent undisturbed earth.
5. Separation Between Direct-Buried, Nonencased Ducts: 3 inch minimum for like services, and 6 inch minimum between power and signal ducts.

3.03 INSTALLATION OF DUCTS

A. Slope: Pitch ducts to drain towards manholes and handholes and away from buildings and equipment unless otherwise shown on Drawings. Minimum slope shall be 4 inch in 100 foot Where necessary to achieve this between manholes, slope ducts from high point in run to drain in both directions.

B. Curves and Bends: Use manufactured elbows for stub-ups at equipment and at building entrances. For other curves and bends, except as otherwise indicated, use manufactured long sweep bends with minimum radius of 36 inches in both horizontal and vertical directions. Conduit elbows in duct banks shall be PVC coated galvanized rigid steel or RTRC fiberglass elbows with factory installed PVC couplings when connecting to PVC conduit.

C. Make joints in ducts and fittings watertight in accordance with manufacturer's instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.

D. Duct Entrances to Manholes and Handholes: End bells spaced approximately 10 inch center to center for 5 inch ducts and varied proportionately for other duct sizes. Change from regular spacing to end bell spacing shall start 10 foot from end bell and shall be made without reducing duct line slope and without forming trap in line. Grout end bells into manhole walls from both sides to provide watertight entrances. Provide groundable end bushings on metal ducts and connect to system grounding conductor.

E. Duct Entrances to Buildings: Transformations from underground PVC duct to PVC-coated steel conduit shall be made 10 foot minimum unless otherwise indicated on drawings, outside building wall and shall use fittings manufactured for purpose. Install in accordance with following:

1. Concrete-Encased Ducts: Install reinforcing in duct banks and coordinate duct bank with structural design at wall so duct bank is supported at wall without reducing structural or watertight integrity.
2. Direct-Buried, Nonencased Duct Entering Nonwaterproofed Walls: Install Schedule 40 galvanized steel pipe sleeve for each duct. Caulk space between conduit and sleeve with duct sealing compound on both sides for moisture-tight seal.
3. Waterproof Entrances: Where ducts enter buildings through waterproofed floor or wall, watertight entrance-sealing device shall be installed with sealing gland assembly on inside. Anchor device securely into masonry construction with one or more integral flanges and membrane waterproofing secured to device in permanently watertight manner.

F. Stub-ups: Duct stub-ups to equipment shall be PVC coated galvanized rigid steel. For equipment mounted on outdoor concrete pads, PVC coated rigid steel conduit shall extend minimum of 5 foot away from edge of pad. Install insulated grounding bushings on terminations. Couple steel conduits to ducts with adapters designed for purpose and encased concrete.

G. Sealing: For ducts to be wired in this Project, provide temporary closure at terminations. For spare ducts, seal bore of ducts at terminations. Use sealing compound and plugs as required to withstand 15 psi minimum hydrostatic pressure.

H. Pulling Cord: Provide 100 pound test nylon cord in ducts including spares.

I. Marker Tape: Provide plastic marker tape over ducts at 12 inch below finished grade in accordance with Section 26 05 53.

3.04 INSTALLATION OF MANHOLES/HANDHOLES, GENERAL

A. General:

1. Provide manholes/handholes of sizes, shapes, and locations as indicated.
2. Determine final elevation of ducts as influenced by possible adjustments in other utilities and surface features and discovery of underground obstructions before installing manholes/handholes. Obtain Engineer's approval for manhole/ handhole installation adjustments necessitated by obstructions.
3. Install units plumb and level and with orientation and depth coordinated with arrangement of connecting ducts to minimize bends and deflections required for proper entrances.

B. Elevation:

1. Handholes: Install handholes with depth as indicated. Where indicated, cast handhole cover frame directly into roof of handhole and set roof surface 1 inch above grade. In roads install flush with road.

C. Access: Install access to manhole/handhole through cast-iron frame and cover. For manholes, use 30 inch gasketed cover except as indicated. Use 30 inch gasketed cover for handholes, except use 24 inch gasketed covers for 2 foot by 2 foot handholes. Set frames in paved areas and traffic ways flush with finished grade. Set other frames 1 inch above finished grade.

D. Waterproofing: Apply waterproofing to exterior surfaces of units after concrete has cured at least 3 days. After ducts have been connected and grouted in, and prior to backfilling, waterproof joints and connections and touch up abrasions and scars.

E. Hardware: Install removable hardware including pulling eyes and cable racks and arms as required for installation and support of cable and conductors. Provide adequate quantity of cable racks and arms to train conductors around perimeter of manholes and support the weight of the cables in the manholes plus 33% extra weight capacity and arm capacity for future cables.

F. Field-Installed Bolting Anchors: Do not drill deeper than 3-7/8 inch for anchor bolts installed in field. Use minimum of 2 anchors for each cable stanchion.

3.05 INSTALLATION OF CAST-IN-PLACE MANHOLES/HANDHOLES

A. Comply with Section 03 30 00 and construct manholes/handholes as indicated.

B. Finish interior surfaces with smooth troweled finish.

C. Windows for future duct connections shall be concrete knock-out panels 1-1/2 to 2 inch thick, located as indicated.

3.06 INSTALLATION OF PRECAST MANHOLES/HANDHOLES

A. Install in accordance with ASTM C891 and manufacturer's instructions.

B. Support units on level bed of crushed stone or gravel, graded from 1 inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

3.07 CLEANING AND RESTORATION

A. Clean Ducts: Clean full length of ducts with round bristle brush with diameter 1/2 inch greater than internal diameter of duct.

B. Clean Manholes: Clean internal surfaces of manholes including sump. Remove foreign materal.

3.08 RESTORATION

A. Restore surface features at areas disturbed by excavation and reestablish original grades except as otherwise indicated.

B. Where sod has been removed, replace it as soon as possible after backfilling is completed.

C. Restore all areas disturbed by trenching, storing of dirt, cable laying, and other work to their original condition.

D. Include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching.

E. Restore disturbed paving as indicated.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1– GENERAL

1.01 SUMMARY

A. Section Includes:

1. Identification of electrical materials, equipment, and installations.

1.02 SUBMITTALS

A. Product Data:

1. Submit for each type of product specified.

B. Miscellaneous:

1. Schedule of identification nomenclature to be used for identification signs and labels.

C. Submit in accordance with Section 01 33 00.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. National Electrical Code (NEC): Components and installation shall comply with National Fire Protection Association (NFPA) 70.
2. Comply with American National Standards Institute (ANSI) C2.

PART 2– PRODUCTS

2.01 RACEWAY AND CONDUCTOR LABELS

A. Manufacturer's Standard Products: Where more than one type is listed for specified application, selection is Installer's option, but provide a single type for each application category. Use colors prescribed by American National Standards Institute (ANSI) A13.1, NFPA 70, or as specified elsewhere.

B. Conform to ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway or cable size.

1. Color: Black legend on orange field.
2. Legend: Indicates voltage.

C. Adhesive Labels: Preprinted, flexible, self adhesive vinyl. Legend is over-laminated with clear, wear and chemical resistant coating.

D. Pre-tensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color coded, acrylic or latex bands sized to suit diameter of line it identifies and arranged to stay in place by pre-tensioned gripping action when placed in position.

E. Colored Adhesive Tape: Self adhesive vinyl tape not less than 3 mils thick by 1 to 2 inch wide (0.08 millimeter thick by 25 to 51 millimeter wide).

F. Underground Line Warning Tape: Permanent, bright colored, continuous printed, vinyl tape with following features:

1. Size: Not less than 6 inch wide by 4 mils thick (152 millimeter wide by 0.102 millimeter thick).
2. Compounded for permanent direct burial service.
3. Embedded continuous metallic strip or core.
4. Printed Legend: Indicates type of underground line.

G. Aluminum, Wraparound Marker Bands: Bands cut from 0.014 inch (0.4 millimeter) thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.

H. Plasticized Card Stock Tags: Vinyl cloth with preprinted and field printed legends. Orange background, except as otherwise indicated, with eyelet for fastener.

I. Aluminum Faced Card Stock Tags: Wear resistant, 18 point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch (0.05 millimeter) thick, laminated with moisture resistant acrylic adhesive, and punched for fastener. Preprinted legends suit each application.

J. Brass or Aluminum Tags: Metal tags with stamped legend, punched for fastener. Dimensions: 2 by 2 inch (51 by 51 millimeter) by 0.05 inch (1.3 millimeter).

2.02 ENGRAVED NAMEPLATES AND SIGNS

A. Manufacturer's Standard Products: Where more than one type is listed for specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, or as specified elsewhere.

B. Engraving stock, melamine plastic laminate, 1/16 inch (1.6 millimeter) minimum thick for signs up to 20 square inch (129 square cm), 1/8 inch (3.2 millimeter) thick for larger sizes.

1. Engraved Legend: Black letters on white face.
2. Punched for mechanical fasteners.

C. Baked Enamel Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size as indicated or as otherwise required for application. 1/4 inch (6.4 millimeter) grommets in corners for mounting.

D. Exterior, Metal Backed, Signs: Wear resistant, non-fading, UV resistant ink, with reinforced UV, chemical, abrasion, and moisture resistant laminate layer. Aluminum substrate 0.04 inch (1 millimeter), with colors, legend, and size appropriate to application. 1/4 inch (6.4 millimeter) grommets in corners for mounting.

E. Fasteners for Plastic Laminated and Metal Signs: Self tapping stainless steel screws or No. 10/32 stainless steel machine screws with nuts, flat washers and lock washers.

2.03 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self extinguishing, 1 piece, self locking, Type 6/6 nylon cable ties with following features:

1. Minimum Width: 3/16 inch (5 millimeter).
2. Tensile Strength: 50 pound (22.3 kilograms) minimum.
3. Temperature Range: Minus 40 to 185 degrees Fahrenheit (Minus 4 to 85 degrees Celsius).
4. Color: As indicated where used for color coding.

B. Paint: Alkyd-urethane enamel. Primer as recommended by enamel manufacturer.

PART 3– EXECUTION

3.01 INSTALLATION

A. Install identification devices according to manufacturer's written instructions.

B. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

C. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and or designations used for electrical identification with corresponding designations used in Contract Documents or required by codes and standards. Use consistent designations throughout Project.

D. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

E. Self Adhesive Identification Products: Clean surfaces of dust, loose material, and oily films before applying.

F. Identify feeders over 600 volt with "DANGER-HIGH VOLTAGE" in black letters 2 inch (51 millimeter) high, stenciled with paint at 10 feet (3 meter) intervals over continuous, painted orange background. Identify following:

1. Entire floor area directly above conduits running beneath and within 12 inch (305 millimeter) of basement or ground floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to conduits concealed within wall.
3. All accessible surfaces of concrete envelope around conduits in vertical shafts, exposed in building, or concealed above suspended ceilings.
4. Entire surface of exposed conduits.

G. Install painted identification as follows:

1. Clean surfaces of dust, loose material, and oily films before painting.
2. Prime Surfaces: For galvanized metal, use single component, acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units, use heavy duty, acrylic resin block filler. For concrete surfaces, use clear, alkali resistant, alkyd binder type sealer.
3. Apply one intermediate and one finish coat of silicone alkyd enamel.
4. Apply primer and finish materials according to manufacturer's instructions.

H. Identify Raceways containing power, control and instrumentation conductors with adhesive labels identifying voltage and raceway contents. Locate labels at penetrations of walls and floors, at 50 feet (15 meter) maximum intervals in straight runs, and at 25 feet (7.6 meter) in congested areas.

I. Identify Raceways and Exposed Cables of Certain Systems with Color Banding: Band exposed and accessible raceways of systems listed below for identification.

1. Bands: Pre-tensioned, snap around, colored plastic sleeves; colored adhesive tape; or combination of both. Make each color band 2 inch (51 millimeter) wide, completely encircling conduit, and place adjacent bands of 2 color markings in contact, side by side.
2. Locate bands at changes in direction, at penetrations of walls and floors, at 50 feet (15 meter) maximum intervals in straight runs, and at 25 feet (7.6 meter) in congested areas.
3. Colors: As follows:

a. Fire Alarm System: Red.
b. Fire Suppression Supervisory and Control System: Red and yellow.
c. Combined Fire Alarm and Security System: Red and blue.
d. Security System: Blue and yellow.
e. Mechanical and Electrical Supervisory System: Green and blue.
f. Telecommunications System: Green and yellow.

J. Identify Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communications lines, install continuous underground plastic line marker located directly above line at 6 to 8 inch (150 to 200 millimeter) below finished grade. Where multiple lines installed in common trench or concrete envelope provide multiple underground line warning tapes, one for each 16 inches of width of lines. If lines do not exceed an overall width of 16 inch (400 millimeter), use single line marker.

1. Install line marker for underground wiring, both direct buried and in raceway.

K. Color Code Conductors: Secondary service, feeder, and branch circuit conductors throughout secondary electrical system.

1. Field applied, color coding methods may be used in lieu of factory coded wire for sizes larger than No. 10 AWG.

a. Colored, pressure sensitive plastic tape in half lapped turns for distance of 6 inch (150 millimeter) from terminal points and in boxes where splices or taps are made. Apply last 2 turns of tape with no tension to prevent possible unwinding. Use 1 inch (25 millimeter) wide tape in colors as specified. Adjust tape bands to avoid obscuring cable identification markings.
b. Colored cable ties applied in groups of 3 ties of specified color to each wire at each terminal or splice point starting 3 inch (76 millimeter) from terminal and spaced 3 inch (76 millimeter) apart. Apply with special tool or pliers, tighten to snug fit, and cut off excess length.

2. 208/120 Volt System: As follows:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.
d. Neutral: White.
e. Ground: Green.

3. 480/277 Volt System: As follows:

a. Phase A: Brown.
b. Phase B: Orange.
c. Phase C: Yellow.
d. Neutral: White with non-green stripe.
e. Ground: Green.

L. Power Circuit Identification: Use metal tags or aluminum wraparound marker bands for cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms.

1. Legend: 1/4 inch (6.4 millimeter) steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.
2. Fasten tags with nylon cable ties; fasten bands using integral ears.

M. Apply identification to conductors as follows:

1. Conductors to Be Extended in Future: Indicate source and circuit numbers.
2. Multiple Power or Lighting Circuits in Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color coding for voltage and phase indication of secondary circuit.
3. Multiple Control and Communications Circuits in Same Enclosure: Identify each conductor by its system and circuit designation. Use consistent system of tags, color coding, or cable marking tape.

N. Apply warning, caution, and instruction signs and stencils as follows:

1. Install warning, caution, and instruction signs where indicated or required to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved, plastic laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.
2. Emergency Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8 inch (9 millimeter) high lettering for emergency instructions on power transfer, load shedding, and or emergency operations.

O. Install identification as follows:

1. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. This includes communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Except as otherwise indicated, provide single line of text with 1/2 inch (13 millimeter) high lettering on 1-1/2 inch (38 millimeter) high label; where 2 lines of text are required, use lettering 2 inch (51 millimeter) high. Use black lettering on white field. Apply labels for each unit of following categories of equipment.

    a. Panelboards, electrical cabinets, and enclosures.
    b. Access doors and panels for concealed electrical items.
    c. Push button stations.
    d. Power transfer equipment.
    e. Power generating units.

2. Apply designation labels of engraved plastic laminate for disconnect switches, breakers, push buttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

END OF SECTION

This page intentionally left blank.

SECTION 26 05 90
ELECTRIC UTILITY SERVICES

PART 1– GENERAL

1.01 SUMMARY

A. Electric Utility Charges:

1. Electric Utility charges for extension of distribution system to point of service termination and meters will be paid by Owner.

1.02 DEFINITIONS

A. Electric Utility: Commonwealth Edison.

1.03 Regulatory Requirements:

1. National Fire Protection Association (NFPA):

a. NFPA No. 70 - National Electrical Code (NEC).

PART 2 – PRODUCTS

2.01 ELECTRIC SERVICE

A. Electric Service Characteristics:

1. As indicated on Drawings and provided by Electric Utility.

PART 3– EXECUTION

3.01 PREPARATION

A. Confirmation of Electric Service:

1. Consult with Electric Utility to verify service information specified and shown on Drawings.
2. Include deviations required by Electric Utility from contract documents to comply with Electric Utility standards and requirements.

B. Metering:

1. Consult with Electric Utility regarding service entrance requirements and metering equipment.
2. Install metering equipment and empty conduit for metering conductors to meet standards and requirements of Electric Utility.

C. Application for Electric Service.

1. Obtain required forms from Electric Utility.
2. Assist Owner in completion of forms and deliver completed forms to Electric Utility.
3. Coordinate schedule for installation of electric service with Electric Utility.

END OF SECTION

This page intentionally left blank.

SECTION 26 08 00
ELECTRICAL SYSTEM DEMONSTRATION

PART 1- GENERAL

1.01 SUMMARY

A. Demonstrate proper operation of electrical systems and equipment in presence of Engineer.

1.02 SUBMITTALS

A. Demonstration log.

B. Submit in accordance with Section 01 33 00.

PART 2- PRODUCTS

(Not Used)

PART 3- EXECUTION

3.01 PERFORMANCE

A. Demonstrations:

1. Each piece of equipment.
2. Each integrated system.

B. Demonstration Log:

1. Keep log of individual demonstrations.
2. Data:

a. Date and time of demonstration.
b. Owner's representative.
c. Equipment or system demonstrated.
d. Result of demonstration.

1) Success or fail.
2) If failure, description of failure.
3) Corrective action taken.
4) Redemonstration result.

END OF SECTION

This page intentionally left blank.

SECTION 26 27 26
WIRING DEVICES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Receptacles, connectors, switches, and finish plates.

1.02 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

1.03 SUBMITTALS

A. Submittals are not required if one of named manufacturers is furnished. If named manufacturer is not furnished submit Product Data and Samples.

B. Product Data:

1. For each product specified that is not one of the named manufacturers.

C. Samples:

1. For devices and device plates for color selection and evaluation of technical features.

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Items provided under this section shall be listed or labeled by Underwriters Laboratories, Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.
2. Term "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

B. Regulatory Requirements:

1. NEC: Components and installation shall comply with National Fire Protection Association (NFPA) 70.

C. Comply with National Electrical Manufacturers Association (NEMA) WD 1.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Wiring Devices:

1. Bryant Electric, Inc.
2. GE Company; GE Wiring Devices.
3. Hubbell, Inc.; Wiring Devices Div.
4. Killark Electric Manufacturing Co.
5. Pass & Seymour/Legrand; Wiring Devices Div.

6. Pyle-National, Inc.; an Amphenol Co.

B. Wiring Devices for Hazardous (Classified) Locations:

1. Crouse-Hinds Electrical Co.; Distribution Equipment Div.
2. Killark Electric Manufacturing Co.
3. Pyle-National, Inc.; an Amphenol Co.

2.02 RECEPTACLES

A. Straight Blade and Locking Receptacles: Heavy Duty specification grade.

B. GFCI Receptacles: Termination type, with integral NEMA WD 6, Configuration 5-20R duplex receptacle. Design units for installation in 2-3/4 inch (70 millimeter) deep outlet box without an adapter.

C. Isolated Ground Receptacles: Equipment grounding contacts connected only to green grounding screw terminal of device with inherent electrical isolation from mounting strap.

1. Devices: Listed and labeled as isolated ground receptacles.
2. Isolation Method: Integral to receptacle construction and not dependent on removable parts.

D. Industrial Heavy Duty Receptacle: Comply with International Electrotechnical Commission (IEC) 309-1 and 309-2.

E. Hazardous (Classified) Location Receptacles: Comply with NEMA FB 11.

1. Appleton Cat. No. EFS B175-2023M, Crouse-Hinds Cat. No. ENR 21201 with NEMA 5-20R.
2. Plugs: Match receptables. Furnish 1 plug for each receptacle installed.

F. Color: White unless otherwise indicated or required by Code.

2.03 SWITCHES

A. Snap Switches: Heavy duty, quiet type.

B. Snap Switches in Hazardous (Classified) Locations:

1. Appleton EFS series, Crouse-Hinds EDS series.
2. Comply with UL Standard 894.

C. Color: White unless otherwise indicated or required by Code.

2.04 WALL PLATES

A. Single and combination types match corresponding wiring devices.

1. Plate Securing Screws: Metal with head color to match plate finish.
2. Finished Spaces: 0.04 inch (1 millimeter) thick, Type 302, satin finished stainless steel.
3. Unfinished Spaces: Galvanized steel.
4. Exterior and wet locations: Weatherproof plates and covers suitable for wet locations while in use.

a. Hinged and gasketed cover/enclosure to maintain weather tight seal while the equipment is plugged into it. TayMac or equal.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types for each location in conformance with following requirements unless otherwise noted on Drawings:

1. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which box is to be installed. Refer to Material Schedule on Drawings for material and NEMA enclosure type to be utilized within each Exposure type.
2. NEMA 7 in Class I hazardous classified locations. When located in exterior locations or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.
3. NEMA 9 in Class II hazardous classified locations. When located in exterior locations or in wet locations provide O-ring/gasket or equivalent making box suitable for outdoor use.
4. Metal Door Jambs: Narrow partition boxes with internal ears.
5. As otherwise indicated and as required by NEC.

B. Mounting height as follows unless otherwise shown on Drawings:

1. AC Receptacles and Switches: 48 inch above floor or grade.

C. Install devices and assemblies plumb and secure.

D. Install wall plates when painting is complete.

E. Install wall dimmers to achieve indicated rating after derating for ganging as instructed by manufacturer.

F. Do not share neutral conductor on load side of dimmers.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

H. Protect devices and assemblies during painting.

I. Adjust locations at which floor service outlets and telephone/power service poles are installed to suit arrangement of partitions and furnishings.

3.02 IDENTIFICATION

A. Comply with Section 26 05 53.

1. Switches: Where three or more switches are ganged, and elsewhere as indicated, identify each switch with approved legend engraved on wall plate.
2. Receptacles: Identify panelboard and circuit number from which served. Use machine printed, pressure sensitive, abrasion resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

3.03 CONNECTIONS

A. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

B. Isolated Ground Receptacles: Connect to isolated ground conductor routed to designated isolated equipment ground terminal of electrical system.

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

3.04 FIELD QUALITY CONTROL

A. Test wiring devices for proper polarity and ground continuity. Operate each device at least six times.

B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

C. Replace damaged or defective components.

3.05 CLEANING

A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION

SECTION 26 32 13.16
GAS-ENGINE-DRIVEN GENERATOR SETS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Equipment specified in this Section is being furnished by Owner for installation by Contractor.
2. Engine generator set, 200-GEN-1.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Anchor generator set and other system components on concrete bases conforming Section 03 30 00 and as indicated. Provide anchorage and vibration isolation according to manufacturer's recommendations.

B. Maintain minimum working space around components according to manufacturer's approved submittals and NEC.

C. Field Installation of Piping: Comply with Division 40.

D. Maintain minimum working space around components according to manufacturer's approved submittals and NEC.

3.02 IDENTIFICATION

A. Identify system components according to Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. Tests: Provide services of qualified testing agency to perform tests listed below according to manufacturer's recommendations upon completion of installation of system. Use instruments bearing records of calibration within last 12 months, traceable to NIST standards, and adequate for making positive observation of test results. Include following tests:

1. Battery Tests: Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions. Test for contact integrity of connectors.
2. Battery Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
3. System Integrity Tests: Verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
4. Simulation of malfunctions to verify proper operation of local and remote protective, alarm, and monitoring devices.
5. Load Test: Use variable load bank capable of simulating kVA, kW, and power factor of load for which unit is rated. Run unit at 25, 50, and 75% of rated capacity for 30 minute each, and at 100% for 1 hour. Record voltage, frequency, load current, battery-charging current, power output, oil pressure, and coolant temperature during test.
6. Exhaust Emissions Test: Conform to applicable government test criteria.

B. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.04 CLEANING

A. Upon completion of installation, inspect system components. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean components internally using methods and materials recommended by manufacturer.

END OF SECTION

SECTION 26 36 00
TRANSFER SWITCHES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Equipment specified herein is the responsibility of the pump manufacturer. See Section 43 25 13.
2. Service Entrance Rated Automatic Transfer Switch (ATS) - 200-ATS-1.

1.02 SUBMITTALS

A. Product Data:

1. Submit for each transfer switch, including dimensioned plans, sections, and elevations showing minimum clearances; conductor entry provisions; gutter space; installed features and devices; and materials lists.
2. Wiring diagrams, elementary or schematic, differentiating between manufacturer-installed and field-installed wiring.

B. Test Results:

1. Certified reports of field tests and observations.

C. Miscellaneous:

1. Manufacturer's certificate of compliance to referenced standards and tested short-circuit closing and withstand ratings applicable to protective devices and current ratings used in this Project, as indicated and as specified in this section.

D. Operation and Maintenance (O&M) Data:

1. Include features and operating sequences, both automatic and manual.
2. List factory settings of relays and provide relay setting and calibration instructions.
3. Submit in accordance with Section 01 33 00.

E. Submit in accordance with Section 01 33 00.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms experienced in manufacturing equipment of types and capacities indicated and having record of successful in-service performance.

B. Emergency Service: Manufacturer maintains service center capable of providing emergency maintenance and repairs at Project site with 4 hour maximum response time.

C. Items provided under this section shall be listed or labeled by Underwriters Laboratories, Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

D. Regulatory Requirements:

1. NEC: Components and installation shall comply with National Fire Protection Association (NFPA) No. 70.

PART 2– PRODUCTS

2.01 MANUFACTURERS

A. Kohler Co.

B. MTU Onsite Energy.

2.02 TRANSFER SWITCH PRODUCTS, GENERAL

A. Number of Poles and Current and Voltage Ratings: As indicated.

B. Solid-State Controls: Repetitive accuracy setting of within 2% or better over an operating temperature range of -20 to 70 degrees Celsius.

C. Resistance to Damage by Voltage Transients: Components meet or exceed voltage surge withstand capability requirements when tested according to American National Standards Institute (ANSI) C37.90.1. Components meet or exceed voltage impulse withstand test of National Electrical Manufacturers Association (NEMA) ICS 1.

D. Neutral Terminal: Where 2- or 3-pole switches are indicated, provide fully rated, solid, unswitched neutral terminal except as indicated.

E. Enclosures:

1. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which transfer switch is to be installed. Refer to Material Schedule on Drawings for material and NEMA enclosure type to be utilized within each Exposure type.
2. As otherwise indicated and as required by NEC.

F. Heater: Within enclosure of units exposed to outdoor temperature and humidity conditions, connect thermostat within enclosure to control heater.

1. 120V; voltage shall be derived within enclosure.

G. Factory Wiring: Train and bundle factory wiring and identify consistently with Shop Drawings, by color code or by numbered or lettered wire and cable tape markers at terminations.

1. Designated terminals accommodate field wiring.
2. Power Terminals Arrangement and Field Wiring Space: Suitable for top, side or bottom entrance of feeder conductors as indicated.
3. Terminals: Pressure type, suitable for copper or aluminum conductors of sizes indicated.
4. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

H. Electrical Operation: Accomplish by nonfused, momentarily energized solenoid or electric motor-operated mechanism, mechanically and electrically interlocked in both directions. Switches using components of molded case circuit breakers or contactors not designed for continuous duty, repetitive switching between active power sources are not acceptable.

I. Switch Action: Mechanically held in both directions for double-throw switches.

J. Switch Contacts: Use silver composition for switching load current. Provide separate arcing contacts for units rated 225 amps and more.

K. Service Equipment Approval: Listed for use as service equipment for automatic transfer switch with main service disconnect.

2.03 AUTOMATIC TRANSFER SWITCHES (ATS)

A. Comply with Level 1 equipment in accordance with NFPA No. 110.

B. Switching arrangement:

1. Switch operator has programmed neutral position arranged to provide midpoint between 2 working switch positions with an intentional, controlled, timed pause during transfer at midpoint.
2. Midpoint pause is adjustable from 0.5 to 30 seconds minimum, and factory set at 2.0 seconds, except as indicated.
3. Time delay occurs for both transfer directions.

2.04 AUTOMATIC TRANSFER SWITCH FEATURES

A. Voltage sensing for each phase of normal source. Pick-up voltage adjustable from 85% to 100% nominal, and drop-out voltage adjustable from 75% to 98% pick-up value. Factory set for pick-up at 90% and drop-out at 85%.

B. Time-delay override of normal source voltage sensing delays transfer and engine start signals. Adjustable 0 to 6 seconds, and factory set at 1 second.

C. Voltage/Frequency Lockout Relay: Prevents premature transfer. Voltage pick-up adjustable from 85% to 100% nominal. Factory set to pick-up at 90%. Pick-up frequency adjustable from 90% to 100% nominal. Factory set to pick-up at 95%.

D. Retransfer Time Delay: Adjustable from 0 to 30 minutes and factory set at 10 minutes. Provides automatic defeat of delay upon loss of voltage or sustained undervoltage of standby source when normal supply has been restored.

E. Test Switch: Simulates normal source failure.

F. Switch-Position Pilot Lights: Indicate source to which load is connected.

G. Source Available Indicating Lights: Supervise sources via transfer switch normal and standby source sensing circuits.

1. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
2. Standby Power Supervision: Red light with nameplate engraved "Standby Source Available."

H. Unassigned Auxiliary Contacts: 2 normally open Single Pole Double Throw (SPDT) contacts for each switch position.

1. Rating: 10 amps at 240 Volts Alternating Current (VAC).

I. Transfer Override Switch: Overrides automatic retransfer control so ATS remains connected to standby power source regardless of condition of normal source. Pilot light indicates override status.

J. Engine Starting Contacts: One isolated normally closed and 1 isolated normally open. Contacts are gold-flashed or gold-plated and rated 10 amps at 32 Volts Direct Current (VDC) minimum.

K. Engine Shut-Down Contacts: Time delay adjustable from 0 to 5 minutes. Factory set at 5 minutes.

L. Engine-Generator Exerciser: Solid-state programmable time switch starts engine-generator set and transfers load to it from normal source for preset time, then retransfers and shuts down engine after preset cool-down period. Initiate exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory-set periods are for 7 days and 20 minutes, respectively. Exerciser features include following.

1. Exerciser transfer selector switch, which permits selection between exercise with and without load transfer.
2. Pushbutton programming controls with digital display of settings.
3. Integral battery operation of time switch when normal control power is not available.

M. Molded-Case Circuit Breaker: NEMA AB 1, handle lockable.

1. Service entrance rated.
2. Characteristics: Frame size, trip rating, number of poles, and auxiliary devices as indicated and interrupting capacity rating to meet available fault current.
3. Circuit Breakers, 400 Amp and Larger: Field-adjustable short-time and continuous current settings.
4. Lugs: Mechanical lugs and power-distribution connectors for number, size, and material of conductors indicated.
5. Series rated circuit breakers not acceptable.

2.05 FINISHES

A. Enclosures: Manufacturer's standard enamel over corrosion-resistant pretreatment and primer.

2.06 SOURCE QUALITY CONTROL

A. Factory test components, assembled switches, and associated equipment to ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for conformance with specified requirements. Perform dielectric strength test conforming to NEMA ICS 1.

PART 3– EXECUTION

3.01 INSTALLATION

A. Wall Mounting of Transfer Switches: Mount on wall as indicated.

B. Identify components in accordance with Section 26 05 53.

3.02 CONNECTIONS

A. Tighten factory-made connections and field connections including connectors and terminals, screws and bolts, according to equipment manufacturer's published torque tightening values.

B. When manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A.

3.03 GROUNDING

A. Make equipment grounding connections for transfer switch units as indicated and as required by NEC.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:

1. Supplier's or manufacturer's field technician for equipment specified herein shall be present at job site for minimum workdays indicated, travel time excluded, for service during plant construction, plant startup, and training of Owner's personnel for plant operation. Include minimum of:

a. 1/2 workday for Post Startup Services.

2. Supplier or manufacturer shall direct services to specific system and equipment operation, maintenance, field tests, and troubleshooting. See Section 01 61 00.
3. In addition to the services specified above, provide manufacturer’s services as required to successfully complete systems demonstration as specified in Section 01 79 10.

B. Preliminary Tests: Perform electrical tests as recommended by manufacturer and as follows.

1. Measure phase-to-phase and phase-to-ground insulation resistance levels with insulation resistance tester, including external control circuits. Use test voltages and procedure recommended by manufacturer. Meet manufacturer's specified minimum resistance.
2. Check for electrical continuity of circuits and for short circuits.

C. Field Tests: Give 7 day advance notice of tests and perform tests in presence of Owner and Engineer.

D. Coordinate tests with tests of generator plant and run them concurrently.

E. Tests: As recommended by manufacturer and as follows.

1. Contact Resistance Test: Measure resistance of power contacts for ATSs. Resolve values in excess of 500 micro-ohms and differences between adjacent poles exceeding 50%.
2. Ground Fault Tests: Coordinate with testing specified in Section 26 28 00 to ensure sensors are properly selected and located to optimize ground-fault protection where power is being delivered from either source.

a. Verify grounding points and sensor ratings and locations.
b. Apply simulated fault current at sensors and observe reaction of circuit interrupting devices.

3. Operational Tests: Demonstrate interlock, sequence, and operational function for each switch at least 3 times.

a. Simulate power failures of normal source to ATSs and of standby source with normal source available.
b. Simulate low phase-to-ground voltage for each phase of normal source of ATSs.
c. Verify time-delay settings and pick-up and drop-out voltages.

F. Test Failures: Correct deficiencies identified by tests and prepare for retest. Verify equipment meets specified requirements.

G. Reports: Maintain written record of observations and tests. Report defective materials and workmanship, and retest corrected items. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach label or tag to each tested component indicating satisfactory completion of tests.

END OF SECTION

DIVISION 31

EARTHWORK

This page intentionally left blank.

SECTION 31 10 00
SITE CLEARING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Protection of existing surface features
2. Removal of miscellaneous surface features.
3. Clearing and grubbing of site.
4. Stripping topsoil.
5. Locating existing pipes and electrical conduits.
6. Removal from site and disposal of stockpiled landfill material.

1.02 SUBMITTALS

A. Submit coordinates and elevation of each located underground pipe.

B. Submit in accordance with Section 01 33 00.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.01 PREPARATION

A. Provide a minimum of 3 working days notice, prior to construction, to owners of existing utilities and surface features.

B. Protect existing utilities and surface features indicated to remain. Restore damaged existing utilities and surface features to condition equal to condition prior to construction.

C. Protect trees, shrubs, and other land resources, where indicated to remain. Provide fencing no closer than “drip line” of trees and shrubs and of sufficient height so features will not be damaged. Comply with requirements of Section 01 57 19.

D. Do not remove or cut down trees unless identified for removal on drawings, or located within limits of excavation, proposed structures or paving as indicated on Drawings.

E. Do not trim trees.

F. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

G. Maintain access to site.

H. Install erosion control measures prior to start of any earth-disturbing activities.

3.02 REMOVALS

A. Remove obstructions such as mounds of dirt, stones, or debris located within construction limits.

B. Remove surface features including pavements, curb and gutter, signs, posts, mailboxes, fences, shrubs, landscaping features, and other miscellaneous items. Street signs, culverts, advertising signs, mail boxes, etc. shall be replaced to original condition.

C. Full depth saw cut all pavement, sidewalk and curbing to be removed.

D. Conform to requirements of Section 01 35 16.

3.03 CLEARING AND GRUBBING

A. Clearing and grubbing shall include cutting and disposal of trees, shrubs, brush, windfalls, logs, and other vegetation, and removal and disposal of roots, stumps, stubs, grubs, logs and other timber, and other perishable or objectionable matter.

B. Clear and grub area within limits to be covered with tanks, buildings, walks, parking areas, drives, and where grade is to be adjusted. Clearing and grubbing limits shall be 20 feet from building or tank lines.

C. Grub stumps and roots to a depth of at least 12 inches below existing ground surface or subgrade, whichever is lower.

D. Cut interfering tree roots and branches 1 inch or greater in diameter perpendicular to direction of growth on tree side of trench.

E. Remove cleared and grubbed material from site and dispose of in accordance with applicable regulations.

3.04 STRIPPING TOPSOIL

A. After area has been cleared of vegetation, remove existing topsoil to entire depth in areas where grade is to be adjusted and in areas to be covered by structures or paving.

B. Stripped topsoil shall be free of clay lumps, sand and gravel, stones, vegetation, and debris.

C. Stockpile on site in an area clear of new construction. Strip stockpile areas of vegetation prior to stockpiling. Provide transportation of material and sites for stockpiles if adequate areas are not available within easements and rights-of-way shown on Drawings. The Contractor shall maintain separate topsoil stockpiles for separate owners parcels of land.

D. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.

1. Protect from erosion.
2. Maintain stockpile free from debris and trash.
3. Immediately stabilize stockpiles and surround stockpiles as needed with silt fence or other perimeter control if stockpiles will remain inactive for 7 days or longer.

E. Owner has first right to excess topsoil not used in Work. Obtain Owners approval before removing any topsoil not required for work. Remove excess topsoil not required by Owner from site.

3.05 DISPOSAL

A. Remove brush, grass, roots, trash, and other material from site preparation operations from site.

B. Do not store or permit debris to accumulate on the job site.

C. Do not burn debris at the site.

D. Dispose of materials removed by clearing and grubbing in accordance with applicable regulations.

3.06 DEMOLITION

A. Conform to Section 01 35 16.

3.07 EXPLORATION FOR EXISTING UNDERGROUND PIPING AND ELECTRICAL CONDUITS

A. Prior to initiating work, Contractor shall determine exact location and elevation of underground piping and conduits at locations specified.

1. Excavate and expose top and sides of piping or conduit.
2. Locate top and outer edges of piping or conduit by surveying with equipment capable of locating each point to within 0.1 ft. accuracy.
3. Tie survey coordinate information to state plane coordinate system shown on drawings.
4. Probing to locate outer edges of piping may be permissible if exposing sides of piping would compromise the structural integrity of the piping, provided the size and invert elevation can be determined from the information available.
5. Each point to be surveyed shall consist of a set of three (3) survey points. One set of points shall consist of coordinates on each side of the pipe or conduit and the top center elevation of pipe or conduit.

B. The Contractor shall excavate the following locations. Should additional location information be needed, contact the Engineer.

C. Submit location survey information in hard copy and electronic form to Engineer. Engineer will evaluate information for its impact on proposed structures and will revise the design as required to avoid impacting the existing piping and conduits.

D. Contractor shall backfill and compact the backfill over the exposed piping and conduits in accordance with the requirements of Section 31 23 00 – Excavation and Backfill and/or 31 23 33 Trenching and Backfill as appropriate for the location.

E. Disposal of excess soil material shall be in accordance with Section 31 22 00.

3.08 PRELIMINARY SITE SURVEY

A. When required on the Drawings or specified in this or other sections, Contractor shall perform a preliminary site survey of surface features to ascertain their locations and elevations to an accuracy of 0.01 ft in all axis.

B. In areas where pavements, driveways or sidewalks are removed and no adjoining fixed features are available to reference (curb gutter, sidewalks, remaining pavement, etc) the Contractor shall provide a survey for the entire area to be disturbed which will establish the grades and locations of the existing features which can be staked for restoration efforts.

Grades shall be determined at no more than 25 ft intervals. It is the intent of the contract documents to restore the project area to existing conditions or better.

C. In all areas where road or driveway centerlines or edges are removed the Contractor shall survey the centerline and edges to allow them to be accurately restored. Survey will not be required if existing curbing is present and is not disturbed on the pavement edge.

D. Inlets or other structures which are removed for construction and are to be replaced shall have their rim elevation and all inverts surveyed prior to removal.

E. Contractor shall photograph all landscape restoration areas including, but not limited to retaining walls, fences, flower beds, garden areas, birdhouses, shrubs and trees.

END OF SECTION

SECTION 31 23 00
EXCAVATION AND FILL

PART 1 – GENERAL

1.01 SUMMARY

A. Excavation and backfilling for structures to elevations shown on Drawings and as needed to meet requirements of Contract Documents.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

1.03 DEFINITIONS

A. Influence Zone Under Foundations, Pavements, or Sidewalks: Area below foundation or pavement or sidewalk subbase bounded by 1 horizontal to 2 vertical slope extending outward from 1-foot beyond outer edge of foundation or pavement or sidewalk subbase.

B. Influence Zone Under Piping or Electrical Ducts: Area below limits bounded by line 6 inches below pipe or electrical duct and by 1 horizontal to 2 vertical slope extending outward from that line 1-foot beyond outer edge of pipe or duct.

C. Unsuitable Material: Topsoil, peat, organic soils, and materials containing slag, cinders, foundry sand, debris, and rubble or soil with less than required bearing capacity as determined by Engineer.

1.04 SUBMITTALS

A. Test Results.

1. Compaction test results.

B. Miscellaneous Submittals.

1. Test results to verify fill materials meet Specifications.

C. Submit in accordance with Section 01 33 00.

1.05 QUALITY ASSURANCE

A. Testing shall be provided by Contractor in accordance with Section 01 and this Section.

B. Sheeting, Shoring, and Bracing:

1. Sheeting, shoring, and bracing shall conform to safety requirements of federal, state, and local agencies.
2. Sheeting, shoring, and bracing shall not affect structural integrity of new construction, water tightness or waterproofing of new construction, and shall allow for sufficient clearances necessary to install associated appurtenances adjacent to new construction.
3. Sheeting, shoring, and bracing shall not penetrate walls or slabs of new construction unless approved by Engineer.

1.06 PROJECT / SITE CONDITIONS

A. Notify Owners of above or below ground utilities encountered during excavation operations.

B. Cap and remove or relocate services in accordance with instructions of Owners of such utilities.

C. Protect, support, and maintain conduits, wires, pipes or other utilities that are to remain in accordance with requirements of Owners of such utilities.

D. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

PART 2 – PRODUCTS

2.01 FILL MATERIALS

A. Structural Fill:

1. Well-graded sand, well-graded sand and gravel, well-graded crushed stone or gravel, or other approved material, of 2 inch maximum size, free from organic and deleterious materials.
2. Plasticity Index: ASTM D4318, 6 or less. Plasticity Index shall be performed on fraction of material that passes the No. 40 sieve.
3. Maximum Fines: ASTM D422, 10% passing No. 200 sieve.
4. Uniformity Coefficient: 5 or greater.
5. Concrete may be used as Structural Fill when approved by Engineer.

B. Free-Draining Fill:

1. ASTM C33, Size No. 67.
2. Washed crushed stone.
3. Maximum Fines: ASTM D422, 1% passing No. 200 sieve.

2.02 FILTER FABRIC

A. Porous non-woven fabric with multiple layers of randomly arranged fibers, min 4.0 ounce per square yard (typical).

B. Manufacturers:

1. Mirafi 140N by Mirafi, Inc.
2. Typar 340I by DuPont.
3. C-40NW by Contech.
4. FX-40HS by Carthage Mills.
5. Or Equal.

2.03 SHEETING, SHORING, AND BRACING

A. Type, design, detail, and installation of sheeting, shoring, and bracing shall be determined by and sole responsibility of Contractor.

2.04 SOURCE QUALITY CONTROL

A. Testing:

1. One sieve analysis, plasticity index, and uniformity coefficient for each source of structural fill.
2. One sieve analysis for each source of free-draining fill.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of Work, such as areas loosened by frost action or softened by flooding or weather, or existence of unsuitable material. Do not proceed until unsatisfactory conditions are corrected.

B. Proof-roll and examine surfaces to receive fill and subgrades within influence zone to determine existence of soft areas, areas loosened by frost action or softened by flooding, groundwater or weather or existence of unsuitable materials.

C. Where sensitive soils are encountered, requirement for proof rolling shall be waived, and Contractor shall perform alternative field testing to determine existence of soft areas. Method of alternative testing shall be approved by Engineer.

3.02 PREPARATION

A. Fill settled areas where excavations or trenches were backfilled and holes made by demolition, tree removal, and site preparation.

B. Natural soils or fill softened by frost, flooding or weather shall be removed and replaced.

C. Remove unsuitable material within influence zone under foundations, pavements, sidewalks, piping or electrical ducts.

D. Remove frozen soils within influence zone.

3.03 SHEETING, SHORING, AND BRACING

A. Whenever necessary to prevent caving during excavation and to protect adjacent piping, structures, property, workers, and the public; excavations shall be sheeted, shored, and braced.

B. When sheeting, shoring, and bracing is required, install to prevent soil from entering excavation below or through sheeting.

C. Keep sheeting, shoring, and bracing in place until structure is placed, tested, and backfilled.

D. Remove sheeting, shoring, and bracing in manner not damaging to structure or permitting voids within backfill.

E. Fill settled areas after sheeting, shoring, and bracing has been removed.

3.04 DEWATERING

A. Contractor shall dewater excavation site prior to starting excavation and shall maintain groundwater minimum of 12 inches below bottom of excavation.

B. Contractor is responsible for choosing method of groundwater control.

C. If Contractor chooses to use deep wells or well points, wells and well points shall be designed, installed, and operated to prevent removal of in-situ materials.

D. Keep construction site free-draining. Keep excavations free of water.

E. Remove soil disturbed by pressure or flow of groundwater.

F. Maintain dewatering system to prevent uplifting of or damage to structures.

G. Protect adjacent utilities, structures, and properties from damage resulting from dewatering operations.

H. Drill, maintain, and abandon dewatering wells in accordance with federal, state, and local ordinances.

3.05 EXCAVATION

A. Excavate to the lines, grades, and elevations indicated and necessary to complete construction.

B. Method of excavation shall be consistent with soil types encountered and result in undisturbed subgrade. Loosened soils shall be recompacted or removed and replaced.

C. Excavation of Rock:

1. Where rock, boulders, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, remove or excavate such material by means which will neither cause additional cost to Owner nor endanger buildings or structures on or off the site.
2. Do not use explosives without written permission from Engineer.

D. Protect excavated areas from freezing.

3.06 FILL USAGE

A. Structural: Within influence zone under footings and foundations, floor slabs, pavements, sidewalks, piping or electrical ducts. Provide a minimum 6 inch layer under floor slabs when subbase material is not granular in nature.

B. Free-Draining: Where noted.

C. Earth: Other areas not previously specified.

3.07 PLACING FILL

A. Notify Engineer before placing fill material.

B. Do not use frozen material or place fill on frozen subgrade.

C. Place filter fabric where indicated in accordance with manufacturer's recommendations.

D. Do not backfill until concrete is properly cured and has reached 85% of design strength, coatings approved, and required tests accepted.

E. Place fill against foundation walls enclosing interior spaces after construction such as cross-walls, beams, or slabs are in-place to brace wall and such construction has reached 85% of design strength.

F. Place fill simultaneously on both sides of free standing structures.

G. Do not operate power-operated earth moving equipment closer to foundation walls or other structures than distance equal to ½ height of fill above footing.

H. Begin compaction of each layer at structure wall to minimize lateral forces against structure due to wedging action of soil.

I. Stop backfill at specified grade to allow for placing topsoil or sidewalk or pavement subbase.

J. Place and compact fill materials in lift thickness and to densities listed.

1. Degree of compaction: ASTM D1557, Modified Proctor.
2. Moisture Content: Within 3% of optimum.

Location	Maximum Lift Thickness	Modified Proctor (%)
Footing, Foundation Slab, or Floor Slab Influence Zone	8 inches	95 minimum
Sidewalk, Pavement, Piping, or Electrical Duct Influence Zone	12 inches	90 minimum
Lawn and Landscaped Areas	12 inches	80 minimum, 90 maximum

K. Free-draining fill below tanks and foundations shall be compacted in max 8-in. lifts with min 10-ton smooth vibratory roller. Make a minimum of 3 passes in each direction. In areas not accessible to roller, compact with equipment acceptable to Engineer.

3.08 FIELD QUALITY CONTROL

A. Testing:

1. One field density test for each 25 cubic yards of structural fill, minimum one each lift.
2. One field density test for each 500 cubic yards of earth fill.
3. Determine in-place density of fill at maximum intervals specified in accordance with ASTM D1556, D2167, D2922 or D2937.

3.09 ADJUSTMENT AND CLEANING

A. Remove excess material not required by Owner, material not suitable for backfilling or site grading, and unsuitable materials from site.

END OF SECTION

This page intentionally left blank.

SECTION 31 23 33
TRENCHING AND BACKFILL

PART 1 – GENERAL

1.01 SUMMARY

A. Trenching and backfilling to elevations shown on Drawings and as needed for installation of underground piping and utilities associated with Work and to meet requirements of Contract Documents.

B. Change in Removal Quantity of Unsuitable Material:

1. Include in Base Bid, cost of removal and disposal of unsuitable material and provide backfill as specified herein.
2. Adjust Contract Price if actual quantity of removal of unsuitable material differs from that specified.
3. Pay limits for change in removal of unsuitable material shall be the maximum trench width as defined herein.
4. Unit cost for change in removal of unsuitable material shall include cost of excavation, hauling, disposal, backfill material, and backfilling.

C. Change in Quantity of Rock Excavation:

1. Include in Base Bid, cost of rock excavation with top of rock elevation shown on Drawings.
2. Adjust Contract Price if actual top of rock elevation differs from that shown on Drawings.
3. Pay limits for change in quantity of rock excavation shall be maximum trench width as defined herein.
4. Unit cost for change in quantity of rock excavation shall include cost of excavation, hauling, and disposal.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

1.03 DEFINITIONS

A. Influence Zone Under Foundations, Pavements, or Sidewalks: Area below foundation or pavement or sidewalk subbase bounded by 1 horizontal to 2 vertical slope extending outward from 1-foot beyond outer edge of foundation or pavement or sidewalk subbase.

B. Influence Zone Under Piping or Electrical Ducts: Area below limits bounded by line 6 in. below pipe or electrical duct and by 1 horizontal to 2 vertical slope extending outward from that line 1-foot beyond outer edge of pipe or duct.

C. Unsuitable Material: Topsoil, peat, organic soils, and materials containing slag, cinders, foundry sand, debris, and rubble or soil with less than required bearing capacity as determined by Engineer.

1.04 SUBMITTALS

A. Test Results.

1. Compaction test results.
2. Proctor test results.

B. Miscellaneous Submittals.

1. Test results to verify fill materials and bedding and cover materials meet Specifications.

C. Submit in accordance with Section 01 33 00.

1.05 QUALITY ASSURANCE

A. Testing shall be provided by Contractor in accordance with Section 01 and this Section.

B. Sheeting, shoring, and bracing shall conform to safety requirements of federal, state, and local agencies.

1.06 PROJECT / SITE CONDITIONS

A. Notify owners of above or below ground utilities encountered during trenching operations.

B. Cap and remove or relocate services in accordance with instructions of owners of such utilities.

C. Protect, support, and maintain conduits, wires, pipes or other utilities that are to remain in accordance with requirements of owners of such utilities.

D. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

F. Trenching and backfilling within influence zone of new or existing structures shall conform to the requirements of Section 31 23 00.

PART 2 – PRODUCTS

2.01 FINE AGGREGATE

A. Granular material, consisting of uniformly graded durable particles. Unwashed bank-run sand and crushed bank-run gravel may be used.

1. Gradation No. 1: IDOT Gradation FA-1 and FA-2
2. Gradation No. 2: IDOT Gradation FA-5 and FA-6

2.02 COARSE AGGREGATE

A. Hard, tough, and durable crushed stone or crushed rock.

1. Gradation No. 1: IDOT CA-11, CA-13, CA-14, CA-15 (open graded)
2. Gradation No. 2: IDOT CA-6, CA-7, CA-9, CA-10 (well graded)
3. Gradation No. 3: IDOT CA-1

2.03 FILL MATERIALS

A. Structural Fill:

1. Fine Aggregate Gradation 1 or 2, Coarse Aggregate Gradation 1 or 2.
2. Plasticity Index: ASTM D4318, 6 or less. Plasticity Index shall be performed on fraction of material that passes the No. 40 sieve.
3. Maximum Fines: ASTM D422, 10% passing No. 200 sieve.
4. Uniformity Coefficient: 5 or greater.

B. Excavated Trench Material:

1. Natural soils resulting from excavation of project trenches.
2. Free of topsoil, wood, peat, cinders, organic and deleterious matter or other rubbish.

C. Flowable Fill: Lean concrete with minimum of 50 pounds of cement per cubic yard, flyash, fine and coarse aggregate, foaming agent, lightweight aggregate, and admixtures as required to achieve a flowable mix with a minimum compressive strength of 30 pounds per square inch and a maximum unit weight of 60 pounds per cubic foot.

2.04 FILTER FABRIC

A. Porous non-woven fabric with multiple layers of randomly arranged fibers, min 4.0 ounce per square yard (typical).

B. Manufacturers:

1. Mirafi 140N by Mirafi, Inc.
2. Typar 340I by DuPont.
3. C-40NW by Contech.
4. FX-40HS by Carthage Mills.
5. Or Equal.

2.05 SHEETING, SHORING, AND BRACING

A. Type, design, detail, and installation of sheeting, shoring, and bracing shall be determined by and sole responsibility of Contractor.

2.06 SOURCE QUALITY CONTROL

A. Testing:

1. One sieve analysis, plasticity index, and uniformity coefficient for each source of structural fill.
2. One sieve analysis for each source of bedding material and cover material.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work such as areas loosened by frost action or softened by flooding or weather, or existence of unsuitable material. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Natural soils or fill softened by frost, flooding or weather shall be removed and replaced.

B. Remove unsuitable material from within trenches.

C. Stabilize trench bottom and replace unsuitable materials with Coarse Aggregate Gradation No. 3.

D. Where placement of coarse aggregate will not provide an adequate foundation for laying pipe due to instability of existing materials and where ordered by Engineer, place geotextile fabric on top of unstable subgrade materials prior to placing coarse aggregate. Sufficient geotextile fabric shall be used to completely enclose foundation materials and pipe.

3.03 SHEETING, SHORING, AND BRACING

A. Whenever necessary to prevent caving during excavation and to protect adjacent piping, structures, property, workers, and public, trenches shall be sheeted, shored, and braced.

B. When sheeting, shoring, and bracing is required, install to prevent soil from entering excavation below or through sheeting.

C. Remove sheeting, shoring, and bracing after backfilling, or when approved by Engineer as backfill is being placed.

D. Remove sheeting, shoring, and bracing in manner not damaging to facility or permitting voids within backfill.

E. Fill settled areas after sheeting, shoring, and bracing has been removed.

3.04 DEWATERING

A. Dewater excavation site prior to starting trenching and maintain groundwater minimum of 12 inches below bottom of trench. Dewatering system shall be of a sufficient size and capacity as required to control hydrostatic pressure on trench sides and bottom to allow material to be excavated, pipe installed and backfill placed, all in a dry condition.

B. Contractor is responsible for choosing method of groundwater control.

C. If Contractor chooses to use deep wells or well points, wells and well points shall be designed, installed, and operated to prevent removal of in-situ materials.

D. Drill, maintain, and abandon dewatering wells in accordance with federal, state, and local ordinances.

E. Keep construction site free-draining. Keep trenches free of water.

F. Remove soil disturbed by pressure or flow of groundwater.

G. Maintain dewatering system to prevent uplifting of or damage to facilities.

H. Protect adjacent utilities, structures, and properties from damage resulting from dewatering operations.

I. Direct discharge of trench dewatering pumps to sediment traps before conveying to natural drainage channels or storm water drains.

3.05 EXCAVATION

A. Excavate to the lines, grades, and elevations indicated and necessary to complete construction.

B. Method of excavation shall be consistent with soil types encountered and result in undisturbed subgrade. Loosened soils shall be recompacted or removed and replaced.

C. Where possible, excavated materials shall be placed in areas that will not block existing vehicle and pedestrian traffic and drainageways.

D. Conduct excavating operations to carefully expose all in-place underground structures without damage. Wherever excavation extends under or approaches close to an existing structure, precautions and protective measures shall be taken as necessary to preserve the structure and provide temporary support. Use hand excavation methods to probe for and expose such critical or hazardous installations as gas pipe and power or communication cables.

E. Excavation of Rock:

1. Where rock, boulders, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, remove or excavate such material by means which will neither cause additional cost to the Owner nor endanger buildings or structures on or off site.
2. Do not use explosives without written permission from Engineer.

F. Trench Tolerances:

1. Maximum width of trench at top of pipe shall be outside diameter of pipe plus 24 inches. When sheeting, shoring, and bracing required, width of trench may be increased to allow for their use, provided provisions for excess width of trench are met.
2. Where trench width below top of pipe exceeds specified limit, Contractor, at his expense, shall furnish pipe with strength adequate for actual trench width.
3. Minimum trench width shall be outside diameter of pipe plus 18 inches
4. Top of concrete encasement for electrical duct or top of conduit shall be minimum of 24-inches below final grade or as shown on Drawings.
5. Trench width at ground surface shall be the minimum allowable based on OSHA standards and soil types.

G. Do not advance excavation of trenches more than 100 feet ahead of completed pipe installation.

H. Do not excavate within influence zone of existing footings or foundations without prior approval of Engineer.

I. Excavation through Rigid Pavement:

1. Remove pavement a minimum of 1 foot beyond anticipated edge of excavation.
2. Saw cut pavement to ensure straight joint.
3. Pavement replacement shall match existing.

J. Excavation, backfill, and pavement replacement of roadways shall conform to requirements of local highway authority. In no case shall the replacement pavement edges bear on less than 12 inches of undisturbed soil.

3.06 INSTALLATION USING TRENCHLESS METHODS

A. See Section 33 05 07.13 and 33 05 07.13.

3.07 FILL USAGE

A. Bedding Material:

1. Plastic, Copper, Fiberglass or Reinforced Plastic Pipe, and Electrical Conduit or Ducts: Fine aggregate gradation No. 1.
2. Other Pipe 18-inch diameter or less: Coarse aggregate gradation No. 1.
3. Other Pipe over 18-inch diameter: Coarse aggregate gradation No. 2.

B. Bedding Material Limits:

1. Electrical Ducts:

a. Hand grade bottom of trench to established uniform grade of not less than 4 inches / 100 feet.
b. Use bedding material to bring grade to desired elevation.

2. Bedding material shall be placed over entire width of trench bottom such that after pipe has been placed thereon, imbedded to grade and aligned, there remains a 6 inch minimum depth of material below pipe barrel and a minimum of 5 inches below the bell.
3. Bell holes shall be excavated so that entire pipe barrel rests on bedding.

C. Cover Material:

1. Copper, Fiberglass or Reinforced Plastic Pipe and Electrical Conduit: Fine aggregate gradation No.1.
2. Other Piping: Fine aggregate gradation No. 2.
3. Electrical Ducts: Structural Fill or Excavated Trench Material.
4. Bedding material may be substituted for cover material.

D. Cover Material Limits:

1. Electrical Conduit: Minimum 6 inches above and 9 inches each side.
2. Piping: Minimum of 12 inches above top of pipe and 12 inches each side.

E. Structural Fill: Within trenches under pavements and sidewalks and within piping, electrical duct or structure influence zone.

F. Excavated Trench Material: Other areas not previously specified.

G. Flowable Fill: Where noted.

3.08 PLACING FILL

A. Notify Engineer before placing fill material.

B. Do not use frozen material or place fill on frozen subgrade.

C. Place filter fabric where indicated in accordance with manufacturer’s recommendations.

D. Do not backfill until concrete is properly cured and has reached design strength, coatings approved, and required tests accepted.

E. Place fill simultaneously on both sides of freestanding structures.

F. Where pipes leave structures, protect by backfilling pipe influence zone down to undisturbed soil with bedding material.

G. Where pipes or electrical ducts cross, protect piping or ducts at higher elevation by backfilling trench within influence zone of higher pipe or duct with structural fill.

H. Where pipes or electrical ducts leave structures, protect by backfilling within influence zone of pipe or duct with structural fill.

I. Provide mechanical compaction.

J. Place and compact bedding, cover and fill materials in lift thickness and to densities listed below:

1. Degree of compaction: ASTM D1557, Modified Proctor.
2. Moisture Content: Within 3% of optimum.

Location	Maximum Lift Thickness	Modified Proctor (%)
Bedding Material or Cover Material	6 inches	90 minimum
Fill material under Footing, Foundation Slab, or Floor Slab Influence Zone	8 inches	95 minimum
Fill material under Sidewalk, Pavement, Piping, or Electrical Duct Influence Zone	12 inches	90 minimum
Fill material under Lawn and Landscaped Areas	12 inches	80 minimum, 90 maximum

3.09 FIELD QUALITY CONTROL

A. Testing:

1. One field density test for each 25 cubic yards, bedding material and cover material, minimum one each lift.
2. Trench Backfill Material: One field density test for each 500 cubic yards.
3. Determine in-place density of fill at maximum intervals specified in accordance with ASTM D1556, D2167, D2922 or D2937.

3.10 ADJUSTMENT AND CLEANING

A. Stockpile material suitable for backfill where designated by Engineer. Place no fill where trenches for sewers, water line, or other utilities will be located.

B. Remove and dispose of all unsuitable excavated material.

C. Owner has first right to excess material suitable for backfilling or site grading, not used in Work. Deliver to site not greater than 2 miles away as determined by Owner. Conform to the requirements of Section 01 41 00.

D. Remove excess material not required by Owner, material not suitable for backfilling or site grading, and unsuitable materials from site.

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROL

PART 1 – GENERAL

1.01 SUMMARY

A. Section describes requirements for control of erosion on construction sites. Contractor shall provide necessary materials, equipment, and labor to control erosion by methods specified herein. If no specific quantities are shown on Plans, Contractor shall use whatever quantities are necessary to prevent sediment transport into adjacent storm water conveyance systems or water bodies.

B. Section includes:

1. Channel Erosion Mat
2. Silt Fence
3. Storm Drain Inlet Protection
4. Mulching
5. Non-Channel Erosion Mat
6. Seeding
7. Sediment Trap
8. Dewatering

Contractor shall not begin work until after initial erosion and sediment control devices are in place and approved by Engineer.

1.02 REFERENCES

A. Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, Current Edition

B. Illinois Urban Manual (IUM), Current Edition

1.03 PERMITS

A. Prior to start of any earthwork, the following local permits are required and will be obtained by Owner.

1. None

1.04 STORMWATER POLLUTION PREVENTION PLAN

A. CONTRACTOR shall prepare a Stormwater Pollution Prevention Plan (SWPPP) for the Work as required by IEPA regulations. Contractor shall prepare the SWPPP and submit it to Engineer for review according to Section 01 33 00. Contractor shall comply with said plan and fully execute it in accordance with IEPA regulations, in order to minimize the discharge of pollutants in storm water. Provide Engineer and Owner with copies of inspection reports upon demand.

1.05 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package.

Partial submittals are unacceptable.

B. Submit in accordance with Section 01 33 00.

PART 2 – **PRODUCTS**

2.01 All products shall be as specified in current version of Illinois Urban Manual.

2.02 TOPSOIL

A. Topsoil shall be fertile, friable, natural loam surface soil, reasonably free of subsoil, clay lumps, brush, weeds, and free of roots, stumps, stones larger than two inches in any dimension, and other matter harmful to plant growth. Topsoil to supplement insufficient topsoil on the site shall originate from local sources, but not from bogs or marshes.

2.03 TEMPORARY SEEDING

A. Temporary seed shall conform to the requirements of Article 1081.15(g) of the IDOT Standard Specifications.

2.04 EROSION CONTROL MAT (NON CHANNEL)

A. Excelsior blanket conforming to the requirements of Article 1081.10(a) of the IDOT Standard Specifications.

2.05 CHANNEL EROSION CONTROL MAT

A. Excelsior blanket conforming to the requirements of Article 1081.10(c) of the IDOT Standard Specifications.

2.06 STORM DRAIN INLET PROTECTION

A. Inlet protection shall be a manufactured storm sewer insert such as Catch All by Marathon Materials, Dandy Bag by Dandy Products, or approved equal.

2.07 EROSION LOG

A. Temporary Erosion Control Barriers conforming to the requirements of Article 1081.15(c) of the IDOT Standard Specifications.

2.08 FILTER SOCK

A. Conform to the requirements of IUM Material Specification 514 – Manufactured Ditch Checks, rolled erosion control products.

2.09 Water: Furnished in accordance with Section 01 52 00.

2.10 All other products shall be specified in current version of Illinois Urban Manual.

PART 3 – **EXECUTION**

3.01 EROSION CONTROL REQUIREMENTS

A. All erosion control measures shall be implemented in accordance with the Illinois Urban Manual.

1. Practice Standard 814: Ditch Check

2. Practice Standard 830: Erosion Control Blanket
3. Practice Standard 861: Inlet Protection – Impervious Areas
4. Practice Standard 862: Inlet Protection – Pervious Areas
5. Practice Standard 875: Mulching for Seeding and Soil Stabilization
6. Practice Standard 927: Soil Stockpile
7. Practice Standard 954: Temporary Concrete Washout Facility
8. Practice Standard 965: Temporary Seeding
9. Practice Standard 981: Topsoiling

B. Site Inspections: The SWPPP shall be implemented as required by this section. CONTRACTOR shall complete and document site inspections at least weekly and within 24 hours after 0.5 inch or greater rainfall.

C. SWPPP Revisions: The SWPPP shall be revised as necessary as soon as practicable following an inspection. Any plan modifications shall be implemented within 7 calendar days following discovery. That Contractor submit to the ENGINEER on an on-going basis the revised project schedules, alternate erosion control details, material data sheets, and locations of specific erosion control measures not explicitly indicated by this Plan, as construction activities progress throughout the project. The Contractor's erosion control implementation submittals will be reviewed by the ENGINEER and the Owner and will be incorporated into the SWPPP as needed.

D. Erosion control devices (or BMPs), disturbed areas of the site that have not achieved final stabilization, and locations where vehicles enter and exit the site shall be inspected by a qualified person at least once every seven (7) calendar days and following a storm event resulting in 0.5 inches or more of rain. Post-rain event inspections shall be completed within 24 hours of the end of the rain event, or by the end of the following work day.

E. Make needed repairs and document findings of inspections in a site erosion control log to be kept with the SWPPP that includes the date of inspection, name of person conducting inspection, scope of the inspection, major observations relating to the SWPPP, and any actions taken. The IEPA Field Operations Section shall be notified within 24 hours of any permit violation or incidence of noncompliance observed during an inspection.

F. Install perimeter erosion controls and rock tracking pad construction entrance(s) prior to any land-disturbing activities, including clearing and grubbing.

G. Contractor shall not begin work until after initial erosion and sediment control devices are in place and approved by Engineer.

H. Contractor shall take all possible precautions to prevent sediment from being tracked onto public or private roadways. Any sediment reaching a public or private road shall be removed by street cleaning (not flushing) before end of each workday.

I. All activities on site shall be conducted in a logical sequence to minimize area of bare soil exposed at any one time.

J. Site stabilization measures shall be initiated whenever any clearing, grading, excavating, or other earth disturbing activities have permanently ceased on any portion of the site, or have temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization measures shall be initiated no later than one (1) working day after cessation of construction activities, except when stabilization is precluded by snow cover. Once initiated, stabilization measures shall be completed as soon as practicable, but no more than 14 days from the initiation of stabilization work in an area.

K. Immediately stabilize stockpiles and surround stockpiles as needed with silt fence or other perimeter control if stockpiles will remain inactive for 7 days or longer.

3.02 TEMPORARY SEEDING

A. All disturbed ground left inactive for 14 days or longer shall be stabilized by seeding or sodding (only prior to October 15) or by mulching or covering, or other equivalent control measure.

Between September 15 and October 15 stabilize with mulch, tackifier, and a perennial seed mixed with winter wheat, annual oats, or annual rye, as appropriate for region and soil type.

After October 15th, stabilize with a polymer and dormant seed mix, as appropriate for region and soil type.

B. Temporarily seed all areas of exposed soil that will not be brought to final grade or on which land-disturbing activities will not be performed for a period greater than 14 days.

C. Temporarily seed in accordance with IUM Practice Standard 965.

3.03 MULCHING

A. In accordance with IUM Practice Standard 875.

3.04 EROSION LOG

A. In accordance with IUM Practice Standard 814.

3.05 STORM DRAIN INLET PROTECTION

A. Install inlet protection prior to land-disturbing activities in the contributing drainage area and/or immediately upon inlet installation.

B. Install device according to manufacturer's instructions.

C. The contributing drainage area to inlet protection device shall be one acre or less. In instances where a larger contributing drainage area exists, runoff shall be routed through a sediment trap or settling device upstream of inlet.

3.06 TEMPORARY SOIL STOCKPILES

A. Erosion and sediment control measures are required for soil stockpiles to remain in place for more than 24 hours.

B. Soil stockpiles shall be located a minimum of 25 feet from any wetland, stream, creek, ditch, swale, water conveyance system, lake, pond, etc.

C. Perimeter sediment control, such as a silt fence, shall be installed on the downslope side of the stockpile prior to its creation. Perimeter protection shall be placed a minimum of 8 feet from the toe of the stockpile slope.

D. Provide erosion and sediment control measures in accordance with IUM Practice Standard 927.

3.07 DEWATERING

A. The Contractor shall make their own calculations and shall plan their work accordingly. Dewatering, surface water control, and temporary diversions shall be used to facilitate work

"in the dry". Work shall not be allowed in wetlands, flowing water, or in standing water that can be discharged directly to Waters of the U.S. or Isolated Waters of Kankakee County.

B. Contact owner or operator of municipal separate stormwater system if discharge is to municipal storm water conveyance system.

C. Select best management practice based on predominant soil texture encountered at dewatering site with consideration given to pumping or flow rates to prevent discharge of sediment to the maximum extent practical. General categories include:

1. Geotextile Bags
2. Gravity Based Settling Systems
3. Passive Filtration Systems
4. Pressurize Filtration Systems

D. Water pumped from the site shall be treated by temporary sedimentation basins, grit chambers, sand filters, upslope chambers, hydro-cyclones, swirl concentrators, or other appropriate controls designed and used to remove particles of 100 microns or greater for highest dewatering pumping rate. If water is demonstrated to have no particles greater than 100 microns during dewatering operations, then no control is needed before discharge. Water may not be discharged in a manner that causes erosion of site or receiving channels.

E. In accordance with IUM Practice Standard 813.

END OF SECTION

This page intentionally left blank.

DIVISION 32

EXTERIOR IMPROVEMENTS

This page intentionally left blank.

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 – GENERAL

1.01 SUMMARY

A. Provide crushed aggregate base course where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 DEFINITIONS

A. IDOT Specs: Illinois Department of Transportation Standard Specification, latest edition

B. ASTM: American Society for Testing and Materials

C. AASHTO: American Association of State Highway and Transportation Officials

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Source of Aggregates

C. Test Results of Quality Assurance Testing

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Perform the following testing:

1. Aggregate Gradation in accordance with AASHTO T 27

PART 2 – PRODUCTS

2.01 PAVEMENT MATERIALS

A. Aggregate: For aggregate shoulder, and aggregate base courses for asphalt pavement sections, concrete sidewalks, and curb and gutter

1. 100% crushed stone in accordance with IDOT Article 1004.01(3)
2. IDOT Gradation CA-6

PART 3 – EXECUTION

3.01 PREPARATION

A. Check subbase for soundness, outline, and contour. Prepare areas for base course placement on

subbase by scraping down or filling irregularities. Compact subbase prior to basecourse placement.

B. Proof roll the prepared subbase. Make multiple passes to test entire area. Remove and replace areas where displacement in base (yielding, heaving, cracking or other signs of instability), in the opinion of the Engineer, is more than 1 inch under a fully-loaded tandem-axle dump truck. Excavate and backfill displaced areas with new base course material, compact, and retest. Do not begin placement of base course until deficient areas have been corrected.

C. Remove excess material not required by Owner, material not suitable for backfilling or site grading, and unsuitable materials from site. Dispose of excavated material in accordance with local, state, and federal requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

A. Adjust weight, type, capacity, haul routes, and method of operation of hauling vehicles such that there is no damage to existing streets, subgrade, or base course.

B. Owner has final authority to designate haul routes, procedures, and operation times

3.03 INSTALLATION

A. Construct aggregate base course in two or more layers of approximately equal thickness.

B. Maximum compacted thickness of layer shall not exceed 6 inches.

C. Deposit material on foundation or previously placed layer to minimize segregation and facilitate spreading to uniform layer.

D. Compact after each layer has been placed and spread to thickness, width, and contour to 95% of maximum density (Standard Proctor), in accordance with ASTM D-1557, before succeeding layer is placed.

3.04 FIELD QUALITY CONTROL

A. Check in-place base course for surface irregularities and repair unacceptable areas.

END OF SECTION

SECTION 32 12 16
ASPHALT PAVING

PART 1- GENERAL

1.01 SUMMARY

A. Provide asphalt pavement where shown on Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 DEFINITIONS

A. IDOT Specifications: Illinois Department of Transportation Standard Specifications for Road and Bridge Construction, Current Edition, including Supplemental Specifications and Recurring Special Provisions and Highway Standards

B. ASTM: American Society for Testing and Materials

C. AASHTO: American Association of State Highway and Transportation Officials

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Source of Aggregates showing use on previous local Department of Transportation Projects.

C. Asphalt Mix Design, including aggregate gradation, showing use on previous local Department of Transportation Projects.

D. Test Results of Quality Assurance Testing

E. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Asphalt supplier shall have a minimum of 5 years of experience producing asphalt mixes for the Department of Transportation.

B. Do not commence placement of asphalt until mix design has been reviewed and approved by Engineer.

C. Perform the following testing during asphalt mix production and placement:

1. Aggregate Gradation in accordance with AASHTO T 27
2. Asphalt Content.
3. Air Voids by calculation in accordance with AASHTO T 269.
4. Voids in Mineral Aggregate (VMA) by calculation in accordance with AASHTO R 35.

D. Frequency of testing for Aggregate Gradation, Asphalt Content, Air Voids, and VMA:

Total Daily Production per mix design for Contract (tons)	Samples per Day (minimum)
50 - 600	1
601 to 1500	2
Greater than 1501	3

E. Testing shall be provided by Contractor in accordance with Section 01 and this section.

PART 2 - PRODUCTS

2.01 BASE MATERIAL

A. Aggregate Base Course in accordance with Section 32 11 23.

2.02 PAVEMENT MATERIALS

A. Aggregate:

1. Aggregate for Bituminous Binder:

a. Sound, angular crushed stone, crushed gravel, or crushed slag, sand, stone or slag screenings.
b. Gradation: Well graded between limits specified and shall conform to IDOT Specifications Article 1004.03 for HMA Binder Course, IL-19.0, N50.

2. Aggregate for Bituminous Surface:

a. Crushed stone, crushed gravel, crushed slag, and sharp-edged natural sand.
b. Sand prepared from stone, blast-furnace slag, gravel, or combinations thereof may be used if required to suit local material availability.
c. Gradation: Well graded between limits specified and shall conform to IDOT Specifications Article 1004.03 for HMA Surface Course, IL-9.5.

5. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with ASTM D242.

B. Bituminous Materials:

1. Asphalt Binder: Penetration Grade PG 64-22 in accordance with ASTM D946.

C. Mix Design:

Mixture Use	Surface Course	Binder Course
Asphalt Binder	PG 64-22	PG 64-22
Design Air Voids	4.0 @ N50	4.0 @ N50
Mixture Composition (Gradation Mixture)	IL 9.5	IL 19.0
Friction Aggregate	Mix “D”	N/A
Unit Weight	112 lbs/square yard/inch	112 lbs/square yard/inch

D. Prime Coat and Tack Coat

1. Bituminous material meeting one of the types listed in IDOT Standard Specifications, Article 406.02.

E. Recycled Asphalt Pavement

1. Stockpile recycled asphalt pavement separately from virgin materials and list each as individual job mix formula components.

2. Conform to the following maximum allowable percent binder replacement (ratio of recovered binder to total binder):

a. Binder Course: 25%
b. Surface Course: 15%

PART 3 - EXECUTION

3.01 WEATHER LIMITATION

A. Apply prime and tack coats when ambient temperature is above 35 degrees Fahrenheit. Do not apply when base is wet or contains standing water.

B. Place asphalt material when atmospheric temperature is above 40 degrees Fahrenheit and rising, and when base is dry.

C. Do not place asphalt material on frozen subgrade or base.

3.02 PREPARATION

A. Check base course for soundness, outline, and contour. Prepare base course for areas to be paved by scraping down or filling irregularities. Compact base course prior to paving.

B. Proof roll prepared aggregate base course to check for unstable areas and areas requiring additional compaction. Make multiple passes to test entire area to be paved. Remove and replace any area where displacement in base (yielding, heaving, cracking or other signs of stability), in opinion of Engineer, is more than 1 inch under a fully-loaded tandem-axle dump truck. Excavate and backfill displaced area with new base material, properly compacted and retested. Do not begin paving work until deficient areas have been corrected.

C. Prime Coat:

1. Apply at rate of 0.25 to 0.80 gallon per square yard, over compacted aggregate base.
2. Apply material to penetrate and seal, but not flood, surface.
3. Cure and dry as long as necessary to attain penetration and evaporation of volatile.

D. Tack Coat:

1. Apply to contact surfaces of previously paved surfaces abutting or projecting into areas to be paved.
2. Apply to surface free of loose dirt, dust or other foreign matter.
3. Apply at a rate of 0.025 gallon per square yard of surface.
4. Apply only to areas expected to be paved in the same day.
5. Allow to dry prior to paving.
6. Avoid tracking or smearing bituminous materials onto adjoining surfaces. Remove material tracked or smeared to adjoining surfaces.

3.03 DELIVERY, STORAGE, AND HANDLING

A. Transport asphalt materials in covered trucks during rainy weather and when air temperature falls below 65 degrees F.

B. Adjust weight, type, capacity, haul routes, and method of operation of hauling vehicles such that no damage results to existing streets, subgrade, or base course.

C. Owner has final authority to designate haul routes, procedures, and operation times.

3.04 PLACING ASPHALT MIX

A. Place asphalt mixture on prepared surface, spread, and strike-off. Spread mixture at a temperature within 20 degrees Fahrenheit of temperature the asphalt material supplier recommends.

B. Place using a self-propelled paver to ensure uniform spreading and strike-off of mix. Provide a smooth mixture free of tearing and segregation. Place mixture to required grade, cross-section, and compacted thickness.

C. Place inaccessible and small areas by hand. Place mixture to required grade, cross-section, and compacted thickness.

D. Joints: Place asphalt continuously to limit the number of joints. Make joints between old and new pavements and between successive days' work, to ensure continuous bond between adjoining work. Clean contact surfaces and apply tack coat. Construct joints to have same texture, density, and smoothness as other sections of asphalt pavement.

3.05 COMPACTION

A. Compact asphalt mix while still hot. Compact each layer by uniformly rolling.

B. In small areas not accessible by a roller, compact using mechanical tampers.

C. Compact until no further consolidation is visible under action of the compaction equipment.

D. Keep roller wheels moistened to avoid sticking.

E. Hot-mix asphalt shall be compacted to the Density Control Limits specified in IDOT Standard Specifications Article 1030.05(d)(4). Do not re-roll compacted mixtures falling below required densities. If densities fall below the required densities, stop placement and identify and correct problem.

3.06 FIELD QUALITY CONTROL

A. Pavement Testing:

1. General: Test in-place asphalt courses for compliance with requirements for surface smoothness and thickness. Repair or remove and replace unacceptable paving.

2. Thickness Tolerance: In-place compacted thickness will not be acceptable if actual thickness exceeds the following allowable variation from required thickness:

a. Binder Course: 1/4 inch.
b. Surface Course: 1/8 inch.

3. Surface Smoothness Tolerances: Test finished surface of each asphalt concrete course for smoothness, using 10 foot straight edge applied parallel with, and at right angles to, the centerline of paved area. Surfaces will not be acceptable if deviations exceed 1/8 inch.

END OF SECTION

This page intentionally left blank.

SECTION 32 16 13
CURBS AND GUTTERS

PART 1 – GENERAL

1.01 SUMMARY

A. Provide portland cement concrete curb and gutter, including form work and reinforcement, base materials with compaction, where shown on the Drawings, as specified herein, and as needed for a complete and proper installation of curb or curb turnouts, combination curb and gutter, combined curb and gutter turnouts, or resetting curb and gutter.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

B. AASHTO: American Association of State Highway and Transportation Officials

C. CRSI: Concrete Reinforcing Steel Institute

D. IDOT: Illinois Department Of Transportation

E. NRMCA: National Ready Mixed Concrete Association

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this section.

B. Product Data:

1. Verification of concrete mix design.

C. Test Results:

1. Tests indicating compliance of reinforcement with referenced standards.
2. Concrete test results.
3. Concrete delivery tickets: With each load of concrete delivered, provide duplicate tickets, one for Contractor, one for Engineer, with following information.

a. Serial number of ticket.
b. Date and truck number.
c. Name of supplier.
d. Class of concrete.
e. Type of cement and cement content in bags/cubic yard.
f. Admixture brand names.
g. Aggregate size.
h. Time loaded.
i. Amount of concrete in load.
j. Gallons of water added at site and slump of concrete after addition of water.
k. Temperature of concrete at delivery.
l. Time unloaded.

4. Certified reports of field tests and observations.

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Plant Certification: Plant or concrete supplier shall comply with requirements of NRMCA certification plan as regards material storage and handling, batching equipment, central mixer, truck mixers with counters, agitators, nonagitating units, and ticketing system.

B. Do not commence placement of concrete until mix designs have been reviewed and approved by Engineer.

C. Concrete Testing: Testing shall be provided by Contractor in accordance with Section 01 and this Section.

1. Conduct tests on sample material in accordance with methods listed below:

a. Slump: ASTM C143.
b. Air-Entrainment: ASTM C231.
c. Compressive Strength: ASTM C31 and ASTM C39.

PART 2 – PRODUCTS

2.01 BASE MATERIAL

A. Crushed Aggregate Base Course in accordance with Section 32 11 23.

2.02 FORMS

A. Construct forms to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished concrete. All forms must be inspected and approved by the Engineer or his authorized representative, prior to placement of concrete.

B. Forms shall be straight and of sufficient strength to resist the pressure of the concrete without bending, tipping, and other deformation. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

C. Forms shall not be removed from freshly placed concrete until it has hardened sufficiently to resist spalling, cracking or any other damage.

D. Curb Machines may be used to construct curb provided the curb can be constructed to the requirements of the specifications.

2.03 REINFORCEMENT

A. Comply with the following as minimums:

1. Tie Bars: AASHTO M31M, Grade 300 or 400.

B. Do not use reinforcement having any of the following defects:

1. Bar lengths, depths, or bends exceeding the specified fabricating tolerances.
2. Bends or kinks not indicated on the Drawings or required for this Work.
3. Bars with cross-section reduced due to excessive rust or other causes.

2.04 CONCRETE

A. Conform to Section 03 30 00.

1. Class A2.

2.05 OTHER MATERIALS

A. Curing Compounds:

1. Membrane Curing Compounds shall be in accordance with AASHTO M148, Type 2.

B. Preformed Expansion Joint Material:

1. Shall meet the requirements of ASTM D 1751.
2. Shall be 3/4 inch thick and premolded.
3. Shall be in accordance with the cross-section of the curb and gutter on the plans.

PART 3 – EXECUTION

3.01 PREPARATION

A. Place base aggregate in accordance with Section 32 11 23.

B. Check base course outline, and contour. Scrape down or fill irregularities.

C. Compact base course prior toconstructing curb.

D. Remove foreign matter accumulated in formwork. Forms may be oiled, if necessary.

E. Where new curb abuts existing curb, place two (2) 12-inch tie bars, 6 inches into existing curb. Do not place tie bars in curb head.

3.02 MIXING CONCRETE

A. Transit mix the concrete in accordance with provisions of ASTM C 94.

B. Deliver and complete discharge within 1-1/2 hours of commencing of mixing. Limitations may be waived by Engineer if concrete slump, after 1-1/2 hours, is sufficient so that concrete can be placed without addition of water. In hot weather, time criteria may be reduced by Engineer.

C. Do not use concrete that has stood for over 30 minutes after leaving the mixer.

3.03 CONVEYING CONCRETE

A. Perform concrete placement at such a rate that concrete which is being integrated with fresh concrete is still plastic.

B. Deposit concrete as nearly as practicable in its final location so as to avoid separation due to rehandling and flowing.

C. Do not use concrete which becomes non-plastic and unworkable, does not meet required quality control limits, or has been contaminated by foreign materials.

D. Remove rejected concrete from job site.

3.04 CONCRETE PLACEMENT

A. Deposit concrete in a continuous operation, within limits of construction joints, until placing of a section is complete.

B. Consolidate concrete immediately after placing, by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.

C. Do not vibrate forms or reinforcement.

D. Do not use vibrators to transport concrete inside the forms.

E. Bring surfaces to correct level with straightedge, and then strike off.

F. Use bullfloats or darbies to smooth surface, leaving surface free from bumps and hollows.

3.05 CONCRETE FINISHING

A. While concrete is still plastic, check curb and gutter with 10-foot straight edge. For areas showing irregularities of 0.25 inches or more cut down high areas or fill depressions with freshly mixed concrete and strike off, consolidate and refinish concrete Do not add water to correct surface deficiencies.

B. Provide a light broom finish perpendicular to direction of travel.

C. Expansion and control joints:

1. Expansion Joints shall extend the entire width of the curb and gutter, at intervals not to exceed 300 feet. Expansion joints shall be installed the full depth of concrete curb and gutter at all construction joints and where the curb and gutter abuts castings, begins a curve, or abuts other rigid structures. Expansion joints shall be placed perpendicular to the face and top of curb.

2. Control Joints:

a. Except as otherwise directed, control joint spacing to be at maximum intervals of 16 feet.
b. Make formed control joints not less in depth than 1/4 the curb height, using a 0.25 inch radius jointing tool.
c. Make sawed control joints not less than 2 inches deep within 24 hours after concrete placement.

D. All edges shall be finished with a 0.25 inch radius edging tool.

E. Curing Compound shall be applied to all exposed surfaces immediately after finishing operations have been completed and surface water has disappeared.

3.06 PROTECTION FROM FREEZING

A. These provisions shall be followed when the atmospheric temperature is 35°F, or is expected to drop below 35°F during the curing period.

B. Heating of aggregates and water:

1. Concrete temperature shall be at least 50°F and not more than 80°F at the time of placing.
2. Heating equipment or methods which alter or prevent the entrainment of the required amount of air in the concrete shall not be used.

3. The equipment shall be capable of heating the materials uniformly.
4. Neither aggregates nor water used for mixing shall be heated to a temperature exceeding 150°F.
5. Materials containing frost or lumps of frozen material shall not be used.
6. When either aggregates or water are heated to 100°F, they shall be combined first in the mixer before cement is added.

C. Immediately after a pour is completed, the freshly placed concrete and forms shall be covered so as to form a protective enclosure and the air in the enclosure kept at a temperature above 50°F for at least 72 hours.

3.07 FIELD QUALITY CONTROL

A. Conform to Section 03 30 00.

B. If tests verify Work in-place is not in conformance with Specifications, Engineer will determine if Work in-place is adequate for intended use. If Work in-place is determined to be inadequate, Contractor shall follow such remedial or replacement measures which Engineer may require. Contractor shall bear costs associated with testing, engineering analysis, remedial work, and replacement required under terms of this paragraph

END OF SECTION

This page intentionally left blank.

SECTION 32 16 23
SIDEWALKS

PART 1 – GENERAL

1.01 SUMMARY

A. Provide portland cement concrete sidewalk including form work and reinforcement, base materials with compaction, where shown on Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

B. CRSI: Concrete Reinforcing Steel Institute

C. NRMCA: National Ready Mixed Concrete Association

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this section.

B. Product Data:

1. Verification of concrete mix design.

C. Test Results:

1. Tests indicating compliance of reinforcement with referenced standards.
2. Concrete test results.
3. Base material test results.
4. Concrete delivery tickets: With each load of concrete delivered, provide duplicate tickets, one for Contractor, one for Engineer, with following information.

a. Serial number of ticket.
b. Date and truck number.
c. Name of supplier.
d. Class of concrete.
e. Type of cement and cement content in bags/cubic yard.
f. Admixture brand names.
g. Aggregate size.
h. Time loaded.
i. Amount of concrete in load.
j. Gallons of water added at site and slump of concrete after addition of water.
k. Temperature of concrete at delivery.
l. Time unloaded.

5. Certified reports of field tests and observations.

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Plant Certification: Plant or concrete supplier shall comply with requirements of NRMCA certification plan as regards material storage and handling, batching equipment, central mixer, truck mixers with counters, agitators, nonagitating units, and ticketing system.

B. Do not commence placement of concrete until mix designs have been reviewed and approved by Engineer.

C. Concrete Testing: Testing shall be provided by Contractor in accordance with Section 01 and this Section.

1. Conduct tests on sample material in accordance with methods listed below:

a. Slump: ASTM C143.
b. Air-Entrainment: ASTM C231.
c. Compressive Strength: ASTM C31 and ASTM C39.

PART 2 – PRODUCTS

2.01 BASE MATERIAL

A. Aggregate Base Courses in accordance with Section 32 11 23

2.02 FORMS

A. Construct forms to exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in finished concrete. All forms must be inspected and approved by Engineer, prior to placement of concrete.

B. Forms shall be straight and of sufficient strength to resist pressure of concrete without bending, tipping, or other deformation. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

C. Forms shall not be removed from freshly placed concrete until it has hardened sufficiently to resist spalling, cracking or any other damage.

D. Slip form machines may be used provided sidewalk can be constructed to the requirements of specifications.

2.03 REINFORCEMENT

A. Welded Wire Fabric: ASTM A 185.

2.04 CONCRETE

A. Conform to Section 03 30 00.

1. Class A2.

2.05 OTHER MATERIALS

A. Curing Compounds:

1. AASHTO M148, Type 2.

B. Preformed Expansion Joint Material:

1. Meet requirements of ASTM D 1751.
2. 1/2 inch thick and premolded.

PART 3 – EXECUTION

3.01 PREPARATION

A. Place base material in accordance with Section 32 11 23.

B. Check base course outline, and contour. Scrape down or fill irregularities.

C. Compact base course prior to paving.

D. Set castings and frames of manholes, catch basins, etc. to required alignment and grade. Hand vibrate concrete adjacent to structures.

E. Remove foreign matter accumulated in formwork. Forms may be oiled, if necessary.

D. Remove excess material not required by Owner, material not suitable for backfilling or site grading, and unsuitable materials from site. Dispose of excavated material in accordance with local, state, and federal requirements.

3.02 MIXING AND DELIVERY

A. Use ready mixed concrete conforming to ASTM C94.

B. Deliver and complete discharge within 1-1/2 hours of commencing of mixing. Limitations may be waived by Engineer if concrete slump, after 1-1/2 hours, is sufficient so that concrete can be placed without addition of water. In hot weather, time criteria may be reduced by Engineer.

C. Do not use concrete that has stood for over 30 minutes after leaving the mixer.

3.03 CONVEYING CONCRETE

A. Perform concrete placement at such a rate that concrete which is being integrated with fresh concrete is still plastic.

B. Deposit concrete as nearly as practicable in its final location so as to avoid separation due to rehandling and flowing.

C. Do not use concrete which becomes non-plastic and unworkable, does not meet required quality control limits, or has been contaminated by foreign materials.

D. Remove rejected concrete from job site.

3.04 CONVEYING PLACEMENT

A. Deposit concrete in a continuous operation, within limits of construction joints, until placing of a section is complete.

B. Consolidate concrete immediately after placing by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.

C. Do not vibrate forms or reinforcement.

D. Do not use vibrators to transport concrete inside the forms.

E. Bring surfaces to correct level with straightedge, and then strike off.

F. Use bullfloats or darbies to smooth surface, leaving surface free from bumps and hollows.

3.05 CONCRETE FINISHING

A. Check sidewalk with 10-foot straight edge. For areas showing irregularities of 0.25 inches or more cut down high areas or fill depressions with freshly mixed concrete and strike off, consolidate and refinish concrete Do not add water to correct surface deficiencies.

B. Provide a light broom finish perpendicular to direction of travel.

C. Expansion joints:

1. Extend entire width of sidewalk, at intervals not to exceed 100 feet.
2. Install full depth of sidewalk.
3. Install at all construction joints and where sidewalk abuts castings or other rigid structures.
4. Place expansion joints perpendicular to sidewalk.

D. Control Joints:

1. Spacing: Maximum intervals of 6 feet.
2. Formed control joints:

    a. Depth of not less than 1/4 the sidewalk depth
    b. Use 0.25 inch radius jointing tool.

E. Finish all edges with 0.25 inch radius edging tool.

F. Apply curing compound to all exposed surfaces immediately after finishing operations have been completed and surface water has disappeared.

3.06 PROTECTION FROM FREEZING

A. These provisions shall be followed when the atmospheric temperature is 35°F, or is expected to drop below 35°F during the curing period.

B. Heating of aggregates and water:

1. Concrete temperature shall be at least 50°F and not more than 80°F at the time of placing.
2. Heating equipment or methods which alter or prevent the entrainment of the required amount of air in the concrete shall not be used.
3. The equipment shall be capable of heating the materials uniformly.
4. Neither aggregates nor water used for mixing shall be heated to a temperature exceeding 150°F.
5. Materials containing frost or lumps of frozen material shall not be used.
6. When either aggregates or water are heated to 100°F, they shall be combined first in the mixer before cement is added.

C. Immediately after a pour is completed, the freshly placed concrete and forms shall be covered so as to form a protective enclosure and the air in the enclosure kept at a temperature above 50°F for at least 72 hours.

3.07 FIELD QUALITY CONTROL

A. Conform to Section 03 30 00.

B. If tests verify Work in-place is not in conformance with Specifications, Engineer will determine if Work in-place is adequate for intended use. If Work in-place is determined to be inadequate, Contractor shall follow such remedial or replacement measures which Engineer may require. Contractor shall bear costs associated with testing, engineering analysis, remedial work, and replacement required under terms of this paragraph

END OF SECTION

This page intentionally left blank.

SECTION 32 31 13
CHAIN LINK FENCES AND GATES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Chain link Fence
2. Chain link Fence Gates

1.02 DEFINITIONS

A. ASTM: American Society for Testing and Materials.

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Construction details, materials descriptions and finishes for chain link fence and gates:
   a. Fence and gate posts
   b. Rails, fittings and hardware
   c. Fabric
   d. Color sample for Polymer Coating.
   e. Manufacturer installation instructions for gates.
   f. Accessories.

C. Shop Drawings:

1. Installation and assembly details.

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Firms experienced in installing chain link fences and equipment similar in material and design indicated that have record of successful in-service performance.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials with manufacturer’s tags and labels intact and legible.

B. Store materials in clean, dry location.

PART 2 – PRODUCTS

2.01 GENERAL

A. Height indicated on drawings measured between top and bottom of outer edge of selvage knuckle.
B. Comply with ASTM A392 and requirements listed in this specification section.

2.02 FABRIC

A. Steel wire helically wound and interwoven to provide continuous mesh without knots or ties, conforming to requirements of ASTM A491.

1. Mesh Size: 2 inch
2. Wire Size: 9 Gauge (0.148 inches)
3. Zinc Coating: Minimum of 1.2 ounces per square foot in accordance with ASTM A 392, Type II, Class I.
4. Fabric Ties: Minimum 9 gauge aluminum or zinc wire.
5. Selvages: Knuckled at selvages

2.03 FRAMEWORK

A. Posts and rails conforming to ASTM F1043 and ASTM F1083 and requirements listed in this specification section

1. ASTM F1043 Group IA, round steel pipe, Schedule 40
2. Post Size (outside diameter):
   a. Top Rail: 1.66 inches
   b. Line Post: 2.375 inches
   c. End, Corner and Pull Post: 2.875 inches
   d. Slide Gate Posts: In accordance with manufacturer directions

B. Metallic Coating

1. Zinc coating per ASTM A 123 consisting of not less than 2.0 ounces per square foot.

2.04 TENSION WIRE

A. Provide horizontal tension wire along bottom of fence fabric.

B. Metallic Coated wire: 0.177 inches diameter complying with ASTM A 817 and coated with zinc coating of not less than 0.8 ounces per square foot of wire surface.

2.05 HORIZONTAL SLIDE GATES

A. Type II Cantilever Slide Gate, Class 2 in complying with ASTM F 1184

B. Fabric and pipe shall conform to previous requirements in this specification section.

C. Height and width

1. Match height of adjacent fence
2. Width as shown on drawings.

D. Frame Assembly: 1-7/8 inch outside diameter pipe with welded joints.

E. Gate Posts: 4 inch outside diameter

F. Hardware:

1. Latches shall permit operation from both sides of gate and have integral eye openings for padlocking with the padlock accessible from both sides of gate.

2.06 FITTINGS

A. Comply with ASTM F 626

B. Provide post and line caps for each post

C. Steel Tension bars:

1. Length: not less than 2” shorter than full height of chain link fence fabric
2. Provide one bar for each gate and end post, and two for each corner and pull post.

D. Wire Ties:
1. Hot Dip galvanized, 0.106 inch diameter wire

2.07 CONCRETE

A. Class B2 concrete in accordance with Section 03 30 00.

2.08 GROUNDING

A. Bare Copper, solid wire No. 6 AWG and smaller with No. 30 AWG bare wire bonding jumpers.

B. 5/8 inch by 96 inch grounding rods with Exothermic welded connectors for connections below ground.

2.09 POLYMER COATING

A. In addition to the metallic coating specified, provide polymer coating on all fence components.

1. Fence Fabric: Polymer Coating in accordance with ASTM F 668, Class 2A over Metallic Coated steel wire
2. Framing and Fittings: Polymer Coating in accordance with ASTM F 1043 and ASTM F 626.

a. Apply coating to all exterior and exposed inside surfaces, except inside cap shapes.
b. Not less than 10-mil thick PVC.

3. Tension Wire: Polymer Coating in accordance with ASTM F 1664
4. Color: Black, complying with ASTM F 934.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Do not begin installation until final grading is complete.

B. Check location of underground work to make sure fence footings clear utilities.

3.02 INSTALLATION

A. Comply with ASTM F 567 and the requirements of this specification.

B. Footings:

1. Set post in concrete at not more than 10 foot apart**.**
2. Dispose of excavated material in accordance with local, state, and federal requirements in a manner that will not cause environmental pollution.
3. Hold posts plumb, aligned and at correct height while concrete sets.
4. Rod and compact concrete around posts. Slope top of footings above level of adjacent grade and trowel finish.
5. Size:

    a. 9 inch minimum diameter, plus outside dimension of post.
    b. Set corner, end, pull, and gate posts 42 inch into concrete.
    c. Set line posts 36 inch into concrete.
    d. Total depth of concrete 6 inch greater than required for post embedment.

6. Time of Set: 48 hours before rails erected or fabric applied or stretched.

C. Framing:

1. Install line posts not more than 10 foot apart.
2. Install pull posts not more than 600 foot apart where straight run of fence exceeds 600 foot and fence line changes direction by more than 15°, but less than 30°.
3. Install corner posts where fence line changes direction by more than 30°.
4. Set posts in concrete footings, plumb and true to line.
5. Brace and truss end, pull, corner, and gate posts to adjacent line posts. Provide brace to match top rail spaced midway between top rail and tension wire and extending to adjacent line post. Truss diagonally with 5/16-inch diameter tension rod with turnbuckle.
6. Fasten top rail to end, pull, gate, and corner posts. Pass top rail through fittings of line posts.
7. Provide expansion and contraction joints in top rail for each 100 linear foot of fence.
8. Fasten bottom tension wire to end, pull, gate, corner, and line posts.

D. Fabric:

1. Place fabric on outside of posts and stretch to avoid bulging or buckling.
2. Fasten at line posts, top rail, and bottom tension wire with aluminum or zinc coated ties. Space ties not more than 15 inch apart on line posts and not more than 24 inch apart on rail and tension wire.
3. Fasten at terminal posts at intervals not exceeding 15 inch using flat or beveled galvanized steel bands with 5/16 inch by 1 ¼ inch galvanized carriage bolts and nuts.
4. Make tie connections on interior side of fence.

E. Gates:

1. Install gates in accordance with manufacturer instructions.

F. Protective Electrical Ground.

1. Ground continuous fence at intervals not exceeding 1500 feet except as follows:

    a. Within 100 feet of buildings, structures, roadways, and sidewalks, Ground at a maximum interval of 750 feet.
    b. Ground fence on each side of gates or other openings. Bond metal gates to gate posts.

c. Bond across openings with a No. 2 AWG wire buried a minimum of 18 inches below grade.

2. Ground fence under power line by three grounds, one directly under crossing and one on each side 150 feet on each side of wire. Locate single ground directly under each telephone wire or cable crossing.
3. Ground rod shall terminate 6” below finished grade and be connected to fence with No. 6 AWG conductor. Connect each fence component to the conductor.
4. Ground gates by with bonding jumper between gate post and gate frame.
5. Make connections with clean and bare metal at points of contact.
6. Connect ground wire to fabric and ground rod by mechanical clamp of cast bronze body and bronze or stainless steel bolts and washers.

END OF SECTION

This page intentionally left blank.

SECTION 32 92 00
TURF AND GRASSES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Preparing ground surface.
2. Seed and sod.
3. Fertilizer.
4. Maintenance.

B. Except for paved, riprapped, or built-up areas, all areas of site which are disturbed and areas noted on Drawings shall be seeded.

C. Surfaces on 3H to 1V slope or less may be either seeded or sodded. Surfaces on steeper than 3H to 1V slope shall be sodded.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.
2. Mix analysis and names of seed mixes.

B. Test Results:

1. Topsoil test results including fertilizer and lime requirements.

C. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Meet or exceed specifications of Federal, State, and local laws requiring inspection for plant disease and insect control.

B. Seed shall conform to U.S. Department of Agriculture Rules and Regulations under Federal Seed Act and requirements of state seed laws.

C. Contractor shall engage certified soils testing laboratory to perform a soils evaluation of existing and/or imported topsoil to determine fertilizer and lime requirements. Provide a minimum of 1 composite soil sample, consisting of 5 test borings, for every 5 acres to be seeded or sodded.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide seed mixture in sealed containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Deliver fertilizer to site in waterproof bags showing weight, chemical analysis, and name of manufacturer.

C. Deliver sod in rolls on pallets. Protect exposed roots from dehydration. Do not deliver more sod than can be laid within 24 hours.

1.06 WARRANTY

A. Warranty lawn areas for period of 1 year after acceptance of seeding and sodding to be alive and in satisfactory growth at end of warranty period.

1. For purpose of establishing acceptable standard, scattered bare spots, none larger than 1 square foot, will be allowed up to a maximum of 3% of lawn area.

PART 2 – PRODUCTS

2.01 SEED

A. Fresh, recleaned, new crop seed in specified varieties and proportions indicated.

B. Weed content shall not exceed 0.25%.

Common Name	Weight (%)	Minimum Germination (%)
Kentucky Bluegrass	50	85
Perennial Ryegrass	30	85
Creeping Red Fescue	20	95

2.02 FERTILIZER

A. Commercial balanced, uniform in composition, free flowing, conforming to state and federal laws.

B. Contain percentage by weight as follows, or as modified by topsoil test recommendations.

1. Prior to seeding or sodding: 6-24-24.
2. After seeding or sodding: 18-5-9.

C. 50% of elements shall be derived from organic sources.

2.04 ACCESSORIES

A. Mulch: Dry oat or wheat straw or wood cellulose fiber free of weeds and foreign matter detrimental to plant life. Hay or chopped corn stacks are not acceptable.

B. Water: Furnished by Owner from existing on-site source. Provide pumps, tankage, hose, piping, and attachments as required to bring water to point of use.

C. Erosion Control Blanket:

1. Short term duration, light duty, organic Erosion Control Revegetative Mat
2. Non-organic photodegradable or biodegradable netting allowed.
3. Manufacturers:

a. Curlex I, by American Excelsior
b. S75, DS75, or DS150, by North American Green
c. Excel SR-1, by Western Excelsior
d. ECS1, by East Coast Erosion Blankets
e. Or Equal

D. Landscape Mat: Porous non-woven fabric with multiple layers of randomly arranged fibers, min 4.0 ounces per square yard (typical).

1. Manufacturers:

a. Mirafi 140N by Mirafi, Inc.
b. Typar 340I by DuPont.
c. Supac 5P by Phillips Fibers Corp.
d. Propex 4545 by Amoco Fabrics Co.
e. Or Equal.

E. Steel Edging: 3/16 inch thick by 4 inches deep.
1. Manufacturers:
a. General Edging by J. T. Ryerson & Son.
b. General Edging by Brighton By-Products.

F. Landscape Stone: Washed, light colored crushed granite or other approved locally available stone conforming to ASTM C33, Size 4.

(ASTM C33 – Size No. 4)

Sieve Size	% Passing by Weight
2 inch	100
1-1/2 inch	90 – 100
1 inch	20 – 55
3/4 inch	0 – 15
3/8 inch	0 – 5

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PLANTING SEASONS

A. Spring Planting Season: From time soil can be satisfactorily worked until following dates.

1. Seed: April 1st to June 15th.

B. Fall Planting Season:

1. Seed: August 1st to November 1st.

C. Dormant Seeding: October 21st to November 15th (Soil at 1"<50 degrees Fahrenheit), seed with cover crop of winterwheat at 20 pounds per acre.

D. Perform planting of seed or placement of sod only when weather conditions and soil conditions are acceptable.

E. Planting season limits may be changed when approved by Engineer.

3.03 PREPARATION

A. Finish grading will be performed under Section 31 22 00.

B. Do not plant seed or place sod until trees, shrubs, and other landscaping completed.

C. Scarify existing topsoil where grade is not being raised, or where topsoil is over compacted, to depth of 2 inches.

D. For topsoil with high acidity, add lime as recommended in topsoil test report.

E. Grade, rake, and roll with roller weighing not more than 100 pounds per foot or less than 25 pounds per foot.

F. Maximum variation from correct elevation is 1/2 inch per 10 feet.

3.04 FERTILIZING

A. Before seeding or sodding, apply 6-24-24 fertilizer at uniform rate of 20 pounds/1000 square feet; make 2 passes at right angles. Incorporate fertilizer into soil to depth of at least 2 inches by discing, harrowing, or other approved method.

B. After completion of required interim mowings, apply 18-5-9 fertilizer at rate of 15 pounds per 1000 square feet; make 2 passes at right angles.

C. Adjust rate of application and type of fertilizer as recommended in topsoil test report.

D. Lightly water to aid dissipation of fertilizer.

3.05 SEEDING

A. Apply seed at a total rate of not less than 5 pounds/1000 square feet; make 2 passes at right angles.

B. Seeding method shall establish smooth, uniform turf.

C. Cover seed with 1/8 inches of soil by light racking.

D. Do not seed following rain, if soil has been compacted by rain, or if ground is too dry.

E. Do not seed when wind velocity exceeds 6 miles per hour.

F. Do not seed areas in excess of that which can be mulched on same day.

G. Immediately after seeding, apply mulch to flat areas and erosion control blanket to areas with greater than 3H to 1V slopes.

H. Place mulch loose to allow some sunlight to penetrate and air to circulate, but thick enough to shade ground, conserve soil moisture, and prevent erosion.

I. Butt ends and edges of erosion control blanket snugly and staple to ground surface with 6 inch staples.

J. Apply water with fine spray immediately after area has been mulched or application of erosion control blanket. Leave area thoroughly soaked at close of each working day.

3.06 LAYING SOD

A. Lay sod by hand in straight lines.

B. Stagger lateral joints.

C. Do not stretch or pull to distort length as cut.

D. Butt joints and edges tightly to prevent voids which would cause drying of sod roots and weed growth.

E. Bury exposed edges of sod flush with adjacent soil.

F. On slopes greater than 3H to 1V, lay sod parallel to slope contours and secure with wood stakes; begin laying of sod at toe of slope.

G. As sodding is completed in an area, roll area with roller weighing 75 to 150 pounds per feet.

H. Water sod immediately after installation to prevent excessive drying during progress of Work. Leave area thoroughly soaked at close of each working day.

3.07 PROTECTION

A. Protect turf areas by erecting temporary fences, barriers, signs, and similar protection as necessary to prevent trampling until acceptance by Owner.

B. Replace, repair, restake, or replant damaged seeding or sod.

C. Protect slopes and embankments against erosion until Work is accepted. Repair eroded areas by refilling, resodding, reseeding, and remulching as required.

3.08 FIELD QUALITY CONTROL

A. Acceptance:

1. Notify Engineer when lawn areas are ready for final inspection.
2. Substantial completion will be granted upon conformance with following;

    a. Turf reasonable free from weeds, diseases or other visible imperfections.
    b. Turf displays uniform color, quality and coverage.
    c. Minimum 3 mowings performed.
    d. Fertilizer application performed after mowing.

3. After substantial completion, Owner will be responsible for maintenance.

3.10 MAINTENANCE

A. Maintenance shall begin immediately following installation of each portion of lawn. Continue until substantial completion.

B. Maintain lawns by watering, mowing, and repairing or replanting as may be necessary to produce uniform stand of grass until Work accepted.

C. Perform first mowing when average height of grass reaches 3 inches. Perform interim mowings, 2 minimum, as needed to maintain grass height at 2 to 2-1/2 inches. Do not remove more than 1/3 of leaf blade by mowing.

D. After completion of required interim mowings, apply 18-5-9 fertilizer as specified herein.

E. Control weed growth; apply herbicide in accordance with manufacturer's instructions.

F. Top dress or resod excessive cracks appearing upon soil shrinkage.

END OF SECTION

DIVISION 33

UTILITIES

This page intentionally left blank.

SECTION 33 05 05
SITE UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes Site Piping for:

1. Sanitary Gravity Sewer
2. Sanitary Force Main
3. Process piping
4. Storm sewer

1.02 REFERENCES

A. AWWA: American Waterworks Association

1.03 SYSTEM DESCRIPTION

A. Systems include yard piping between buildings or structures.

B. Systems are further described and specified in:

1. Sanitary Sewer Gravity Piping: Section: 33 31 13
2. Sanitary Sewerage Force Main Piping: 33 31 23
3. Storm Sewer Gravity Piping: Section 33 42 11
4. Process-Mechanical Piping Systems: Section 40 05 05

1.04 SUBMITTALS

A. Manufacturer's specifications, data sheets, and installation instructions for piping, equipment, and accessories.

B. Include other data as necessary to show compliance with these Specifications.

C. Submit in accordance with Section 01 33 00.

PART 2 - PRODUCTS

2.01 PROCESS MECHANICAL PIPING

A. Ductile Iron

1. Pipe: Comply with Section 40 05 19.
2. Joints: Comply with Section 40 05 19.
3. Coatings: Comply with Section 40 05 19.
4. Polyethylene Encasement: Comply with Section 40 05 19.

B. Stainless Steel Piping: Comply with Section 40 05 23

C. Containment Piping: Comply with Section 40 05 31.14.

2.02 VALVES

A. Comply with Section 40 05 53.

2.03 BACKFILL, COVER AND BEDDING MATERIALS

A. Comply with Section 31 23 33.

2.04 CONNECTING DISSIMILAR PIPE MATERIALS

A. Provide factory fabricated connecting piece meeting same structural and joint testing standards as adjacent new piping.

2.05 BURIED INSULATION

A. Manufacturers:

1. Dow Chemical Company, Styrofoam HI 60.
2. U.C. Industries, Inc., Foamular 600.
3. Or equal.

B. Rigid, closed-cell extruded polystyrene insulation, moisture-resistant and suitable for buried installations.

2.06 UNDERGROUND PIPE TRACE WIRE

A. Type: 12 gauge AWG multiple stranded copper wire, insulated for underground installation.

B. All tracing wire splices shall be spliced with Direct Bury Splice Kit No. 09053 as manufactured by 3M, or equal.

PART 3 - EXECUTION

3.01 BURIED PIPING INSTALLATION

A. Comply with Section 31 23 33 and material and system specifications for piping being installed.

B. When new pipe is to be connected to existing pipe not terminating in manhole, uncover end of existing pipe to allow adjustments in line and grade before any pipe is laid.

C. Lay pipe to line and grade shown on Drawings.

D. For gravity piping, begin laying pipe from lowest point in proposed pipe line.

E. For pressure piping, lay pipe at continuous slope between invert elevations shown at building faces, unless otherwise noted.

F. Lay pipe with bell end of bell and spigot pipe pointing upgrade.

G. Lay gravity pipe uniformly to line and grade so finished pipe presents uniform bore.

H. Noticeable variations from true alignment and grade shall be considered sufficient cause for rejection of Work.

I. Record Northing, Easting and Elevation of all bends and fittings. Provide data to Owner and Engineer as work progresses.

J. Take precautions to prevent foreign material from entering pipe during or after laying operations. If foreign material enters pipe, remove it completely before continuing.

K. Provide watertight plugs for open ends of pipe when laying not in progress.

L. Laying of Pipe in Cold Weather:

1. Heat pipe and jointing materials to prevent freezing of joints.
2. Do not lay pipe on frozen ground.
3. Pipes with rubber gaskets or resilient type joints: Warm gasket or joint material to facilitate making proper joint.
4. With solvent cemented joint: Remove ice and snow from jointed area prior to applying of solvent cement.

M. Wrap buried ductile iron pipe with polyethylene wrap as specified in Section 40 05 19.

N. Lay water main and process mechanical pressure pipe to line and grade so horizontal and vertical joint deflection will not be more than 50% maximum deflection as recommended by manufacturer. Where greater deflections are necessary, proper fittings shall be used.

O. Thrust Restraint:

1. Provide thrust restraint on pressure pipe tees, plugs, caps, bends, and other locations where unbalanced forces exist.

2. Restrain by one of the following means:

a. Thrust blocks conforming to details on drawings.
b. Mega-Lug by EBBA Iron, or equal.
c. Other restrained joint types as specified in Section 40 05 19.

3. Thrust blocks

a. Unless otherwise shown, place the base and thrust bearing sides of thrust blocking directly against undisturbed earth.
b. Sides of thrust blocking not subject to thrust may be placed against forms.
c. Place thrust blocking so the fitting joints will be accessible for repair.
d. Protect Steel rods and clamps by galvanizing or by coating with bituminous paint.

4. Valves located less than 30 feet from plugged end of dead-lines shall be restrained.

P. Connect dissimilar pipe materials using factory fabricated connecting pieces.

Q. Plug lines and provide necessary thrust restraint until connections to internal and building systems are made.

3.02 VALVE BOX INSTALLATION

A. Provide thrust blocking with solid concrete block or concrete.

B. Center valve boxes on the valves, setting plumb.

C. Tamp earth fill around each valve box to a distance of four feet on all sides, or to the undisturbed trench face if less than four feet.

D. Tighten stuffing boxes, and fully open and close each valve to assure that all parts are in working condition.

3.03 TRACE WIRE INSTALLATION

A. Install for all pipe except ductile iron and reinforced concrete.

B. Secure tracer wire to pipe, including stubs and dead ends, at top of pipe and tape at 10 ft intervals.

C. Positively electrically connect wire to valve boxes, hydrants, or terminate at structure. Termination at structures shall be in accordance with details shown in drawings.

D. Where pipe terminates at a structure, bring tracer wire to surface per Detail C490 in the drawings.

3.04 MANHOLE AND INLET INSTALLATION

A. Comply with Section 33 05 61 and Section 31 23 33.

B. Construct at locations and elevations shown on Drawings.

3.05 INSULATION INSTALLATION

A. Place at locations of water or drain (sanitary) and gas piping where less than 5 feet of cover exists or at locations within 2 feet from a storm sewer pipe.

1. Prior to placement of horizontal insulation, place bedding material 6 inches deep over top of pipe, level, and compact. Lightly scarify surface of cover material to depth of 1/2 inch.
2. Place horizontal insulation boards on scarified material with long side parallel to centerline of pipe.
3. Place boards in staggered arrangement to eliminate continuous joints. If 2 or more layers of insulation board are used to meet required thickness, place each layer to cover joints of layer immediately below.

B. Backfill First Lift:

1. Backfill with 6 inches of bedding material. End or side dump onto insulation board and spread so construction equipment does not operate directly on insulation.
2. Compact layer with equipment exerting contact stress of 70 to 80 pounds per square inch.

C. After first lift, compact to specified density.

3.06 FIELD QUALITY CONTROL

A. Disinfection:

1. Disinfect potable water lines (W1) in accordance Section 33 01 10.58.

B. Testing:

1. Test piping systems in accordance with Section 40 05 10 and requirements of applicable systems specifications.
2. Electrical Continuity: Test tracer wire for electrical continuity prior to acceptance of piping.

END OF SECTION

This page intentionally left blank.

SECTION 33 05 07.13
HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.01 SUMMARY

A. Contractor shall furnish all labor, materials and equipment required to install force main and electric using directional drilling method of installation. The pipe and conduit size, type and length shall be as specified in this and other specification sections and as shown on the Drawings.

B. Work included with horizontal directional drilling shall include but not be limited to proper installation, testing, and restoration of any other underground utilities which may be damaged from the installation.

C. Horizontal directional drilling shall be accomplished by first drilling a pilot hole along the alignment shown on the drawings, and then enlarging the pilot hole in one or more passes to no more than 1.5 times the outer diameter of the largest cross section of the installed force main pipe and electric conduit and couplings to accommodate the pull back of the pipe through the enlarged hole. Drilling mud shall be used to maintain the pilot and enlarged holes prior to installation of the force main pipe and electric conduit.

D. The Contractor shall utilize horizontal directional drilling techniques where shown on the drawings or called for in the specifications. Where open cut excavation is necessary to conform to the extent, line, and grade required conform to specification Section 31 23 33.

E. Soil borings which may be desired by the Contractor to determine certain subsurface soil conditions shall be provided by the Directional Drilling Contractor at its sole expense.

1.02 SUBMITTALS

A. Data supporting the directional drilling contractor's and/or the lead field personal qualifications and experience. Directional drilling contractor shall demonstrate at least 5 years of successful experience installing 8 inch pipe or larger, including a minimum of 5 projects with a continuously drilled length of 500 linear feet or greater using directional drilling operations. Directional drilling contractor shall have successfully completed a minimum 5 projects using fusible HDPE directional drilling operations. A list of acceptable project references is required prior to job commencement. If experience is determined to be lacking Contractor shall arrange subcontracts with acceptable references and experience to perform required drilling operations.

B. Work plan: Prior to beginning work, the Contractor shall submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The work plan should be comprehensive, realistic and based on actual working conditions anticipated for this particular project. Plan should document the thoughtful planning required to successfully complete the project.

C. The work plan should include a description of:

1. Drilling materials and mud system, including drilling additives and drilling fluid mixtures, mud motors and recovery systems. MSDS (material safety data sheets) shall be submitted for all fluids and additives.
2. A list of personnel assigned to the project and their qualification and experience.
3. The directional drilling contractor site safety plan (including MSDS of any potentially hazardous substances to be used)

4. A spill and “frack out” response plan.
5. Material delivery and staging area layouts
6. The methods to be used to connect sections which are directionally drilled. The methodology shall include discussions of how, when and where the pipes will be fused or connected for initial installation(strung out on grade, supported and connected on downslope into hole) and how adjacent HDD sections will be connected after installation.
7. A plan for disposal of excess drilling mud, excess excavated material, and groundwater collected during dewatering. Disposal methods shall comply with all local, County, State, and Federal requirements.

D. The Contractor shall submit material certifications and data sheets evidencing the pipe materials compliance with the required loads (tensile, crushing, and buckling) and minimum curvature radius for the pipe/conduit size and material type to be installed by trenchless methods.

E. Record drawings showing installed location and elevation of completed force main.

F. Submit in accordance with Section 01 33 00.

PART 2 - PRODUCTS

2.01 PIPE MATERIALS FOR DIRECTIONAL DRILLING

A. Refer to specification section 33 31 23 for pipe materials used for directional drilling.

B. Refer to specification section 33 05 05 for tracer wire.

2.02 DIRECTIONAL DRILL RIG REQUIREMENTS

A. The directional drilling machine shall consist of a hydraulically powered system to rotate and push hollow drilling pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the installation. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations. There shall be a system to detect electrical current from the drill string and an audible alarm that automatically sounds when an electrical current is detected.

B. Electronic guidance system capable of continuously monitoring the location of the drilling head in x, y, z coordinates including the length from the drill machine and providing a readout of the inclination and azimuth on the drilling head to an accuracy of 1% incline and 1 degree bearing.

C. Drill Head: The drill head shall be steerable vertically and horizontally by the drilling rig operator by changing its rotation and shall provide necessary cutting surfaces and drilling fluid jets.

D. Mud Motors (if required): Mud motors shall be of adequate power to turn the required drilling tools.

E. The drilling equipment shall be capable of providing continuous support to the drilled void through the application of pressure to the drilling fluid and the selection of appropriate drilling fluids to “bind” the soil.

F. Drilling equipment shall have a minimum pull back capability of at least 2 times the maximum calculated pullback force.

2.03 GUIDANCE SYSTEM

A. General: A magnetometer-accelerometer type Guidance System (MGS) probe, or proven (non-experimental) gyroscopic probe and interface shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance system shall enable the driller to continuously guide the drill head by providing immediate information at the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be accurate and calibrated to manufacturer's specifications. The vertical location of the tool referenced to USGS elevations shall be capable of being determined at all times. Contractor to include the cost of additional survey and guidance systems necessary to achieve specified accuracy and to identify the bored path in plan view and vertical alignment in profile view of the drawings. The contractor shall plot the path on the project drawings and provide the raw data.. .

B. Components: The Contractor shall supply all components and materials to install, operate, and maintain the guidance system.

C. The Magnetic Guidance System (MGS) and wire line tracking systems shall be set up and operated by personnel trained and experienced with the systems. The Contractor shall be aware of any geo-magnetic anomalies and shall consider such influences in the operation of the guidance system.

D. The accuracy of the bore path and resulting pipe profile centerline shall be within 2 feet left or right horizontally of the specified forcemain alignment and within 4-inches above or below the specified forcemain profile (surface grade to top of pipe) in any soil condition. The exit point for the pilot hole bore path shall be within a tolerance of 5 feet short of or 5 feet past the specified exit point.

E. The Contractor shall provide the Engineer with real-time readings from the wire line tracking system if requested to verify the bore path is within the specified accuracy limits prior to pipe pull back. Real-time readings will be read by the Contractor and Engineer from the tracking system during installation.

2.04 PIPE ROLLERS AND SUPPORTS

A. Pipe Rollers and supports shall be used for pipe assembly and during final product pull back whenever unsupported pipe lengths in excess of 10 feet occur. Rollers and supports shall be capable of supporting the pipe materials uniformly and shall be equipped with rollers or other low friction systems which do not materially increase pull back forces. Rollers and supports shall be designed and installed to prevent the pipe from falling off the sides or lifting due to sharp bends either vertically or horizontally. Systems shall also be designed to account for pipe twisting/rotation during pull back. Laying pipe on ground during pull back within 50 ft of drill entrance will not be permitted.

2.05 PERSONNEL REQUIREMENTS

A. All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety. All drill rig and fluid mixing operators must have at least two years directional drilling experience with the equipment used for this project.

B. A competent and experienced supervisor with 5 years experience in directional drilling who is thoroughly familiar with the equipment and type of work to be performed must be in direct charge and control of the operation at all times during the actual drilling operations. In all

cases, the supervisor must be continually present at the job site during the actual Directional drilling operations.

C. The personnel operating fusion equipment shall be certified by the pipe manufacturer.

D. If fusible pipe is utilized the personnel operating the fusion equipment shall have at least 5 years of experience with fusion equipment and shall be certified by the pipe or fusion equipment manufacturer.

2.06 COUPLINGS AND FITTINGS

A. Comply with Section 33 31 23.

PART 3 - EXECUTION

3.01 PREPARATION

A. All work under this specification shall be carried out to the full satisfaction of the Owner or other appropriate authority. The Contractor shall fully inform himself of all requirements for this project and shall conduct all his work accordingly.

B. Give Engineer and OWNER minimum 48 hr notice prior to starting directional drilling operations. Provide notice to others in accordance with permit requirements.

C. The Contractor shall provide all material, equipment, and facilities required for directional drilling. Proper alignment and elevation of the borehole shall be consistently maintained throughout the directional drilling operation.

D. The entire drill path shall be surveyed by the Contractor with entry, exit, and connection stakes placed prior to commencement of drilling at the intended entry, exit and connection points.

E. Prior to commencement of drilling operations, drill path shall be surveyed for any surface geo-magnetic variations or anomalies.

F. If obstructions to the drilling operations are encountered, Contractor is responsible for investigating and resolving obstructions within requirements of the specifications, permits obtained for the project, and appropriate authorities regulations.

G. Contractor shall place filter sock or other controls as identified in the contractors work plan and spill response plan between all drilling operations and any surface drainage paths, wetlands, waterways or other similar areas. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains, absorbent materials and other measures.

H. Provide adequate supplies of pipe, drilling fluids, drilling rods, water, pipe supports and rollers and fuel to allow continuous operations to be maintained once operations begin. Problems resulting from failure of Contractor to maintain continuous operations shall not be cause for additional compensation.

3.02 GENERAL

A. Location readings shall be recorded after advancement of each successive drill pipe (no more than 20’ intervals) and the readings plotted on the field copy of the plan and profile drawings. Vertical alignment shall be shown based on true elevation as determined by survey

and not referenced from the surface grade. Access to all recorded readings and plan and profile information shall be made available to the Engineer, and the UTILITY at all times. At no time shall the deflection radius of the drill pipe exceed the deflection limits of the carrier pipe as specified herein.

B. All drilling fluids and loose cuttings shall be contained in pits or holding tanks for recycling or disposal at the Contractor's option. No fluids shall be allowed to enter any unapproved areas or natural waterways. During and following completion of directional drilling operations, the drilling mud and cuttings shall be disposed of by the Contractor at an approved dumpsite.

C. The deflection radius of the installed pipeline shall not exceed 50% of the minimum allowable bend radius allowed by the pipe manufacturer.

D. Take precautions to ensure settlement or heaving of surface or underground structures above directional drilling operations will not occur. For grade sensitive features such as railroad tracks, paved areas, and under existing sewers an existing conditions survey shall be performed to document existing conditions. The existing conditions survey shall include detailed topographic survey of all features which may be affected by the proposed work such as ground surface, pavement surface, railroad ties, railroad ballast, railroad tracks, signals, other cast in place structures, manholes, sewers, overhead utility poles, and other surface or subsurface features within 10 feet horizontally of the proposed alignment. Evidence that voids are being created, subsidence is occurring, or puncture/damage to underground utilities is occurring will be sufficient cause to require remedial action without additional compensation.

E. Protect existing utilities, site objects, and new work, which are to remain in service.

F. Reroute around or excavate and remove obstacles and debris blocking progress of directional drilling, including but not limited to cobbles, boulders, or rock, timbers, construction debris, concrete spillage from previous construction, abandoned utilities discovered during installation, and unused piling or caissons. Contractor shall properly cap, plug, or bulkhead abandoned utilities which are discovered.

3.03 PILOT HOLE INSTALLATION

A. The pilot hole shall be drilled on the bore path with no deviations at any point greater than the specified accuracy vertically or horizontally. In the event that pilot does deviate from the bore path more than specified, vertically or horizontally at any point, Contractor shall notify Engineer. Engineer may require Contractor to pull-back and re-drill from the location along bore path before the deviation. In the event of a fluid drilling fracture or blowout, inadvertent returns, or returns loss during pilot hole drilling operations, Contractor shall cease drilling and take immediate steps to resolve the problem. If Contractor is unable to resolve alignment deviations in existing drill hole, redrilling may be required at no additional cost. Contractor shall discuss redrilling options with the Engineer and work will proceed as agreed.

B. Upon completion of pilot hole phase of the operation, an initial set of “as-built” records in electronic format shall be submitted to the Engineer and OWNER within 1 working day of pilot hole completion. These records shall include copies of the pilot bore path plan and profile within 0.25 feet at 20 foot intervals, as well as locational survey reports as recorded during the drilling operation.

C. Engineer and OWNER will review pilot hole information and determine if the location and elevation of the pilot hole are suitably close to the proposed alignment to continue with pipe installation. Completion of review shall occur within 1 working day of submittal of pilot hole alignment. Should Contractor decide to initiate the hole opening or enlarging phase of the

installation prior to approval of the pilot hole, Contractor will bear all risk for incorporating alterations requested by OWNER or Engineer.

3.04 PIPE INSTALLATION

A. Upon approval of the pilot hole location by the Engineer and OWNER, the hole opening or enlarging phase of the installation shall begin. The bore hole diameter shall be increased to accommodate the pullback operation of the required carrier pipe. The type of hole opener or back reamer to be utilized shall be determined by the Contractor based on the types of subsurface soil conditions that have been encountered during the pilot hole drilling operation. The Contractor shall select the proper reamer type with the final hole opening being a maximum of 1.5 times the largest outside diameter pipe system component to be installed in the bore hole.

B. The open bore hole shall be stabilized by means of bentonite drilling slurry pumped through the inside diameter of the drill rod and through openings in the reamer. The drilling slurry must be in a homogenous / flowable state serving as an agent to carry the loose cuttings to the surface through the annulus of the borehole. The volume of bentonite mud required for each pullback shall be calculated based on soil conditions, largest diameter of the pipe system component, capacity of the bentonite mud pump, and the speed of pullback as determined by the contractor bentonite drilling fluid manufacturer. The bentonite slurry is to be contained at the exit or entry side of the directional bore in pits or holding tanks. The slurry may be recycled at this time for reuse in the hole opening operation, or shall be hauled by the Contractor to an approved dumpsite for proper disposal.

C. The pipe sections shall be joined together according to the manufacturer's specifications. Butt fused joints shall be true alignment and shall have uniform roll-back beads resulting from proper temperature and pressure. Joints shall be allowed adequate cooling time before removal of pressure. Joints shall be watertight and have strength equal to that of adjoining pipe sections.

D. A pulling eye will be attached to a pipe pulling head on the lead stick of pipe, which in turn will be attached to a swivel on the end of the drill pipe string.

E. Two tracer wires are required for all HDD portions of the forcemain and shall be attached to the pipe/conduit at no more than 10 ft increments.

F. The pipe shall be elevated to the approximate angle of entry and supported by means of rollers or supports, to allow for the "free stress" situation as the pipe is pulled into the exit hole toward the drill rig. The pullback phase of the directional operation shall be carried out in a continuous manner until the pipe reaches the original entry side of the bore.

3.05 JOINING TO ADJACENT PIPE SECTIONS

A. When adjacent sections of directionally drilled pipe are to be connected together the Contractor shall excavate a sufficiently large area that the adjoining sections of pipe can be installed without sags or humps so there are no high points created.

B. Excess pipe lengths from drilling operations shall be cut off accurately to connect to adjoining sections with a single electrofusion coupling or butt fuse.

C. Trenching and backfilling operations to complete the installation shall comply with specification Section 31 23 33.

D. Adjacent pipe/conduit sections shall not be connected together for a minimum of 24 hours to allow for any pipe/conduit retraction as the pipe/conduit adjusts to the ground temperature.

CONTRACTOR shall provide the additional length as needed to allow for thermal contraction as described as L1 in ASTM F1962.

3.06 PIPE HANDLING

A. Care shall be taken during transportation that materials will not be cut, kinked or otherwise damaged.

B. Ropes, fabric or rubber protected slings and straps shall be used when handling materials. Chains, cables or hooks inserted into the pipe/conduit ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe/conduit. Do not drop materials onto the ground.

C. Pipe/conduit shall be stored in accordance with manufacturers recommendations on level ground, free of sharp objects that could cause damage. Stacking shall only occur when manufacturers shipping system is utilized which will not cause deformation of the bottom layers under anticipated temperature conditions.

D. The handling of assembled pipe/conduit shall be in such a manner that it is not damaged by dragging over sharp or cutting objects. Slings and rollers for handling the pipe/conduit shall not be positioned for lifting at joints. Sections with cuts and gouges or excessive deformation shall be removed and replaced.

3.07 SITE RESTORATION

A. Following drilling operations, Contractor will de-mobilize equipment and restore the work site to the original conditions or better. All excavations will be backfilled and compacted according to the drawings and specifications.

3.08 TESTING AND INSPECTION

A. Leakage Inspection: Perform preliminary leakage test once all sections have been assembled together for the entire length of each HDD length. Each connected length shall be successfully tested prior to installation by air pressure to 5 psi. The test pressure shall be held for a minimum duration of 15 minutes. Contractor to expect and allow for some straightening to occur in laydown area during pressure test without damage occurring to the pipe or adjacent materials.

B. Perform second leakage test immediately after installing each HDD pipe section. Test for leakage in accordance with Section 33 04 00.

C. Perform final leakage test in accordance with Section 33 04 00.once all pipe sections have been connected together or after all piping between valves has been connected. Repair all visible or detected leaks.

END OF SECTION

This page intentionally left blank.

SECTION 33 05 61
MANHOLES, CATCH BASINS, AND INLETS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Precast concrete manholes and risers, catch basins and inlets.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

1.03 SUBMITTALS

A. Product data:

1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
2. Manufacturers recommended installation procedures.

B. Provide certification reports attesting that materials supplied meet referenced specifications.

C. Shop drawings for manholes showing all components to be installed.

D. If manufacturer’s test data is inadequate or unavailable, Engineer reserves right to require cores drilled for compressive strength tests.

E. A buoyancy calculation for each manhole and valve vault documenting the following buoyancy criteria is met:

1. Minimum safety factor 1.1
2. Surface friction with backfill materials shall not be included
3. Submerged soil weight of 55 pounds per cubic foot where soil weight is used to help hold down the manhole. Only soil directly above manhole or any anti-floatation devices may be included.
4. Water table to grade
5. No water weight to be included inside structure
6. Weights for castings, all precast components and any manufacturer supplied fillets in bottom of manhole may be included.

F. Calculations and design drawings for the reinforced concrete top slabs. The top slabs shall be designed for H-20 traffic loading. Calculations and drawings shall be signed and sealed by a Registered Structural Engineer licensed to practice in the State of Illinois

G. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Manufacturer shall conform to requirements of ASTM C478.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE SECTIONS

A. Precast sections:

1. Provide reinforced precast concrete manhole, catch basin or inlet sections complying with ASTM C478.
2. No “see through” lift holes shall be allowed on precast concrete manholes and risers 48 inches in diameter or less.
3. All lift holes on structures greater than 48 inches in diameter shall be thoroughly wetted and completely filled with non-shrink mortar or epoxy grout; then smoothed and covered on the outside, with a trowelable grade butyl rubber base backplaster material to minimize leakage.
4. Provide integral anti-floatation collars (extended bases) with a minimum width of 6 inches around bottom of all manholes. Provide larger collars for manholes that calculations indicate have buoyancy safety factors less than 1.2 so that required factor of safety is achieved. Other methods of buoyancy control may also be acceptable upon Engineer’s approval.
5. Provide eccentric cone type precast or flat top slabs as shown on Drawings. Coordinate flat top slab with hatches shown on Drawings and Section 05 50 00.
6. Wall Thickness:

Structure/Riser Diameter	Minimum Wall Thickness
4 feet	5 inches
5 feet	6 inches
6 feet	7 inches
7 feet	8 inches
8 feet	9 inches
10 feet	11 inches

B. Precast Box sections

1. Provide reinforced precast concrete catch basin or inlets complying with ASTM C 1433.
2. Size: 2 feet x 3 feet
3. Provide 2 ft sump.

C. Joints:
1. Single off-set with rubber gaskets meeting requirements of ASTM C443.
2. Joints shall be watertight.

D. Pipe to Manhole Connections: All connections shall provide for a watertight seal between pipe and manhole.

1. Connect sanitary sewer pipe and flexible storm sewer pipe to manhole by means of boot-type or compression-type connector, meeting the requirements of ASTM C923.

a. Kor-N-Seal I, by Trelleborg
b. A-Lok, by A-Lok Products, Inc.

c. Z-Lok Cast in Boots, by A-Lok products, Inc.
d. PSX Direct Drive, by Press-Seal Gasket Corporation
e. Or equal.

2. Connect concrete effluent pipe to precast concrete manholes and inlets by means of brick and mortar connection.

E. Mark each precast section with name or trademark of manufacturer and date of manufacture. Marking shall be indented into manhole section or shall be painted thereon with waterproof paint.

F. Source Quality Control:

1. Test risers and tops in accordance with ASTM C497 for compressive strength compliance by compression tests on cores drilled from 5% of lot.
2. Number of compression tests may be reduced to 1% of lot, with minimum of two cores per lot, for manhole sections fabricated on sewer pipe machine.
3. Manufacturer's core drilling machine shall conform to ASTM C497. Operator shall take test cores as directed by testing laboratory.
4. Stamp base sections, risers and tops, meeting strength requirements, with appropriate monogram.

2.02 CONCRETE

A. Conform to Section 03 30 00.

1. Class B2.

2.03 MORTAR

A. Comply with ASTM C270, type M.

2.04 ADJUSTING RINGS

A. Precast concrete with one line of steel reinforcements, centered in normal handling and use.

B. Mating Faces: Smooth, parallel, and free from cracks, chips, spalls, or casting irregularities.

C. Minimum thickness: 2 inches

D. Maximum thickness: 6 inches.

2.05 INTERNAL CHIMNEY SEAL

A. Internal Chimney seal as manufactured by Cretex Specialty Products, or equal.

2.06 EXTERNAL CHIMNEY SEAL

A. External Chimney seal as manufactured by Cretex Specialty Products, or equal

2.07 FRAMES AND COVERS

A. ASTM A48, Class 30-B minimum.

B. Free from cracks, holes, swells, and cold shuts.

C. Provide all frames, gratings and covers from the same manufacturer unless approved by Engineer.

D. Provide standard finish, supplied as a total unit.

1. Sanitary Manhole Frames and Covers: Solid lid with sealed pick holes and gasket seal lid.

a. Wording “Sanitary” in 2-inch high letters cast into cover.
b. Neenah Foundry Catalog No. R-1916.
c. East Jordan Iron Works Catalog No. 1203.
d. For other structures and access hatches, see Section 05 50 00.
e. Or equal

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items in accordance with the approved design.

3.03 INSTALLATION

A. Trench, backfill, and compact for work of this Section in accordance with pertinent provisions of Section 31 23 33.

B. Standard Precast Manhole with Integral Base:

1. Excavate deep enough so bottom manhole barrel section with integral base rests on 4 in. minimum of bedding material.
2. Bedding material shall conform to requirements of adjacent pipe.
3. Set manholes plumb with orientation of cast-in items as shown on Drawings.

3.04 BACKFILL

A. Backfill with pipe bedding and cover material to spring line of incoming pipe in accordance with Section 31 23 33.

3.05 MANHOLE BENCH (CONSTRUCTED IN FIELD)

A. Shape invert channels to be smooth and semicircular, conforming to inside of adjacent sewer sections.

B. Make changes in direction of flow with a smooth curve of as large a radius as size of manhole will permit.

C. Make changes in size and grade of channels smoothly and evenly.

D. Form invert channels directly manhole base, with concrete. On manholes with straight through pipe invert may be formed by laying full section sewer pipe through manhole and cleanly breaking out top half after surrounding concrete has hardened.

E. Smooth floor of manhole outside channels, and slope toward channels at not less than 1 inch per foot or more than 2 inches per foot.

F. Construct outside drop at sanitary manholes whenever free drop inside manhole exceeds 24 inches measured from invert of inlet pipe to top of floor of manhole outside channels.

3.06 PIPE TO MANHOLE CONNECTION

A. Support pipe entering manhole above manhole base from wall of manhole back to face of first pipe joint bell with wall of backfill concrete, brick or solid concrete block columns.

B. Connect by means of an approved flexible watertight pipe to manhole seal.

3.07 SETTING CASTINGS

A. Set at elevation shown on Drawings.

B. Adjust castings to grade with adjusting rings. Do not use more than 8 inches of adjusting rings.

C. Sealing: Seal interior and exterior of adjusting rings and castings with trowelable mastic sealing material.

D. Provide external chimney seals, with extensions as necessary, on manholes. Install seals and extensions in accordance with manufacturer's instructions.

3.08 MANHOLE OVER EXISTING PIPE

A. Construct new manhole as specified, breaking upper half of existing pipe after base of manhole is completed so as not to obstruct flow of existing pipe.

3.09 TESTING AND INSPECTING

A. Do not allow or cause any of Work of this Section to be covered up or enclosed until after it has been inspected.

B. Precast reinforced concrete manholes, inlets, catch basins, risers and tops shall be subject to rejection on account of failure to conform to any specification requirements. In addition, individual sections may be rejected because of any of the following reasons:

1. Fractures or cracks passing through shell, except for single end crack not exceeding depth of joint.
2. Defects indicating imperfect proportioning, mixing, and molding.
3. Surface defects indicating honeycombed or open texture.
4. Damaged ends where such damage would prevent making satisfactory joint.
5. Infiltration into sanitary sewer exceeding 0.0758 gal/vert ft/hr.
6. Internal diameter of section varying more than 1% from nominal diameter.
7. Any continuous crack having surface width of 0.01 in. or more and extending for length of 12 in or more, regardless of position.

C. Manhole seals shall be approved by inspecting Engineer after application and prior to backfilling.

3.10 VACUUM TESTING MANHOLES

A. General:

1. Test manholes as recommended by manufacturer. All manholes shall be tested for leakage/air tightness.
2. Provide equipment such as pumps, gauges, regulators, hoses, pipe plugs, manhole frame plugs, necessary to perform air tests of manholes. Equipment configuration shall be such that there are no valves on or along air line between measuring point at manhole and pressure transducer or sensing device located in control unit on surface. Amount of pressure being exerted on joint shall be readable above ground on pressure gauge.
3. Accuracy and calibration of pressure sensing/monitoring system shall have been certified by reliable testing firm within one-month period preceding use of equipment. Proof of certification shall be submitted.
4. Test sanitary manholes only.

B. Equipment:

1. Pressure meter device shall accurately show PSIG to nearest 1/10 of one pound and shall respond to and record any change in void pressure instantly.
2. Systems which incorporate bladders, hoses, or like for monitoring pressure and which have questionable accuracy will not be allowed.

C. Testing Procedure:

1. Test sanitary manholes prior to installation of chimney seals.
2. Test in accordance with ASTM C1244 and D3753.
3. Isolate manhole to be tested by temporarily plugging al pipes entering the manhole
4. Draw vacuum of 10 in. of mercury (5 PSIG or 0.03 Bar) within manhole.
5. If required vacuum pressure cannot be developed, manhole shall have failed test. Manhole being tested will also have failed if the time for the vacuum reading to drop from 10 in. of mercury to 9 in. of mercury meets or exceeds the values indicated in Table 1 or ASTM C1244.
6. Failure of manhole indicates need for sealing. Seal in accordance with manufacturer recommendations.
7. Retest until satisfactory results obtained.

END OF SECTION

SECTION 33 31 13
SANITARY SEWER GRAVITY PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Provide sewer pipe materials and installation as shown on Drawings, specified herein, and as needed for a complete and proper installation of sanitary systems.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

B. AASHTO: American Association of State Highway and Transportation Officials

C. AWWA: American Water Works Association

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product data:

2. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
3. Manufacturers recommended installation procedures.

C. Provide certification reports attesting that materials supplied meet referenced specifications

D. Table of manufacturer’s recommended mandrel sizes for 3, 4, and 5% deflection cases based on diameters and wall thickness of pipe provided for this project.

E. Calculations verifying pipe stiffness class, installation conditions and floatation (for depths less than 6 feet).

F. Pipe layout/installation guide from manhole to manhole by pipe diameter and pipe class or D-Load, or pipe stiffness rating.

G. Pipe joint certification indicating compliance with 50 ft hydrostatic head rating.

H. Submit in accordance with Section 01 33 00.

I. Results of plant tests shall be included with shipment of materials, with two additional copies of each test result to be furnished to Engineer.

1.04 QUALITY ASSURANCE

A. Pipe manufacturer shall have minimum of five (5) years of experience manufacturing pipe in accordance with ASTM Standard Specifications.

B. Plant Testing:

1. Testing shall consist of flatting, Impact resistance, and pipe stiffness tests in accordance with ASTM D3034 and ASTM F679. Testing shall be performed on pipe manufactured for this project.
2. Pipe diameter, wall thickness and other dimensions shall be verified as per ASTM D2122.
3. For pipe testing frequency, pipe lot shall be defined as pipe of same diameter and class or D-Load manufactured by same process in one plant, over period not to exceed approximately 2 weeks.
4. Engineer or Engineer's representative will randomly select test pipe from each lot as follows:

a. For lots of 100 or more pipe, 1% of number of pipe in lot with a minimum of 2 pipes selected.
b. For lots less than 100 pipe, 1 pipe will be selected.
c. For lots less than 10 pipes, testing may be waived by Engineer if manufacturing plant has satisfactory specification compliance on other pipe lots.

PART 2 - PRODUCTS

2.01 GRAVITY SEWER PIPE STRENGTH DESIGN

A. All sewer pipe materials provided shall be designed in accordance with the following criteria:

1. Traffic Loading = HS-20 per AASHTO, Traffic impact = 30% for depths less than 5 feet.
2. Soil loading based upon depth and unit weight of 125 pounds per cubic feet.
3. Trenching and Bedding as per details shown in plans for pipe types and per Section 31 23 33.
4. Ground water table assumed to be at the surface.
5. Saturated soil weight for bouyancy calculations = 62.5 pounds per cubic feet.
6. Safety factor for pipe buoyancy calculations =1.3.

B. Flexible pipe shall also comply with following design criteria:

1. Allowable Deflection < 3%
1. Deflection Lag Factor = 1.0 for design condition (1.5 for 1 year post construction monitoring
2. Maximum E=1000 for depths less than 25 feet to top of pipe, maximum E=1500 for depths from 25 to 35 feet to top of pipe. (Lessor values may be used at manufacturer's option.)
3. Safety factor for buckling = 2.5
4. Safety factor for wall crush = 2. 0

2.02 PVC AWWA C-900 PIPE (8-inch)

A. PVC pipe shall be made from virgin compounds as defined in ASTM D1784 and as per AWWA C900.

B. Pipe shall have a dimension ratio (DR) of the following sizes and conform to cast iron outside diameters as per Table 1 of AWWA C900.

1. DR 14 (305 psi)

C. Gaskets and Lubricants: Gaskets and lubricants intended for use with the PVC pipe and appurtenances shall be made materials that are compatible with the plastic material and with each other when used together as per AWWA C900.

D. Joints:

1. PVC pipe installed using trenchless methods must be installed with integral restrained joints and circular rubber gasket such as JM Eagle Loc 900, Diamond Lok-21, or equal.

2.03 SOLID WALL PVC PIPE (10-inch)

A. Pipe shall conform to ASTM D3034 for sizes 15 inch and less and ASTM F679 for sizes 18 inch and greater. Pipe and fittings shall have a minimum cell classification of 12364 or 12454 as per ASTM D1784. PVC compounds shall meet or exceed requirements of listed cell classification.

B. Minimum pipe stiffness:

1. 115 psi and dimension ratio (SDR) 26 per ASTM D3034.
2. 46 psi per ASTM F679.

C. Bell and spigot joint, rubber gasket.

D. Flexible Rubber gaskets shall be as per ASTM D3212 and ASTM F477.

E. Pipe shall be green or white.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items in accordance with approved design.

3.03 INSTALLATION

A. Trenching and backfill for Work of this Section shall conform to Section 31 23 33 and pipe manufacturer’s recommendations.

B. Location with respect to water supply piping:

1. Locate sewer at least 10 feet away, horizontally, from water supply main or service line, as measured from outside edges of pipe.
2. Where water lines cross under gravity sewer lines, a minimum vertical separation of 18 inches shall be maintained between top of water main and bottom of sewer. Water lines shall not cross under sewer lines.
3. Where water lines cross over gravity sewer lines, water main shall be at least 18 inches above sewer.

4. When these conditions are not met, contractor shall:

    a. Fully encase sewer pipe for a distance of ten feet on each side of crossing; or whenever sewer and water main are within eight feet horizontally.
    b. Use acceptable pressure rated pipe for sewer with no joint closer horizontally than five feet from crossing.

C. Pipe laying:

1. Protect pipe during handling against shocks and free fall. Remove extraneous material from pipe interior.
2. Between manholes all gravity pipe shall be of same strength class and as shown on layout/installation guide.
3. Lay pipe by proceeding upgrade with spigot ends of bell-and-spigot pipe pointing in direction of flow.
4. Lay each pipe accurately to indicated line and grade, aligning so sewer has a uniform invert. Noticeable variations from true alignment and grade shall be considered sufficient cause for rejection of Work.
5. Continually maintain interior of pipe free from foreign material. Provide watertight plugs for open ends of pipe when laying not in progress.
6. Before making pipe joints, clean and dry all surfaces of pipe to be joined.
7. Use lubricants recommended by pipe manufacturer.
8. Place, fit, join, and adjust joints to obtain water tight seal.
9. Lay pipe to line and grade so horizontal and vertical joint deflection will not be more than 50% maximum deflection as recommended by manufacturer.
10. Laying of Pipe in Cold Weather:

    a. Heat pipe and jointing material to prevent freezing of joints, as recommended by manufacturer.
    b. Do not lay pipe on frozen ground.
    c. Pipes with rubber gaskets or resilient type joints: Warm gasket or joint material to facilitate making proper joint.

3.04 TESTING AND INSPECTING

A. Do not allow or cause any work of this Section to be covered until after it has been inspected.

B. Test and inspect sewer installation in accordance with Section 40 05 10.

1. Televise sewer installation.
2. Leakage Test
    a. Low Pressure Air Test, or
    b. Infiltration Test, if top surface of ground water is at least 2 feet above top of pipe for entire test length
3. Deflection Test (Flexible Pipe Only)
    a. Perform not sooner than 30 days following installation.

END OF SECTION

SECTION 33 31 23
SANITARY SEWERAGE FORCE MAIN PIPING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sanitary Sewer Force Main

1.02 DEFINITIONS

A. American Society of Testing Materials (ASTM).

B. American Waterworks Association (AWWA).

C. Polyethylene (PE)

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Manufacturer's specifications, data sheets, and installation instructions for piping, equipment, and accessories.
2. Include other data as necessary to show compliance with these Specifications.

C. Submit thrust restraint calculations showing lengths, locations and methods of restraining pipe.

D. Test Results:

1. Results of plant tests shall be included with shipment of materials, with two additional copies of each test results to be furnished to Engineer.
2. Certified reports of field tests and observations.

E. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: pipe manufacturer shall have minimum of five (5) years experience manufacturing pipe in accordance with ASTM or AWWA Standard Specifications.

B. Plant testing for PE pipe:

1. Dimensions comply with ASTM D2122, as specified in AWWA C901.
2. Ring-tensile strength test complies with ASTM D2290 and AWWA C901.
3. Quick burst test complies with ASTM D1599, and AWWA C901.
4. Elongation -at-break complies with ATM D638, and AWWA C901.
5. Five-second pressure test complies with ASTM D1598, and AWWA C901.

6. Carbon black content complies with ASTM D1603 or ASTM D4218, and AWWA C901.
7. Melt index complies with ASTM D 1238, and AWWA C901 and the manufacturer requirements.
8. Density complies with ASTM D2839, ASTM D 1505, and AWWA C901.

C. For all pipes

1. For pipe testing frequency, pipe lot shall be defined as pipe of same diameter and class manufactured by same process in one plant, over period not to exceed approximately 2 weeks.
2. Engineer or Engineer's representative may randomly select test pipe from each lot as follows:

a. For lots of 100 or more pipe, 1% of number of pipe in lot with a minimum of 2 pipes selected.
b. For lots less than 100 pipe, 1 pipe will be selected.
c. For lots less than 10 pipes, testing may be waived by Engineer if manufacturing plant has satisfactory specification compliance on other pipe lots.

D. Fusion technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type and size being used. Qualification shall be current as of the actual date of fusion performance on the project.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store in a manner that will exclude dirt and moisture from entering pipe and prevent damage from construction operations.

B. Store pipe and materials in accordance with Manufacturer's recommendations.

PART 2 – **PRODUCTS**

2.01 PIPE MATERIALS FOR DIRECTIONAL DRILLING

A. For sections of the forcemain indicated as directional drilled (HDD), the Contractor shall install the following pipe materials in locations specified in the Contract Drawings:

a. 4-inch FUSIBLE DR11 HDPE (DIPS) pressure rating 200 psi.

2.02 DUCTILE IRON FITTINGS FOR PIPE

A. Use restrained joint or mechanical joint, except mechanical joint required where tie rods used. Push-on joint fittings not allowed.

B. All joints shall be rated for 350 psi pressure minimum with a surge safety factor of 100 psi:

C. Compact style in accordance with AWWA C153.

D. Cement Lined: AWWA C104

2.03 SOLID WALL PE PIPE

A. PE pipe is to be used for horizontally directional drilled pipe only.

B. PE pipe shall be made from new or rework compounds conforming to PE grades PE 4710 as per AWWA C901 or AWWA C906.

C. Pipe shall be DR-11 with a minimum pressure class of 200 as per AWWA C901 or AWWA C906.

D. Pipe shall conform to Ductile Iron pipe size (DIPS or DIOD) outside diameter pipe sizes.

E. Joints and fittings shall be specifically manufactured for and be compatible with PE piping materials. All joints and connections shall be restrained to prevent separation and pullout due to internal pressure, thrust, or thermal expansion and contraction.

F. PE pipe sections shall be fused together to form an impermeable seal to protect the nearby water well. Electrofusion couplings may be used.

2.04 FITTINGS FOR DUCTILE IRON PIPE

A. Push-on or mechanical joint, except mechanical joint required where tie rods used.

B. Mechanical joints and retainer glands or restrained joint pipe shall be provided where restrained joints are required to resist deflection.

C. Compact style in accordance with AWWA C153.

D. Cement Lined: AWWA C104.

2.05 HDPE Mechanical Joint Adapters (MJ ADAPTERS)

A. Mechanical Joint Adapters shall have a material designation code of PE4710 or higher and a minimum Cell Classification as noted for HDPE pipe.

B. Mechanical Joint Adapters can be made to ASTM D 3261 or if machined, must meet the requirements of ASTM F 2206.

C. MJ Adapters shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

D. Markings for molded or machined MJ Adapters shall be per ASTM D 3261.

1. Manufacturer’s name or trademark
2. Material designation (PE4710)
3. Date of manufacture or manufacturing code
4. Size
5. Where recessed marking is used, take care not to reduce the wall thickness below the minimum specified.

E. Metal gland for MJ Adapter shall be AWWA C153.

F. Low alloy steel bolts shall comply with AWWA C 111.4. Bolts, rods, and hex nuts shall be manufactured from 304 stainless steel as per ANSI/ AWWA C111/A21.11.

2.06 HDPE STIFFENING INSERT (STIFFENER)

A. Provide Stiffeners at each MJ adapter and coupling.

B. Stiffening inserts shall be specially designed for use on the inside of HDPE pipe in conjunction with AWWA C111 mechanical joints.

C. Provide stainless steel per ASTM 240, type 304 or 316.

D. Stiffener shall be manufactured within the pipe or MJ adapter by the factory.

E. Wedge style stiffeners are allowed.

F. Stiffener length must be sufficient to fully encompass the area of the pipe being restrained.

G. Inserts must be designed for underground pressurized fluid service and are pressure rated to match the pipe DR pressure rating, derated as appropriate for service temperature. Maximum test pressure limited to pipe rated pressure.

H. Stiffener design shall prevent movement causing fitting to slide or rotate on the pipe.

2.07 HDPE WALL ANCHOR

A. Butt fusion wall anchors, or force restraint collars, shall comply with requirements of DR11, Ductile Iron Pipe Size (DIPS), minimum cell class 445474C, and meeting this specification's requirements for HDPE pipe except for striping.

2.08 ARV Vent Pipe

A. 4-inch ductile iron, cement lined, bituminous coated, class 350 pipe.

B. Piping below grade to be push on joint.

C. Piping above grade to be flanged with stainless steel fasteners.

D. Cover end of vent piping with 12 Gauge Screen with maximum ¼-inch openings, secured to vent piping.

E. Paint pipe forest green with exterior paint for ductile iron application.

PART 3 – **EXECUTION**

3.01 SURFACE CONDITIONS

A. Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of Work. Do not proceed until unsatisfactory conditions are corrected.

B. Comply with Section 31 23 33, appropriate paragraphs of this section and pipemanufacturer's recommendations.

3.02 FIELD MEASUREMENT

A. Make necessary measurements in the field to assure precise fit of items in accordance with approved design.

3.03 HANDLING

A. Handle pipe accessories so as to ensure delivery to the trench in sound, undamaged condition:
   1. Carry pipe into position; do not drag.
   2. Use pinch bars or tongs for aligning or turning the pipe only on the bare end of the pipe.

B. Thoroughly clean interior of pipe and accessories before lowering pipe into trench. Keep clean during laying operations by plugging or other method approved.

C. Before installation, inspect each piece of pipe and each fitting for defects.

D. Replace material found to be defective at no additional cost to Owner.

E. Store rubber gaskets in a cool dark place until just prior to time of installation.

3.04 PIPE CUTTING

A. Cut pipe neatly and without damage to pipe.

B. Unless otherwise recommended by pipe manufacturer, cut pipe with mechanical cutter.

C. Cut plastic pipe square, and remove all burrs.

3.05 LOCATING

A. Locate sewer pipe at least 10 feet away, horizontally, from water pipes.

B. A deviation may be allowed on a case by case basis if bottom of water main is at least 18" above top of sewer pipe and minimum horizontal separation is 3 feet.

C. Where water mains cross over sewers, water main shall be at least 6 inches above top of sewer.

3.06 JOINT DEFLECTION

A. Maximum allowable deflection will be one–half (1/2) of amount given in AWWA C600 or the manufacturers recommendation whichever is less.

B. If alignment requires deflection exceeding one-half the limits shown in AWWA C600 or from the manufacturer, furnish bends to provide angular deflections within the limits shown.

3.07 PLACING AND LAYING

A. General:

1. Lower pipe and accessories into trench by means of derrick, ropes, belt slings, or other equipment. Do not dump or drop materials into trench.
2. Except where necessary in making connections to other lines or in unique circumstances where no options exist, lay pipe with bells facing in direction of normal flow (bell section on upstream end).
3. Rest full length of each pipe section solidly on pipe bedding, with recesses excavated to accommodate bells, couplings, and joints.
4. Relay pipe that has the grade or joints disturbed after laying.
5. Do not lay pipe in water, or when trench conditions are unsuitable for work; keep water out of the trench until jointing is completed.
6. Securely close open ends of pipe, and fittings when work is not in progress.
7. Where any part of coating or lining is damaged, repair in accordance with manufacturers recommendations at no additional cost to Owner.

B. Place and spread pipe bedding material in trench bottom to depth shown on drawings and in accordance with Section 31 23 33.

C. Pipe laying

1. Position pipe and fittings in trench in a manner that identifying markings will be readily visible for inspection.

2. Cutting and joining:

a. Protect against abrasion from serrated holding devices.
b. Remove burrs from surfaces to be jointed and dirt, dust, and moisture by wiping clean with chemical cleaner or dry cloth.
c. Using a pure bristle paint brush, apply an even coat of the specified lubricant on the rubber gasket joint.

3. Insert pipe into bottom of the fitting socket; and push home
4. Align pipe system components without strain and within allowable deflection limits.
5. For HDPE pipe provide an electrically continuous type TW insulated number 14 tracer wire in the trench along the pipe, fastened to the pipe at 20 foot intervals, and terminating above ground at a service fitting or hydrant.

D. At connections to existing pipe or where different pipe materials connect with each other, use factory-manufactured fittings approved by utility having jurisdiction.

E. Sleeves:

1. Where pipe passes through walls of valve pits or structures, provide cast iron wall sleeves.
2. Fill annular space between walls and sleeves with rich cement mortar.
3. Fill annular space between pipe and sleeves with mastic.

3.08 THRUST RESTRAINT

A. Provide thrust restraint on plugs, caps, tees, and bends deflecting 11 ¼ degrees or more either vertically or horizontally.

B. Restrain by one of the following means:

1. Thrust blocks conforming to details on Drawings.
2. Meg-a-Lug by EBAA Iron, or equal.

C. Installation of thrust blocks:

1. Locate thrust blocking between solid ground and the fitting to be anchored.
2. Unless otherwise shown, place the base and thrust bearing sides of thrust blocking directly against undisturbed earth.
3. Sides of thrust blocking not subject to thrust may be placed against forms.
4. Place thrust blocking so the fitting joints will be accessible for repair.
5. Protect steel rods and clamps by galvanizing or by coating with bituminous paint.

3.09 TESTING AND INSPECTION

A. Closing uninspected work: Do not allow or cause any work of this Section to be covered until after it has been inspected and tested.

B. Hydrostatic Pressure Test:

1. Where any section of a sewer line is provided with concrete thrust blocking for fittings, do not make hydrostatic tests until at least five days after installation of the concrete thrust blocking.
2. Devise a method for disposal of wastewater from hydrostatic tests.
3. Pressure: 1.5 time working pressure of pipe.
4. Replace or remake joints showing visible leakage.
5. Remove cracked pipe, defective pipe, and cracked or defective joints and fittings. Replace with sound material and repeat the test until results are satisfactory.
6. Make repair and replacement without additional cost to the Owner

END OF SECTION

This page intentionally left blank.

SECTION 33 42 11
STORM WATER GRAVITY PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Provide sewer pipe materials and installation as shown on Drawings, specified herein, and as needed for a complete and proper installation of storm systems.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

B. AASHTO: American Association of State Highway and Transportation Officials

C. AWWA: American Water Works Association

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product data:

2. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
3. Manufacturers recommended installation procedures.

C. Provide certification reports attesting that materials supplied meet referenced specifications

D. Calculations verifying pipe stiffness class, installation conditions and floatation (for depths less than 6 feet).

E. Table of manufacturer’s recommended mandrel sizes for 5% deflection cases based on diameters and wall thickness’ of pipe provided for this project.

F. Pipe layout/installation guide from manhole to manhole by pipe diameter and pipe class or D-Load, or pipe stiffness rating.

G. Pipe joint certification indicating compliance with 50 ft hydrostatic head rating.

H. Submit in accordance with Section 01 33 00.

I. Results of plant tests shall be included with shipment of materials, with two additional copies of each test result to be furnished to Engineer.

1.04 QUALITY ASSURANCE

A. Pipe manufacturer shall have minimum of five (5) years experience manufacturing pipe in accordance with ASTM Standard Specifications.

B. Plant Testing:

1. Determine average inside diameter and wall thickness for each lot as per ATSM F1803 or ASTM D2122. Testing shall be performed on pipe manufactured for this project.
2. Each lot shall be tested for flattening (ASTM F1803), impact resistance (ASTM D2444), pipe stiffness (ASTM D2412), fusion (ASTM D2152), and air tightness (ASTM F1803).
3. Cost of testing shall be borne by CONTRACTOR. Pipe which is tested (except air tested) which fails to return to normal cross section or shows other signs of damage may not be used.
4. For pipe testing frequency, pipe lot shall be defined as pipe of same diameter and class or D-Load manufactured by same process in one plant, over period not to exceed approximately 2 weeks.
5. Engineer or Engineer's representative will randomly select test pipe from each lot as follows:

a. For lots of 100 or more pipe, 1% of number of pipe in lot with a minimum of 2 pipes selected.
b. For lots less than 100 pipe, 1 pipe will be selected.
c. For lots less than 10 pipes, testing may be waived by Engineer if manufacturing plant has satisfactory specification compliance on other pipe lots.

PART 2 - PRODUCTS

2.01 GRAVITY SEWER PIPE STRENGTH DESIGN

A. All sewer pipe materials provided shall be designed in accordance with the following criteria:

1. Traffic Loading = HS-20 per AASHTO, Traffic impact = 30% for depths less than 5 feet.
2. Soil loading based upon depth and unit weight of 125 pounds per cubic feet.
3. Trenching and Bedding as per details shown in plans for pipe types and per Section 31 23 33.
4. Ground water table assumed to be at the surface.
5. Saturated soil weight for bouyancy calculations = 62.5 pounds per cubic feet.
6. Safety factor for pipe buoyancy calculations =1.3.

B. Flexible pipe (closed profile PVC) shall also comply with following design criteria:

1. Allowable Deflection < 3%
2. Deflection Lag Factor = 1.0 for design condition (1.5 for 1 year post construction monitoring
3. Maximum E=1000 for depths less than 25 feet to top of pipe, maximum E=1500 for depths from 25 to 35 feet to top of pipe. (Lessor values may be used at manufacturer's option.)
4. Safety factor for buckling = 2.5
5. Safety factor for wall crush = 2. 0

2.02 PVC CLOSED PROFILE GRAVITY SEWER PIPE

A. Pipe: Polyvinyl Chloride Closed Profile Gravity Pipe conforming to ASTM F1803, with integral bell and elastomeric seal joints.

B. Minimum pipe stiffness: 46 psi as per ASTM F1803.

C. Pipe and fittings shall have a minimum cell classification of 12364 or 12454 as per ASTM D1784. PVC compounds shall meet or exceed requirements of listed cell classification.

D. Gaskets: Elastomeric gaskets shall be in accordance with Specification F477.

E. Lubricant: Lubricant shall have no detrimental effect on gasket or pipe material.

F. All joints shall be certified by pipe manufacturer to perform at fifty (50) feet of hydrostatic head at 5% deflection.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items in accordance with approved design.

3.03 INSTALLATION

A. Trenching and backfill for Work of this Section shall conform to Section 31 23 33 and pipe manufacturer's recommendations.

B. Location with respect to water supply piping:

1. Locate sewer at least 10 feet away, horizontally, from water supply main or service line, as measured from outside edges of pipe.
2. Where water lines cross under gravity sewer lines, a minimum vertical separation of 18 inches shall be maintained between top of water main and bottom of sewer. Water lines shall not cross under sewer lines.
3. Where water lines cross over gravity sewer lines, water main shall be at least 18 inches above sewer.

4. When these conditions are not met, contractor shall:

    a. Fully encase sewer pipe for a distance of ten feet on each side of crossing; or whenever sewer and water main are within eight feet horizontally.
    b. Use acceptable pressure rated pipe for sewer with no joint closer horizontally than five feet from crossing.
    c. Where concrete encasement is used, provide not less than 4 inch thickness around pipe and 6 inches at pipe joints.

C. Pipe laying:

1. Protect pipe during handling against shocks and free fall. Remove extraneous material from pipe interior.
2. Between manholes all gravity pipe shall be of same strength class and as shown on layout/installation guide.
3. Lay pipe by proceeding upgrade with spigot ends of bell-and-spigot pipe pointing in direction of flow.
4. Lay each pipe accurately to indicated line and grade, aligning so sewer has a uniform invert. Noticeable variations from true alignment and grade shall be considered sufficient cause for rejection of Work.
5. Continually maintain interior of pipe free from foreign material. Provide watertight plugs for open ends of pipe when laying not in progress.
6. Before making pipe joints, clean and dry all surfaces of pipe to be joined.
7. Use lubricants recommended by pipe manufacturer.
8. Place, fit, join, and adjust joints to obtain water tight seal.
9. Lay pipe to line and grade so horizontal and vertical joint deflection will not be more than 50% maximum deflection as recommended by manufacturer.
10. Laying of Pipe in Cold Weather:

    a. Heat pipe and jointing material to prevent freezing of joints, as recommended by manufacturer.
    b. Do not lay pipe on frozen ground.
    c. Pipes with rubber gaskets or resilient type joints: Warm gasket or joint material to facilitate making proper joint.

3.04 TESTING AND INSPECTING

A. Do not allow or cause any work of this Section to be covered until after it has been inspected.

B. Test and inspect sewer installation in accordance with Section 40 05 10.

1. Leakage Test

    a. Low Pressure Air Test, or
    b. Infiltration Test, if top surface of ground water is at least 2 feet above top of pipe for entire test length

2. Deflection Test (Flexible Pipe Only)

    a. Perform not sooner than 30 days following installation.

END OF SECTION

SECTION 33 52 00
HYDROCARBON TRANSMISSION AND DISTRIBUTION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Provide buried gas piping systems as shown on the Drawings, specified herein, and as needed for a complete and properly functioning system.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

1.03 SUBMITTALS

A. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable

B. Submit Product data of pipe and fittings proposed to be used in sufficient detail to confirm compliance with requirements of this Section.

C. Submit shop drawings of pipe and fittings proposed to be used.

D. Submit in accordance with Section 01 33 00.

PART 2 – PRODUCTS

2.01 POLYETHYLENE UNDERGROUND GAS DISTRIBUTION PIPE AND FITTINGS

A. High Density Polyethylene conforming to PE Grade 4710 as per ASTM F714.

B. Manufactured and testing is accordance with ASTM D2513.

C. Minimum Dimension Ratio: SDR11.

D. Cell Classification: PE 445474 C or higher.

E. Piping shall be provided with service identification stripe coextruded with the pipe and of the same material as pipe.

F. Fittings shall be polyethylene molded heat fusion type, manufactured with PE 4710 and in accordance with ASTM D2513

G. Fittings and joints shall have long-term pressure capabilities equal to or greater than the pressure/vacuum rating of the pipe.

PART 3 – EXECUTION

3.01 PREPARATION

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

B. Comply with Section 31 23 33 – Trenching, Backfilling, and Compacting, appropriate paragraphs of this Section, and pipe material manufacturer's recommendations.

3.02 FIELD MEASUREMENTS

A. Make necessary measurements in the field to assure precise fit of items in accordance with the approved design.

3.03 HANDLING

A. Handle pipe so as to ensure delivery to the trench in sound, undamaged condition:

1. Carry pipe into position; do not drag.

2. Care shall be taken during transportation of the pipe such that it will not be cut, kinked or otherwise damaged.

B. Thoroughly clean interior of pipe and accessories before lowering pipe into trench. Keep clean during laying operations by plugging or other method approved.

C. Before installation, inspect each piece of pipe and each fitting for defects:

1. Material found to be defective before or after laying shall be replaced without additional cost to the Owner.

D. Pipes shall be stored in accordance with manufacturer's recommendations on level ground, free of sharp objects that could damage pipe. Stacking pipe shall only occur when manufacturers shipping system is utilized which will not cause deformation of the bottom layers of pipes under anticipated temperature conditions.

3.04 PIPE CUTTING

B. Cut pipe neatly and without damage to the pipe.

C. Unless otherwise recommended by pipe manufacturer, cut pipe with mechanical cutter only.

D. Cut pipe square and remove all burrs.

3.05 DEFLECTION

E. Do not bend pipe tighter than ½ of the minimum allowable radius as defined for the pipe size and DR by the manufacturer

3.06 PLACING AND LAYING

A. General:

1. Lower pipe and accessories into trench by means of derrick, ropes, belt slings, or other equipment. Do not dump or drop any of the materials into the trench.

2. Rest the full length of each section of pipe solidly on the pipe bedding.

3. Do not lay pipe in water, or when trench conditions are unsuitable for the work; keep water out of the trench until jointing is completed.

4. Securely close open ends of pipe when work is not in progress.

B. Pipe laying:

1. Position pipe and fittings in trench in a manner that identifying markings will be readily visible for inspection.

2. Align pipe system components without strain and within allowable deflection limits.

3. The pipe sections shall be joined together according to the manufacturer's specifications. Butt fused joints shall be true alignment and shall have uniform roll-back beads resulting from proper temperature and pressure. Joints shall be allowed adequate cooling time before removal of pressure. Joints shall be watertight and have strength equal to that of adjoining pipe sections.

3.07 CONNECTING DISSIMILAR PIPE MATERIALS

A. Provide factory fabricated connecting piece meeting same structural and joint testing standards as adjacent new piping.

3.08 TESTING AND INSPECTION

A. Closing uninspected work: Do not allow or cause any of the work of this Section to be covered up until after it has been completely inspected and tested.

B. Low pressure air tests:

1. Perform in accordance with section 40 05 10.

END OF SECTION

This page intentionally left blank.

DIVISION 40

PROCESS INTERCONNECTIONS

This page intentionally left blank.

SECTION 40 05 05
EXPOSED PIPING INSTALLATION

PART 1 – GENERAL

1.01 SUMMARY

A. This section identifies process-mechanical piping systems to be provided, specifies unique requirements for each system identified, and references other sections where detailed requirements of piping components are specified.

B. Process-mechanical piping systems are shown on Process-Mechanical Drawings and on Civil Site Piping Drawings. Civil Site Piping Drawings may also show site utility, plumbing, fire protection, and HVAC piping systems that are specified in other sections.

C. Process-Mechanical Piping Schedule included with this section identifies process-mechanical piping systems to be provided. Schedule includes application information and specifies unique system requirements.

1.02 SUBMITTALS

A. Shop Drawings:

1. Layout drawings for each process-mechanical piping system drawn to scale. Identify each piping system with same flow stream identifier as shown on Drawings.

a. Double-line layout for each piping system 3-inch pipe size and larger. Minimum scale of ¼-inch = 1 foot.
b. Single-line or double-line layout for each piping system smaller than 3-inch pipe size. Minimum scale of ¼-inch = 1 foot.
c. For each piping system include:

1) Size for each pipe and fitting.
2) Size, type, and orientation for each valve.
3) Material, lining type, and system number for coating to be provided for each pipe and fitting.
4) Pipe class, thickness or schedule for each pipe and fitting.
5) Pipe end connections (joint type) and couplings.
6) Location and type of supports, hangers, anchors, and expansion joints.
7) Pipe couplings, saddles, sleeves, clamps, adapters, and other piping products.
8) Pipe mounted equipment and instrumentation identified by tag number assigned on Drawings.
9) Insulation to be provided.

B. Submit in accordance with Section 01 33 00.

PART 2 – PRODUCTS

2.01 PIPE AND FITTINGS

A. Provide pipe and fittings as shown on Drawings and as specified in sections identified in Process-Mechanical Piping Schedule presented at end of this section.

2.02 PIPING SUPPORT, FLEXIBILITY, THERMAL EXPANSION, ANCHORAGE, AND VIBRATION

A. Provide support system for each non-buried process-mechanical piping system in accordance with Section 40 05 07.

B. Provide anchors, restraints, and concrete blocks as required to resist hydraulic thrust and forces due to thermal expansion.

C. Piping system, including support and anchorage system, shall allow for thermal expansion and contraction due to differences in operating temperature and temperature piping is exposed to during construction. Provide piping system products to allow for and control movement of piping due to thermal expansion and contraction.

D. No attempt has been made to show all pipe supports, hangers, anchors, expansion joints, and other piping products required for piping support, thermal expansion, and anchorage. Absence of these products on Drawings does not relieve Contractor of his responsibility for providing them in accordance with these Specifications.

E. Provide joints, couplings, and expansion joints as shown on Drawings and as required for piping flexibility and vibration isolation. No attempt has been made to show all joints, couplings, expansion joints, and other piping products required for piping flexibility and vibration isolation.

2.03 OTHER PIPING PRODUCTS

A. Provide products for pipe penetrations in accordance with Section 40 05 09.

B. Provide couplings, flanged coupling adapters, service saddles, and expansion joints in accordance with Section 40 05 06.

2.04 COATINGS

A. Coat exterior surfaces of non-insulated piping products with coating system numbers specified in Specifications sections identified in Part 3 of this section and in accordance with Section 09 96 00.

B. Do not coat stainless steel, copper, galvanized, plastic, or FRP piping or insulation jacketing.

PART 3 – EXECUTION

3.01 PREPARATION

A. Use implements, tools, and facilities for handling and protection of piping products to avoid damage prior to installation.

B. Inspect piping products before installation. Provide new or repair or recondition damaged piping products. Repair or reconditioning is subject to Engineer's approval. Patch damaged interior linings and exterior coatings or replace damaged product with new product. Patching is subject to Engineer's approval.

C. Clean ends of piping products before installation. Remove foreign matter and dirt from inside of piping products and keep products clean until Work has been accepted.

3.02 INSTALLATION

A. Location:

1. Install piping parallel to structure lines unless shown otherwise on Drawings.

2. Do not install piping through beams, columns, or other structural members unless shown on Drawings.
3. Locate valves in piping system in accordance with manufacturer's instructions. In horizontal piping runs, do not orient valves so operating stem is below horizontal centerline.

B. Assembly:

1. Install piping without springing or forcing in manner which would cause stress in piping, valves, or connected equipment.
2. Set pipe flanges level, plumb, and aligned. Set flanged fittings so flange is true and perpendicular to pipe axis. Set flanges so bolt holes straddle vertical centerline of pipes.
3. For flanged connections, match bolt holes and obtain uniform contact over entire flange area prior to installation of flange bolts. Tighten bolts to uniformly compress gaskets and minimize flange stress. Tighten bolts to torque recommended by gasket manufacturer. Coat nuts and bolts with anti-seize thread compound.
4. Machine off raised-face of steel flange when mating with flat-faced flange.

C. Pump, Blower and Equipment Connections:

1. Align pipe, equipment, pumps, and blowers so stresses are not transmitted to connections. Support piping independently from pumps, blowers, and equipment. Do not support piping from equipment, blowers, and pumps. Anchor piping to prevent transmission of hydraulic thrust load to pumps, blowers, and equipment.
2. Install couplings, adapters, expansion joints, flanges, and unions so pumps, equipment, valves, and in-line instruments can be removed from service without disruption to other portions of piping system.
3. Install couplings, expansion joints and other vibration isolation components to isolate piping from pump, blower, and equipment vibration.
4. For welded nozzle connections, allow for shrinkage during welding to prevent excessive stresses on pumps and equipment.
5. Provide drain piping from pump and equipment drains and overflows to floor drain system.
6. Provide control lines such as air and bubbler level system piping necessary for operation of pumps, equipment, valves, and in-line instruments.

D. Install insulating flange, insulating coupling or dielectric union at each connection between ferrous and non-ferrous metal piping.

3.03 FIELD QUALITY CONTROL

A. Inspect installed piping products for dents, kinks, abrupt changes of curvature, damage to lining, and other damage. Repair or recondition damaged products as approved by Engineer or replace damaged products with new products.

B. Inspect installed, unlined piping products for corrosion and scale on interior surfaces. Clean products to remove corrosion and scale or replace with new products.

C. Test system in accordance with Section 40 05 10 and as specified in Process-Mechanical Piping Schedule.

3.04 CLEANING

A. After installation and before testing, remove dirt, rocks, debris and other foreign matter from interior of each piping system.

B. Water flush each hydrostatically tested piping system unless specified otherwise.

1. Flushing velocities of 2.5 feet per second shall be maintained until accumulated debris has been removed.
2. Insert cone strainers at equipment connections prior to flushing. Remove cone strainers after flushing is complete.
3. Remove accumulated debris through drains not less than 2 inch in diameter or by temporarily removing pipe spools, fittings, or valves.
4. Drain piping after flushing and immediately dry piping with compressed air.

C. Blow clean each pneumatically tested piping system with compressed air unless specified otherwise.

3.05 PROCESS-MECHANICAL PIPING SCHEDULE

A. **SERVICE** column: Presents Flow Stream Identifiers for process-mechanical piping systems shown on Process-Mechanical Drawings and on Civil Drawings.

1. Civil Drawings may also show site utility, plumbing, fire protection, and HVAC piping systems which are not included in Process-Mechanical Piping Schedule. Site utility, plumbing, fire protection, and HVAC piping systems are specified in other sections.

B. **SIZE** column: Presents nominal pipe diameter(s) for each piping system shown on Process-Mechanical Drawings and continuation of piping system on Civil Drawings.

C. **PIPE MATL** column: Identifies material type to be provided for piping system. Piping material shall conform to requirements of referenced sections:

Pipe Material	Section	Abbreviation in Piping Schedule
Cement Lined Ductile Iron Piping	40 05 19	CLDI
Polyvinyl Chloride Piping	40 05 31.13	PVC
316L Stainless Steel Piping	40 05 23	316SS

D. **LOCATION** Column: Identifies installation location of piping system. Piping system components shall be suitable for condition specified.

E. **MIN/MAX TEMP** column: Presents minimum and maximum operating temperature of piping system. Piping system components shall be suitable for operating temperatures shown.

F. **MAX PRESSURE** column: Presents maximum operating pressure of piping system and type of test to be provided. Piping system components shall be suitable for maximum operating pressure shown and test pressure specified.

1. Provide hydrostatic testing in accordance with Section 40 05 10 where maximum operating pressure value is followed by "-H".

G. **COLOR** column: Specifies color coding and banding to be provided for non-buried piping systems. Provide color coding, banding, and labeling in accordance with Section 40 05 97. For piping scheduled to be color-coded, but not scheduled for complete painting (such as plastic piping, stainless steel piping, or aluminum insulation jacketing) provide pipe marking tape banding to represent piping color-code. At each banding location provide following

sequence:

1. 8-inch wide tape of scheduled pipe color.
2. 4-inch wide tape of scheduled band color (if pipe color-code calls for banding).
3. 8-inch wide tape of scheduled pipe color (if pipe color-code calls for banding).

H. **REMARKS** column: Provides further description of piping system and specifies additional requirements.

PROCESS-MECHANICAL PIPING SCHEDULE

Service	Size (in.)	Pipe Matl	Location	Min/Max Temp (ºF)	Max Press (psig)	Color	Remarks
100 – BENTON LIFT STATION							
RWW	4	CLDI	Inside Exposed, Embedded, Buried, Submerged	-20/110	20-H	Dark Gray	
D	2	PVC	Inside Exposed, Embedded, Buried	-20/110	N/A	None	
V	4	316SS	Outside Exposed, Embedded	-20/110	N/A	None	
200 – GREENFIELD LIFT STATION							
RWW	4	CLDI	Inside Exposed, Embedded, Buried, Submerged	-20/110	45-H	Dark Gray	
D	1 1/2	PVC	Inside Exposed, Embedded, Buried	-20/110	N/A	None	Gravity drain from Meter Vault to Valve Vault. See 22 00 05 for Sump Pump piping
V	4	316SS	Outside Exposed, Embedded	-20/110	N/A	None	
210 – EXISTING GREENFIELD LIFT STATION							
RWW	4	CLDI	Inside Exposed, Embedded	-20/110	45-H	Dark Gray	
YARD PIPING – SEE SECTION 33 05 05							

END OF SECTION

This page intentionally left blank.

SECTION 40 05 06
COUPLINGS, ADAPTERS, AND SPECIALS FOR PROCESS PIPING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Couplings, flanged coupling adapters, service saddles, expansion joints, and flexible couplings required for piping connections. Some products specified in this Section may not be required for this Contract. Refer to piping system Specification section(s) and Drawings to determine particular products to be provided under this Contract.

1.02 REFERENCES

A. ANSI: American National Standards Institute

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for couplings and service saddles specified.
2. Catalog cuts and product specifications for couplings, flanged coupling adapters, and service saddles.

C. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing equipment of types and capacities indicated that have record of successful in-service performance.

PART 2 – PRODUCTS

2.01 COUPLINGS

A. Couplings for connecting plain-end steel or ductile iron pipe of same outside diameter:

1. Dresser Style 38.
2. Smith-Blair Product No. 411.

B. Transition couplings for connecting plain-end steel or ductile iron pipe of different outside diameter:

1. Dresser Style 162.
2. Smith-Blair Product No. 413.

C. Insulating couplings for connecting plain-end steel or ductile iron pipe and stopping flow of

electrical current:

1. Dresser Style 39
2. Smith-Blair Product No. 416.

D. Restrained couplings for connecting plain-end steel, ductile, PVC, HDPE, or combinations of pipe of same outside diameter, where coupling requires restraint:

1. Smith-Blair Product No. 471
2. EBAA-Iron Series 3800

E. Pressure rating shall be greater than test pressure of piping system.

F. Materials:

1. Middle Ring and Gaskets: As selected by manufacturer. Suitable for fluid service and maximum operating temperature of piping system.
2. Followers: Ductile iron or steel.
3. Bolts and Nuts: Stainless steel.

2.02 FLANGED COUPLING ADAPTERS

A. Flanged coupling adapters for connecting plain-end steel or ductile iron pipe to flanged pipe, fitting, valve, instrument, or equipment item:

1. Dresser Style 128.
2. Smith-Blair Product No. 913.

B. Pressure rating shall be greater than test pressure of piping system.

C. Materials:

1. Flange: Steel, faced and drilled to 150-pound class in conformance with ANSI B16.5.
2. Body: Steel.
3. Follower: Ductile iron or steel.
4. Gasket: As selected by manufacturer. Suitable for fluid service and maximum operating temperature of piping system.
5. Bolts and Nuts: Stainless steel.

2.03 RESTRAINED FLANGED COUPLING ADAPTERS

A. Restrained flanged coupling adapters for connecting plain-end ductile iron or steel pipe to flanged spools and fittings.

1. EBAA-Iron MegaFlange Series 2100
2. Smith-Blair Product No. 911.

B. Pressure rating shall be greater than or equal to the pressure rating of the piping system in which it used.

C. Materials:

1. Flange: Ductile iron, drilled to 125/150-pound class in conformance with ANSI B16.5. Provide flat or raised face flanges to match piping system.
2. Body: Ductile iron

3. Gasket: As selected by manufacturer. Suitable for fluid service and maximum operating temperature of piping system.
4. Bolts and Nuts: Match piping system as specified in Division 40 05 05.
5. Adapter shall be coated to match piping as specified in Division 09 96 00.

2.04 DISMANTLING JOINTS

A. Dismantling joint for valve, pump, meter, or other fitting installations with heavy duty joint restraint:

1. Style 975, by Smith Blair, Inc.
2. Or equal.

B. Pressure and Service: Same as connected piping.

C. Body: ASTM A53, ASTM A283 Gr C or carbon steel with a minimum yield of 30,000 psi.

D. Follower Flange: Ductile iron per ASTM A536, Steel section per ASTM A576GR1020HR, or carbon steel having a minimum yield stress of 30,000 psi.

E. Gasket: Recommended by the manufacturer.

F. Bolts and Nuts: Stainless steel bolts complete with washers complying with ASTM F593, AISI Type 316 and nitrided stainless nuts.

G. Type 316 stainless steel anchor studs installed in pressure-tight anchor boss for restraint. For buried or submerged applications, provide external bolting and other hardware of Type 316 stainless steel, including tie bolts, bolt plates, lugs, nuts, and washers. Provide number of studs required to restrain test pressure and service conditions. Harness shall be as designed and recommended by manufacturer.

2.05 SERVICE SADDLES

A. Service saddles for tapping pipe sizes 18 inches and smaller shall be double strap design.

1. Dresser Style 91.
2. Smith-Blair Product No. 317.

B. Service saddles for tapping pipe sizes larger than 18 inches shall be triple strap design.

1. Smith-Blair Product No. 366.

C. Materials:

1. Body: Malleable iron or ductile iron.
2. Straps: 304 Stainless Steel.
3. Nuts and Washers: 304 Stainless Steel.
4. Gasket: As selected by manufacturer. Suitable for fluid service and maximum operating temperature of piping system.

2.06 RUBBER EXPANSION JOINTS

A. Rubber expansion joints rubber designed to absorb all-directional movements and reduce noise and vibration manufactured by:

1. General Rubber.
2. Garlock.
3. Mercer.
4. Or equal.

B. Rubber Expansion Joints:

1. Cover, body, seamless tube, and integral full-faced flanges. Standard 125-pound flange drilling.
2. Materials and construction shall be suitable for fluid service, maximum operating temperature, maximum operating pressure and test pressure of piping system.
3. Single arch.

    a. Filled for wastewater, sludge and other fluids with suspended solids.
    b. Unfilled for air, clean water and other fluids without suspended solids.

4. Split stainless steel retaining rings.
5. Provide control unit for each expansion joint:

    a. Gusset plates, washers, bolts, and elastomeric bushings.
    b. No metal-to-metal contact to eliminate transmission of noise and vibration.
    c. Size control units for maximum operating pressure and test pressure of piping system.
    d. Control unit hardware shall be stainless steel.

6. Minimum movement capability for single, unfilled arch joints:

Joint Size (inch)	Axial Compression (inch)	Axial Extension (inch)	Lateral Deflection (inch)
≤ 6	7/16	1/4	1/2
8 to 18	11/16	3/8	1/2
20 to 24	13/16	7/16	1/2
26 to 40	15/16	1/2	1/2
≥ 42	1-1/16	9/16	1/2

7. Minimum movement capability for single, filled arch joints shall be at least 50 percent of movement specified above for unfilled arch joints.

2.07 ANCHORS

A. Provide anchors including, but not limited to, tie rods, lugs, harness assemblies, flanged spool pieces, friction collars and hardware for each coupling and flanged coupling adapters to restrain pipe where required to prevent pipe movement out of each coupling or flanged coupling adapter.

B. Design each anchor to sustain force developed by test pressure of piping system.

C. Anchorage with welded attachments to ductile iron piping is unacceptable.

2.08 COATINGS

A. Coatings for couplings, flanged coupling adapters, and service saddles shall be same material as coatings for connected pipe.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install couplings, adapters, and specials for process piping in accordance with manufacturer's written instructions. Provide flanged coupling adapters as shown on the drawings, restrained flange adapters are not an acceptable equal to flanged spool sections in rigid piping systems.

B. Provide expansion joints where indicated on Drawings and elsewhere as determined by Contractor for adequate expansion compensation and vibration isolation of piping systems.

3.02 EXPANSION JOINT SUPPORTS

A. Provide supports in accordance with pipe hangars, supports, and anchors in accordance with Section 40 05 07.

B. Fixed Supports:

1. Provide a fixed support for each expansion joint. Fixed support shall restrain pipe to prevent movement of fixed end of the expansion joint.
2. Fixed support shall be located on the same end of pipe as the “restraining ring” is welded.
3. Design each support to sustain force developed by test pressure of piping system.
4. Fixed supports with welded attachments to stainless steel piping are unacceptable.

C. Adjustable Supports:

1. Provide adjustable supports for each expansion joint. Adjustable support shall allow axial movement of pipe into the expansion joint.
2. Adjustable support shall be located on the opposite end of the pipe as the welded “restraining ring.”
3. Design each support to sustain force developed by test pressure of piping system.
4. Adjustable supports with welded attachments to stainless steel piping are unacceptable.

END OF SECTION

This page intentionally left blank.

SECTION 40 05 07
PIPE HANGERS AND SUPPORTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. System of pipe supports and anchors with necessary inserts, bolts, nuts, restraining and hanger rods, washers, and other accessories.

1.02 REFERENCES

A. MSS: Manufacturers Standardization Society

B. ASTM: American Society for Testing and Materials

C. ANSI: American National Standards Institute

1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Design, detail, and installation of pipe support system shall be responsibility of Contractor.
2. Pipe support system components shall withstand dead loads imposed by weight of pipes filled with water plus insulation, plus live loads due to thermal expansion, vibration, internal test pressures, and have minimum safety factor of 5.
3. Absence of pipe supports and details on Drawings shall not relieve Contractor of responsibility for providing them throughout plant.
4. Supply design loading criteria to precast concrete manufacturer for piping supported from precast members.

1.04 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for pipe hangers, supports, and anchors specified.

C. Shop Drawings:

1. Pipe supporting system, including manufacturer's product data, dimensions, sizes, types, location, maximum loadings, thrust anchorage, and installation instructions.
2. Shop Drawing shall be stamped by a Structural Engineer registered in the State of Illinois.

D. Submit in accordance with Section 01 33 00.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing equipment of types and capacities indicated that have record of successful in-service performance.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipe hangers, supports, and anchors to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is made safe from such hazards.

B. Store pipe hangers, supports, and anchors in clean, dry location.

C. Fiberglass components shall be stored on a flat, level surface protected from UV light (sunlight).

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. B-Line.

B. Grinnell.

C. Carpenter-Paterson.

D. Unistrut.

E. Superstrut.

F. Champion Fiberglass

2.02 GENERAL

A. MSS types indicated are typical of types and quality of standard pipe supports and hangers to be employed. Special support and hanger details are shown to cover locations where standard catalog supports are inapplicable.

B. Provide factory fabricated piping hangers and supports, clamps, hanger rod attachments, building attachments, saddles, shields, thrust anchorage, and other miscellaneous products of MSS SP69 type indicated or shop fabricated supports; comply with MSS SP58 and manufacturer's published product information. Where MSS type not indicated, provide proper selection for installation requirements and comply with MSS SP69, MSS SP89 and manufacturer's published product information.

2.03 MATERIALS

A. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which materials are to be installed. Refer to Material Schedule on Drawings for materials to be utilized within each Exposure type.

B. Where galvanized supports are used, structural shapes, framing, hangers, and supports shall be hot dipped galvanized and saddles, hangers, shields, hanger rods and hardware may be electroplated galvanized.

C. Fiberglass components:

1. Shall be pultruded or injection molded from fire-resistant vinyl ester, or polyurethane resins. Polyester and vinyl ester resins utilized will have a fire-retardant rating of 25 or less when tested in accordance with ASTM E-84 and exhibit low smoke generation.
2. Installed allowable operating temperature range shall be -40 to 140F.
3. Glass-reinforced channels shall be constructed with 70% glass and 30% resin. Channels shall utilize UV-stabilized resins and incorporate UV-resistant surfacing veil into the laminate. Surfacing veils shall be applied to all exterior surfaces to improve weatherability and inhibit ultraviolet degradation.
4. Glass-reinforced pipe hangers and clamps shall be injection molded from 40% long glass fiber polyurethane resin and shall incorporate dark grey pigments to improve weatherability and inhibit ultraviolet degradation.
5. Non-metallic fasteners shall be manufactured from long glass fiber-reinforced polyurethane.
6. Fiberglass threaded rod shall be manufactured from pultruded vinyl ester resin with rod couplers of injected molded polyurethane resin.

2.04 HORIZONTAL PIPING HANGERS AND SUPPORTS

A. General:

1. Unless otherwise shown or specified, hangers for 2 1/2 inches and smaller pipe shall be split-ring, adjustable swivel, clevis or roller type, hangers for 3 inch pipe or greater shall be clevis or roller type.
2. Hangers for use with spring supports shall be split-ring or clamp type.
3. Hangers for fiberglass reinforced pipe shall be saddle type.
4. Each hanger shall be designed to permit at least 1/2 inch vertical adjustment after installation.

B. Adjustable Swivel Split Ring Hanger: MSS Type 6.

C. Adjustable Clevis Hanger: MSS Type 1.

D. Adjustable Band Hanger: MSS Type 7.

E. Adjustable Swivel-Band Hanger: MSS Type 10.

F. Clamp: MSS Type 4.

G. Single Roll Support: MSS Type 41, including axle roller and threaded sockets.

H. Adjustable Roller Hanger: MSS Type 43, including axle roller and clevis.

I. Roll/Stand: MSS Type 44, including roller, stand, and axle.

J. Adjustable Roller/Base: MSS Type 46, including roller, adjustable base, and stand.

K. Steel Brackets: Welded structural steel shapes complying with following:

1. Light Duty: MSS Type 31.
2. Medium Duty: MSS Type 32.
3. Heavy Duty: MSS Type 33.

L. Adjustable Saddle Support:

1. MSS Type 38, including saddle, pipe and reducer.

2. Fabricate base support from steel pipe and include cast iron flange or welded steel plate. Use of threaded rod for pedestal support stanchions is not acceptable.

M. Stanchion Saddle Support:

1. MSS Type 37, including saddle and U-bolt.
2. Fabricate base support from steel pipe and include cast iron flange or welded steel plate. Use of threaded rod for pedestal support stanchions is not acceptable.

N. Strap or wire hangers not acceptable.

2.05 VERTICAL PIPING CLAMPS

A. 2-Bolt Riser Clamp: MSS Type 8.

B. 4-Bolt Riser Clamp: MSS Type 42, include pipe spacers at inner bolt holes.

2.06 HANGER RODS AND ATTACHMENTS

A. Hanger Rods:

1. ASTM A36, threaded both ends or continuous thread.
2. Rods shall conform to following sizes.

Pipe Size (inches)	Minimum Rod Diameter (inches)
Up to 2	3/8
2 1/2 and 3	1/2
4	5/8
6 to 8	3/4
10 to 12	7/8
14 to 18	1
20 and Up	1-1/4
Trapeze Hangers	As Required

B. Turnbuckles: MSS Type 13.

C. Weldless Eye Nut: MSS Type 17.

D. Eye Socket: MSS Type 16.

E. Clevis: MSS Type 14.

2.07 BUILDING ATTACHMENTS

A. Individual Concrete Inserts:

1. MSS Type 18.
2. MSS Type 19.
3. Minimum Safe Load: 1,100 pounds.

B. Top Beam C-Clamp: MSS Type 19.

C. C-Clamps: MSS Type 23.

D. Single-Side Clamp: MSS Type 25.

E. Top I-Beam Clamp: MSS Type 25.

F. Side Beam Clamp: MSS Type 20.

G. Concrete Anchors:

1. Provide in accordance with Section 05 50 00.
2. Minimum Safety Factor: 5.

2.08 SADDLES AND SHIELDS

A. Protection Saddles: MSS Type 39.

B. Protection Shields: MSS Type 40.

C. Wood Insulation Saddle:

1. Elcen Metal Products Company.
2. Or equal.

2.09 FRAMING SYSTEMS

A. Metal Systems:

1. Shop-Fabricated Anchors and Supports:

a. Steel Plates, Shapes, and Bars: ASTM A36.
b. Restraining Rods: ASTM A307.

B. Fiberglass Systems:

1. Provide as a system including all necessary non-metallic components including fasteners, hangers, pipe clamps, channel splice plates, brackets, beam clamps, etc.

C. Concrete: Minimum 28 day compressive strength of concrete – 3,000 pounds per square inch.

PART 3 – EXECUTION

3.01 GENERAL

A. Proceed with installation of hangers, supports, and anchors after required building structural work is complete and concrete support structure has reached 28-day compressive strength as 3,000 pounds per square inch.

B. Install hangers, supports, clamps, and attachments from building structure. Comply with MSS SP-69. Group parallel runs of horizontal piping to be supported together on trapeze type hangers where possible.

C. Install supports to provide indicated pipe slopes and maximum pipe deflections allowed by ANSI B31.1 are not exceeded.

D. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.

E. Do not support piping from other piping.

F. Prevent contact between dissimilar metals. Where concrete or metal pipe support is used, place 1/8 inch thick Teflon, neoprene rubber or plastic strip under piping at point of bearing. Cut to fit entire area of contact between pipe and support.

G. Prevent electrolysis in support of copper tubing by use of hangers and supports where are copper plated, plastic coated or by other recognized industry methods. Electrician's tape not acceptable isolation method.

H. Apply anti-seize compound to nuts and bolts.

3.02 INSTALLATION OF BUILDING ATTACHMENTS

A. Support piping from structural framing, unless otherwise noted.

B. Concrete Inserts:

1. Locate inserts so total load on insert does not exceed manufacturer's recommended maximum load. Location of inserts shall be approved by Engineer.
2. Where necessary to anchor supports to hardened concrete or completed masonry, use concrete anchors.

C. Attach to structural steel with beam clamps.

3.03 THRUST ANCHORS AND GUIDES

A. Thrust Anchors:

1. For suspended piping, center thrust anchors as closely as possible between expansion joints and between elbows and expansion joints. Anchors shall hold pipe securely and be sufficiently rigid to force expansion and contraction movement to take place at expansion joints or elbows and preclude separation of joints.
2. Provide thrust anchors as required to resist thrust due to changes in diameter or direction or dead ending pipe lines. Anchorage shall be required wherever bending stresses exceed allowable for pipe. Wall pipes may be used as thrust anchors.

B. Pipe guides shall be provided adjacent to sliding expansion joints in accordance with recommendations of National Association of Expansion Joint Manufacturers.

3.04 PIPE SUPPORT

A. Spacing:

Type of Pipe (inches)	Maximum Pipe Support Spacing (feet)
Plastic (Schedule 80 at 100 degrees Fahrenheit, F)	
2	6
1 1/2	5-1/2
(For plumbing or chemical applications, plastic piping shall be supported at maximum of 4 ft-0 in. spacing.)	
Stainless Steel	
1 1/2 through 4	8
Cast Iron and Ductile Iron	
3 and 4	10

B. Where piping of various sizes is to be supported together, space supports for smallest pipe size or install intermediate supports for smaller diameter pipe.

C. Provide minimum of 2 pipe supports for each pipe run.

D. Where piping connects to equipment, support by pipe support and not by equipment, unless approved by equipment manufacturer.

E. Unless otherwise shown or authorized by Engineer, place piping running parallel to walls approximately 1 1/2 inches out from face of wall and at least 3 inches below ceiling.

F. Pedestal pipe supports shall be adjustable with stanchion, saddle, and anchoring flange. Use of threaded rod for pedestal support stanchions is not acceptable.

G. Piping passing through sleeves or openings in interior wall sleeves shall be carried by supports or hangers. Do not rest on wall.

H. Support piping in manner preventing undue strain on valve, fitting or equipment. Provide pipe supports at changes in direction or elevation, adjacent to flexible couplings, adjacent to non-rigid joints, and where otherwise shown. Do not install pipe supports and hangers in equipment access areas.

I. Install supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Piping shall be free to move when expands or contracts, except where fixed anchors are indicated. Where specified hanger rod swing length cannot be provided or where pipe movement based on expansion of 1 inch per 100 feet for each 100 degrees F change in temperature exceed 1/2 inch, provide approved roller supports.

K. Piping 6 inches and larger supported by trapeze hangers shall be supported with rollers.

L. Stacked horizontal runs of piping along walls may be supported by metal framing systems. Metal framing systems shall be attached to concrete insert channels.

M. Coat hangers, clamps, protective shields, metal framing support components, and hanger accessories in accordance with Section 09 96 00.

END OF SECTION

This page intentionally left blank.

SECTION 40 05 09
PIPE SLEEVES AND SEALS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Modular mechanical seals.
2. High density polyethylene (HDPE) sleeves.

1.02 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for sleeves and seals specified.

C. Submit in accordance with Section 01 33 00.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing equipment of types and capacities indicated that have record of successful in-service performance.

B. Items provided under this section shall be listed or labeled by Underwriters Laboratories Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

C. Single-Source Responsibility: Obtain sleeve and seals from single manufacturer with responsibility for entire system. Unit shall be representative product built from components that have proven compatibility and reliability and are coordinated to operate as unit as evidenced by records of prototype testing.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. GPT Industries, LINK-SEAL.

B. Advance Products & Systems (APS), Innerlynx.

2.02 MODULAR MECHANICAL SEALS

A. Modular, mechanical type, consisting of inter-locking synthetic rubber links shaped to

continuously fill annular space between pipe and opening.

B. Seal Element: Ethylene propylene diene monomer (EPDM). Provide low-durometer EPDM elements for thin or soft walled pipes of HDPE, PVC, tubing, or others with a wall thickness less than 3/8-inches as recommended by manufacturer.

C. Pressure Plates: Composite.

D. Bolts and Nuts: 316 stainless steel.

2.03 HDPE SLEEVES

A. Material: HDPE.

B. Integrally molded water stop / anchor at least 4-inches larger than outside diameter of sleeve.

C. Textured surface to increase concrete bond strength.

D. Designed for use with modular mechanical seals.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install sleeves and seals in accordance with manufacturer's written instructions.

END OF SECTION

SECTION 40 05 10
TESTING PIPING SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Hydrostatic pressure testing, low pressure air testing, and high pressure air testing of piping systems.

B. Systems to be tested, type of test to be performed, and test pressure shall be as specified in other sections of Specifications.

1.02 SUBMITTALS

A. Test report for each piping system tested. Include following:

1. Date of test.
2. Description and identification of piping system tested.
3. Type of test performed.
4. Test fluid.
5. Test pressure.
6. Type and location of leaks detected.
7. Corrective action taken to repair leaks.
8. Results of retesting.

B. Submit in accordance with Section 01 33 00.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. Test in presence of Engineer.

B. Owner will provide on-site source of water for testing specified herein.

1. Install acceptable meter.

C. Provide pumps and piping required to bring water to point of use.

D. Provide air supply.

E. Provide test pressure equipment, meters, pressure gauges, and other equipment, materials, and facilities necessary to perform specified tests.

F. Provide bulkheads, flanges, valves, bracing, blocking, or other temporary sectionalizing devices that may be required.

G. Remove temporary devices after tests complete.

H. Perform tests on exposed piping after completely installed, including supports, hangers, and anchors.

I. Perform tests on piping before insulation installed.

J. Perform tests on piping that is clean and free of dirt, sand or other foreign material.

K. Plug pipe outlets with test plugs. Brace each plug securely to prevent blowouts.

L. Add test fluid slowly.

M. Include regulator set to avoid overpressurizing and damaging piping.

N. Perform pressure testing in accordance with local, state, and federal requirements.

O. Correct leaks or defects and retest at no additional cost to Owner.

3.02 HYDROSTATIC PRESSURE TESTING – NON-HDPE PIPING

A. Perform hydrostatic pressure testing for piping systems identified in other sections. Test pressure shall be as specified in other sections.

B. Open vents at high points to purge air pockets while piping system is filling. Venting may also be provided by loosening flanges or with equipment vents.

C. Testing:

1. After section of piping to be tested has been filled with water, apply test pressure by means of force pump of such design and capacity that required pressure can be applied and maintained without interruption for duration of test.
2. Measure test pressure by means of tested and properly calibrated pressure gauge acceptable to Engineer.
3. Maintain test pressure for sufficient length of time to permit Engineer to observe piping under test but not less than 2 hours.

D. With exception of buried piping with mechanical joints or push-on joints, piping systems shall show no visual evidence of weeping or leaking. If leakage is evident, make appropriate repairs and retest.

E. Maximum allowable leakage for buried piping with mechanical joints or push-on joints is as follows. If leakage is excessive, make appropriate repairs and retest.

$$L = \frac{NDP^{1/2}}{7{,}400}$$

Where:
L = Leakage, gallons per hr
N = Number of joints under test
D = Nominal diameter of piping, in.
P = Average pressure during test, lbs per sq in.

END OF SECTION

SECTION 40 05 19
DUCTILE IRON PROCESS PIPE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Detailed requirements for various ductile iron piping products. Some products specified in this Section may not be required for this Contract. Refer to piping system Specification section(s) and Drawings to determine particular ductile iron piping products to be provided under this Contract.

1.02 REFERENCES

A. AWWA: American Water Works Association

B. ANSI: American National Standards Institute

C. ASTM: American Society for Testing and Materials

D. AWS: American Welding Society

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for ductile iron piping specified.
2. Manufacturer's specifications, catalog cuts, and literature for the following:

a. Pipe.
b. Inside linings.
c. Restrained push-on joints.
d. Mechanical joints.
e. Flange joints.
f. Grooved joints.
g. Standard fittings.
h. Special fittings.
i. Wall pipe and floor pipe.
j. Polyethylene encasement.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for ductile iron piping.
2. Submit outside coating system for buried, interior, exterior, and submerged piping locations. Include submittal information in accordance with Section 09 96 00.
3. Submit all product data and coating system information specified above in one complete

submittal.

4. Shop drawings showing layout for ductile iron piping systems shall be submitted in accordance with and transmitted under appropriate piping system Specification section.
5. Submit in accordance with Section 01 33 00.

D. Lining Reports:

1. Submit layout drawing showing location of each pipe spool and fitting identification number.
2. Submit notarized certification report for each pipe spool and fitting for approval prior to shipment.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing materials of types and capacities indicated that have record of successful in-service performance.

B. Single-Source Responsibility: Obtain ductile iron piping from single supplier with responsibility for entire system.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. American Cast Iron Pipe Company.

B. U.S. Pipe and Foundry Company.

C. McWane Ductile - Clow Water Systems Co. (Less than 48-inch pipe)

2.02 PIPE

A. Liquid and air service pipe: AWWA C151, ductile iron.

B. Minimum Thickness/Pressure Class:

1. Buried Piping: Restrained push-on joint pipe and mechanical joint pipe, Pressure Class 250 unless specified otherwise in Section 40 05 05**.**
2. Flanged joint pipe: Special Thickness Class 53.
3. Grooved joint pipe: Special Thickness Class 53.

2.03 INSIDE LINING

A. Pipe and fittings shall be provided unlined or with inside lining as specified in Section 40 05 05.

B. Cement lining shall be in accordance with AWWA C104.

2.04 JOINTS

A. Joint Type:

1. Liquid and air services in buried locations shall be mechanical or push-on joint unless otherwise noted or specified in system Specification section.

a. Provide restrained mechanical joints or restrained push-on joints for piping systems with a maximum operating pressure greater than 5 pounds per square inch.

2. Liquid and air service in locations other than buried shall be flanged or grooved end joint at Contractor's option unless a specific joint type is noted on the Drawings or specified elsewhere.

B. Mechanical and Push-On Joints:

1. AWWA C111.
2. Gasket material:

    a. Suitable for service and maximum operating temperature of piping system as specified in Section 40 05 05.
    b. Selected by pipe manufacturer.

3. Restrained Mechanical Joints:

    a. Incorporate restraint into follower gland with individually actuated wedges.
    b. Full mechanical joint deflection during assembly and after burial.
    c. Ductile iron components.
    d. Series 1100 Megalug as manufactured by EBBA Iron, Inc.

4. Restrained Push-On Joints:

    a. Retainer Ring Type:

        1) American Cast Iron Pipe Company, Flex-Ring and Lok-Ring.
        2) U.S. Pipe and Foundry Company, TR-Flex, HDSS, or HP LOK.
        3) McWane-Clow, TR-Flex.

5. Restrained joints shall be mechanical locking type to provide positive restraint from joint separation without use of restraining rods, straps, or clamps.
6. Minimum pressure rating of restrained joints: 250 pounds per square inch.
7. For all buried applications use Cor-Blue T-bolts or equal, which have a ceramic filled, baked on fluorocarbon resin developed to handle highly corrosive conditions. Cor-Blue or equal T-Bolts and nuts shall comply with current version of ANSI/AWWA C111/A21.11.

C. Flanged Joints:

1. Flanged pipe for liquid and air service shall be in accordance with AWWA C115.
2. Fabrication of flanged pipe, including assembly of flange on pipe shall be performed by pipe manufacturer in accordance with AWWA C115. Assembly of flange on pipe outside of manufacturer's shop is unacceptable.
3. Flange material for flanged pipe shall be ductile iron. Flanged pipe with gray iron flanges is not acceptable.
4. Gasket material shall be suitable for service and maximum operating temperature of piping system as specified in Section 40 05 05. Torque requirement of gaskets shall be less than torque rating of flange, bolt, and nuts.
5. Gaskets shall be ring or full face, 1/8-inch thick, and conform to dimensions shown in Appendices to AWWA C110 and AWWA C115.
6. Nuts and bolts:

    a. Size, length, and number as shown in AWWA C110 and AWWA C115.
    b. Materials:

        1) Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which materials are to be

installed. Refer to Material Schedule on Drawings for materials to be utilized within each Exposure type.
2) Carbon steel fasteners shall be ASTM A307, Grade B.
3) Stainless steel fasteners shall be Type 316. Provide bolt insulating sleeves to protect against dissimilar materials.

c. Dimensions: ANSI B18.2.1, heavy hex.

2.05 FITTINGS

A. Pressure rating shall be 250 pounds per square inch, minimum.

B. Standard fittings for liquid and air service:

1. Restrained push-on and restrained mechanical joint fittings:

a. Ductile iron.
b. AWWA C110 or AWWA C153.

2. Flanged joint fittings:

a. Ductile iron.
b. AWWA C110.
c. Flange dimensions in accordance with AWWA C115.

3. Grooved joint fittings:

a. Ductile iron.
b. AWWA C110 except end preparation.
c. End preparation in accordance with AWWA C606, rigid radius groove.
d. Minimum wall thickness in accordance with AWWA C110/ANSI A21.10 and AWWA C153.

C. Special fittings for liquid and air service, not included in AWWA standards, shall be manufacturer's standard, based on AWWA design principles, and in compliance with applicable requirements of AWWA standards.

D. Wall Pipe and Floor Pipe:

1. Ductile iron.
2. Wall thickness of body equal to or greater than wall thickness of connecting pipe.
3. Flanges set flush with face of concrete shall be tapped for stud bolts.
4. Collar dimensions as shown on Drawings.
5. Collar cast integral with pipe or fabricated by welded attachment of collar to pipe.
6. Fabricated wall pipe and floor pipe shall be as follows:

a. Rated for dead end thrust due to 250 pounds per square inch internal pressure.
b. Steel collar welded continuously around pipe on both sides of collar.
c. Weld in pipe manufacturer's shop by qualified welder.
d. Electrodes: AWS A5.15, Class ENiFe-CI or AWS 5.6, Class ECuAl-2.

E. Miscellaneous Fittings:

1. Provide miscellaneous fittings, such as cutting in sleeves, tapping sleeves, caps, plugs, and other fittings, as required for a complete system.

2. Manufacturer of miscellaneous fittings shall be same manufacturer as pipe.
3. Miscellaneous fittings shall be suitable for service.

2.06 COATINGS

A. Provide buried piping with 1 mil thick asphaltic coating in accordance with applicable AWWA and ANSI standards.

B. Surface preparation, priming, and finish coating of non-buried piping shall be compatible and in accordance with Section 09 96 00.

C. Finish color for interior and exterior piping shall be as specified in Section 40 05 05.

D. Coating for piping embedded in concrete is not required.

2.07 POLYETHYLENE ENCASEMENT

A. Provide polyethylene encasement for buried piping in accordance with AWWA C105.

PART 3 – EXECUTION

3.01 INSTALLATION

A. In accordance with Section 40 05 05.

B. Buried Piping: In accordance with Section 33 05 05.

C. Pipes to be cut in the field shall be gauged and within acceptable tolerances to ensure fit of connections.

3.02 JOINT ASSEMBLY

A. Restrained push-on, mechanical, and grooved joint in accordance with manufacturer's written instructions.

B. Flanged joint in accordance with Section 40 05 05, flanged pipe manufacturer's written instructions, and gasket manufacturer's written instructions.

3.03 WALL PIPES

A. Wall pipes in cast-in-place concrete walls shall be supported independent of the reinforcing steel. Contact with the reinforcing steel either directly or hanging wall pipes by tie wires from the reinforcing steel is not acceptable.

B. Install in accordance with Section 03 30 00

3.04 POLYETHYLENE ENCASEMENT

A. Install on all buried piping in accordance with AWWA C105.

3.05 TAPPING

A. Do not tap polyethylene-lined or glass-lined pipe.

B. Taps for cement-lined and unlined pipe shall be in accordance with pipe manufacturer's

instructions.

C. Provide service saddles for tap sizes greater than 1-inch. Service saddles are not required for tap sizes 1-inch and smaller.

3.06 TESTING

A. Test pipe and pipe products in accordance with Section 40 05 10.

3.07 IDENTIFICATION

A. Provide pipe identification in accordance with Section 40 05 97.

END OF SECTION

SECTION 40 05 23
STAINLESS STEEL PROCESS PIPE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Detailed requirements for various 304L and 316L stainless steel pipe and fittings. Some products specified in this Section may not be required for this Project. Refer to piping system Specification section(s) and Drawings to determine stainless steel piping products to be provided under this Contract.

1.02 REFERENCES

A. ASME: American Society of Mechanical Engineers.

B. ASTM: American Society of Testing and Materials.

C. ANSI: American National Standards Institute.

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for piping system specified.
2. Submit for pipe, fittings, flanges, face rings, and bolting.
3. Submit proposed gasket material for each service. Submit documentation confirming gasket material selection is appropriate for fluid carried in system.
4. Coating system for carbon steel surfaces. Include coating system submittal information specified in Section 09 96 00.

C. Shop Drawings:

1. Shop Drawings showing layout for stainless steel piping shall be submitted in accordance with and transmitted under appropriate piping system specification sections.

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing equipment of types and capacities indicated that have record of successful in-service performance.

B. Welding Qualifications:

1. Contractor shall be responsible for qualifying welders as required by ANSI B31.3 and ASME Boiler and Pressure Vessel Code, Section IX.

C. Contractor shall maintain record of welding procedures used and welders or welding operators assigned to this Project and their symbols. Records shall show date and results of procedure and performance qualifications. Records shall be certified by Contractor and kept at job site and shall be available to Owner or Engineer on request for duration of Project.

D. Single-Source Responsibility: Obtain stainless steel products from single manufacturer with responsibility for entire system.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is made safe from such hazards.

B. Shipping:

1. Sections with field welded ends shall have wooden plug securely installed at each end to prevent pipes from being bent out of round.
2. Flanged connections shall have plywood blind wired over end and through bolt holes to hold flange against face ring or clip-on type flange protectors.
3. Ship protected from damage and contact with carbon steel.
4. Tarp sections during shipment to avoid contact with road dust and salt spray.

C. Storage:

1. Store stainless steel products in clean, dry location.
2. Store protected from damage and contact with carbon steel.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Felker Brothers Corporation

B. Or equal.

2.02 GENERAL

A. Grade of stainless steel (304 or 316) shall be as indicated in Section 40 05 05 or elsewhere.

B. All piping, fittings and miscellaneous components installed on welded piping systems shall be provided in low carbon (L) variant of specified stainless steel alloy.

C. When cast materials are used, systems specified for:

1. 304 stainless steel shall be cast from CF-8 materials.
2. 304L stainless steel shall be cast from CF-3 materials.
3. 316 stainless steel shall be cast from CF-8M materials.
4. 316L stainless steel shall be cast from CF-3M materials.

D. At Contractor’s option, thicker materials than specified are acceptable.

E. At Contractor’s option, 316 stainless steel will be accepted in lieu of 304 stainless steel.

2.03 PIPE

A. Unless indicated otherwise, provide piping as follows:

1. 1/2-inch to 3/4-inch:

    a. ASTM A312.
    b. Dimensions: Conform to ANSI B36.19.
    c. Schedule 10 for socket welded piping, Schedule 40 for socket welded piping utilizing Class 3000 fittings, Schedule 80 for threaded.
    d. Fittings: Unless indicated otherwise in Section 40 05 05 or elsewhere for specific service, use the following:

        1) 150-lb fittings meeting pressure/temperature requirements of MSS-SP-114 Class 150 fittings (300-psi CWP)
        2) Threaded end connections shall conform to ASME B1.20.1.
        3) Dimensions: Conform to MSS-SP-114.
        4) ASTM A351, cast stainless steel.

2. 1-inch to 2-inch:

    a. ASTM A312.
    b. Dimensions: Conform to ANSI B36.19.
    c. Schedule 10 for socket welded piping, Schedule 40 for threaded and for socket welded piping utilizing Class 3000 fittings.
    d. Fittings: Unless indicated otherwise in Section 40 05 05 or elsewhere for specific service, use the following:

        1) 150-lb fittings meeting pressure/temperature requirements of MSS-SP-114 Class 150 fittings (300-psi CWP)
        2) Threaded end connections conforming to ASME B1.20.1.
        3) Dimensions: Conform to MSS-SP-114.
        4) ASTM A351, cast stainless steel.

3. 2-1/2-inch:

    a. ASTM A312.
    b. Dimensions: Conform to ANSI B36.19.
    c. Schedule 10 for butt welded piping.
    d. Fittings: Unless indicated otherwise in Section 40 05 05 or elsewhere for specific service, use the following:

        1) Butt Weld Fittings:
        2) ASTM A403, Class WP.
        3) Dimensions: Conform to ANSI B16.9, Buttwelded.
        4) Elbows shall be long radius unless otherwise indicated on Drawings.
        5) Wall Thickness: match connecting pipe.

4. 3-inch to 24-inch:

    a. ASTM A312 or ASTM A778.
    b. Dimensions: Conform to ANSI B36.19.
    c. Schedule 10 for butt welded piping.
    d. Fittings: Unless indicated otherwise in Section 40 05 05 or elsewhere for specific service, use the following:

1) Butt Weld Fittings:
2) ASTM A403 or ASTM A774, Class WP.
3) Dimensions: Conform to ANSI B16.9, Buttwelded.
4) Elbows shall be long radius unless otherwise indicated on Drawings.
5) Mitered fittings are not permitted unless approved by Engineer.
6) Wall Thickness: match connecting pipe.

2.04 FITTINGS

A. Class 150 Cast Threaded Fittings:

1. Fittings shall be 150-lb fittings meeting pressure/temperature requirements of MSS-SP-114 Class 150 fittings (300-psi CWP)
2. Threaded end connections conforming to ASME B1.20.1.
3. Dimensions: Conform to MSS-SP-114.
4. ASTM A351, cast stainless steel.

B. Class 150 Cast Socket Welded Fittings:

1. Meeting pressure/temperature requirements of MSS-SP-114 Class 150 fittings (300-psi CWP).
2. Socket welded end connections shall be bored to match mating pipe Outside Diameter.
3. Dimensions: Conform to MSS-SP-114. ASTM A351, cast stainless steel.

C. Forged Class 3000 Fittings:

1. Forged stainless steel materials conforming to ASME A182.
2. All fittings shall be socket welded fittings.
3. Dimensions: Conform to ASME B16.11.

D. Butt Weld Fittings:

1. ASTM A403, Class WP when ASTM A312 pipe materials provided.
2. ASTM A774, Class WP when ASTM A778 pipe materials provided.
3. Dimensions: Conform to ANSI B16.9, Buttwelded.
4. Elbows shall be long radius unless otherwise indicated on Drawings.
5. Mitered fittings are not permitted unless approved by Engineer.
6. Wall Thickness: match connecting pipe.

2.05 JOINTS

A. Threaded Joints:

1. Size: ½-inch to 2-inch.
2. Non-flanged equipment connections and valves shall be threaded, all other connections are Contractors choice of threaded or socket welded.
3. Thread Sealant: Teflon tape or Teflon paste.

B. Socket Welded Joints:

1. Size: ½-inch to 2-inch.
2. Socket welded joints shall be performed in the shop in accordance with Shop Fabrication paragraph or in the field in accordance with Field Welded Joints paragraph.

C. Butt Welded Joints:

1. Size: 2-1/2-inch and Larger.
2. Butt welded joints shall be performed in the shop in accordance with Shop Fabrication paragraph or in the field in accordance with Field Welded Joints paragraph.

D. Flanged Joints:

1. Flange:

a. Unless specifically indicated on Drawings or Remarks of Process-Mechanical Piping Schedule of Section 40 05 05, type of flange to be used in Contractor's choice from the list below:

1) 316L stainless steel -up (lap joint) type.
2) Weld-neck style matching specified pipe material.
3) Slip-on flanges matching specified pipe material.

b. Flanges shall be raised face except where attaching to flat faced equipment or valves, then flat faced flanges shall be provided.
c. Faced and drilled to 150 or 300 pound class in conformance with ANSI B16.5.

2. Face Ring: Type 304L or 316L (match material type of pipe) stainless steel angle ring or flat plate. Flat plate thickness to suit pipe wall thickness and welding procedure to avoid warpage.
3. Bolting: ASTM F593-02 Type 316 stainless steel bolts, nuts and washers. Provide anti-galling compound on all mating threads of nuts and bolts.
4. Gaskets:

a. Biogas Service:

1) Ring-type. Provide full faced gaskets when connecting to Class 125 flanges.
2) PTFE composition, non-asbestos
3) Garlock "Gylon" style, or equal.

b. All other Services:

1) Material and facing as recommended as suitable for service by gasket Manufacturer.

2.06 FLANGE ISOLATION KITS

A. Manufacturers:

1. Pipeline Seal and Insulator, Inc.

B. Flange Isolation Kit:

1. Provide at all locations where stainless steel piping contacts ductile iron, carbon steel, cast iron, or copper piping to prevent galvanic reaction created from dissimilar metals.
2. Isolating and Sealing Gasket:

a. Provide one full faced isolating and sealing gasket, 1/8" thick, G-10 retainer containing precision tapered groove to accommodate controlled compression of a Teflon or Viton quad-ring sealing element.
b. Sealing element placement shall accommodate either flat, raised face, or RTJ flanges.

c. Quad-ring seal shall be pressure energized.
d. G-10 retainer shall have 550 volts/mil dielectric strength and minimum 50,000 psi compressive strength.
e. Full faced flange isolating gasket shall be 1/8-inch less in inner diameter than the inner diameter of flange in which it is installed.

3. Full Length Bolt Isolating Sleeves:

a. Provide one full length G-10 sleeve (extending half way into both steel washers) for each flange bolt.
b. G-10 shall be 1/32 inch thick tube with 400 volts/mil dielectric strength and water absorption of 0.10 percent or less.

4. Flange isolating kits shall be manufactured at a facility that has a registered ISO 9001:2000 Quality Management System.

2.07 SHOP FABRICATION

A. Dimensions:

1. Piping dimensions of fabricated sections shall conform to dimensions for manufactured pipe in ANSI B36.19.
2. For purpose of shop fabrication, dimensions shown on Drawings shall be considered approximate only. Field verification is responsibility of Contractor. Where possible, use field welds in each direction with adequate allowance for trim and fit, but not less than 2-inch in each direction. Loose flanged shall be provided for fit up at equipment connections.

B. Branch Connections:

1. Nozzle welds may be used in lieu of buttwelded reducing tees when permitted by ANSI B31.3. Buttwelded tees shall be used when branch is same size or one pipe size smaller than header. Nozzle welds shall be reinforced in conformance with ANSI B31.3.
2. Threaded or welded full couplings (O-lets) may be used for branch connections of 1-inch or smaller pipe size. Coupling shall comply with Fittings Paragraph of this Section.

C. Shop Welded Joints:

1. Preparation: Equipment used in welding preparation shall be covered or faced to prevent mild steel contamination of stainless steel. Items shall be marked “STAINLESS STEEL”, and shall be used for no other purpose.
2. Cleaning: Clean metal to be fused of lubricants, grease, paint, filings, and cuttings. Cleaning with alcohol or acetone. Do not use chlorinated solvents.
3. MIG and TIG Welding: Metal Inert Gas (MIG) welding may be used with automatic or semi-automatic machine welding. Tungsten Inert Gas (TIG) welding shall be used for manual welding of pressure joints. Apply shielding gas protection to underside of weld. Filler metal rods shall be AWS A5.9 Type ER308L or ER316L.
4. SMA Welding: Shielded Metal Arc (SMA) welding may be used at noncritical non-pressure connections and for joining stainless to carbon steel. Welding electrodes shall be stored in dry atmosphere to avoid moisture pick-up. Filler metal rods shall be AWS A5.4 Type E308L or E316L.
5. Dissimilar Metals: Do not weld carbon steel directly to stainless steel piping. Weld “poison pads” of equal thickness and same material of pipe to pipe and attach carbon steel to poison pad. SMA welding may be used to attach carbon steel to stainless pad. Filler metal rods shall be AWS A5.4 Type E309, or ASW A5.9 Type ER309 if TIG welding is used.
6. Shielding Gas: Use welding grade argon or helium-argon mixture.

7. Penetration: Buttweld joints shall have 100 percent penetration.
8. Tack Welding: Make tack welds with same grade of filler metal as finished weld. Tack welds shall be small enough to be absorbed into following weld beads and have slag and oxides removed prior to finishing weld or shall be completely removed.
9. Weld Finish: Inside of weld shall be smooth and free from projections and depressions. Grind with iron free grinding wheels labeled “STAINLESS STEEL” used for nothing else. Use 160 grit grinding wheels. Remove scale, oxides, and discolorations from pipes and welds. Products and procedures shall be as recommended by manufacturer.

2.08 COATING

A. Surface preparation, priming, and finish coating of carbon steel surfaces shall be compatible and in accordance with Section 09 96 00.

B. Stainless steel components shall not be coated.

2.09 INSTALLATION

A. Install piping systems in accordance with manufacturer's written instructions.

B. Install in accordance with appropriate piping system Specification section.

C. Non-flanged equipment or skid connections shall be provided a union upstream of connection point between isolation valve and equipment.

D. Interconnections between stainless steel piping systems and copper, steel, or iron piping systems shall be made with a flanged connection, utilizing a Flange Isolation Kit.

2.10 IDENTIFICATION

A. Identification: pipe identification shall be in accordance with Section 40 05 97.

2.11 FIELD WELDED JOINTS

A. Branched connections:

1. Nozzle welds may be used in lieu of buttwelded reducing tees when permitted by ANSI B31.3. Use buttwelded tees when branch is same size or one pipe size smaller than header. Reinforced nozzle welds in conformance with ANSI B31.3.
2. Threaded full couplings may be used for branch connections of 1-inch or smaller pipe size. Couplings shall comply with Paragraph 2.03.A.

B. Joint Preparation:

1. Equipment used in welding preparation shall be covered or faced to prevent mild steel contamination of stainless steel.
2. Prepare buttwelded joints in conformance ANSI A16.25.
3. Cleaning: Clean metal to be fused of lubricants, grease, paint, filings, and cuttings. Cleaning with alcohol or acetone. Do not use chlorinated solvents.

C. Welding:

1. Protect weld area from wind or draft while welding with gas back-up.
2. Preheat weld area if work piece temperature is less than 60 degrees Fahrenheit (F).
3. TIG Welding: Use Tungsten Inert Gas (TIG) welding for welding of critical pressure pipe

joints. Apply shielding gas protection to underside of weld. Filler metal rods shall be AWS A5.9 Type ER316L.

4. SMA Welding: Shielded Metal Arc (SMA) welding may be used at noncritical pressure pipe joints and for joining stainless steel to carbon steel. Welding electrodes shall be stored in dry atmosphere to avoid moisture pick-up. Filler metal rods shall be AWS A5.4 Type E316L.
5. Dissimilar Metals: Carbon steel shall not be welded directly to stainless steel piping. Weld "poison pads" of equal thickness and same material of pipe to pipe and attach carbon steel to poison pad. SMA welding may be used to attach carbon steel to stainless pad. Filler metal rods shall be AWS A5.4 Type E309, or ASW A5.9 Type ER309 if TIG welding is used.
6. Shielding Gas: Use welding grade argon or helium-argon mixture.
7. Penetration: Buttweld joints shall have 100 percent penetration.
8. Tack Welding: Make tack welds with same grade of filler metal as finished weld. Tack welds shall be small enough to be absorbed into following weld beads and have slag and oxides removed prior to finishing weld or be completely removed.
9. Weld Finish: Inside of weld shall be smooth and free from projections and depressions. Grind with iron free grinding wheels labeled "STAINLESS STEEL" used for nothing else. Use 160 grit grinding wheels. Remove scale, oxides, and discolorations from pipes and welds. Products and procedures shall be as recommended by manufacturer.

D. Field welding of joints shall not be performed in Class I, Division 1, Group D or Class II, Division 1, Group G hazardous locations as noted on the drawings.

2.12 FIELD QUALITY CONTROL

A. Any appearance of rusting from embedded iron on exterior surfaces of installed piping systems prior to issuance of Substantial Completion for associated system shall be corrected by Contractor by means of pickling affected surface with an appropriate solution, scrubbing with stainless steel brushes, and rinsing clean with deionized / distilled water.

2.13 WALL PIPES, WALL SLEEVES, AND SEALS FOR WALL PENETRATIONS

A. Support wall pipe by form work to prevent contact with reinforcing steel.

B. Install wall pipe in accordance with Section 03 30 00.

END OF SECTION

SECTION 40 05 31.13
POLYVINYL CHLORIDE PROCESS PIPE

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Detailed requirements for various PVC piping products. Some products specified in this Section may not be required for this Contract. Refer to piping system Specification section(s) and Drawings to determine particular PVC piping products to be provided under this Contract.

1.02 REFERENCES

A. ASTM: American Society for Testing and Materials

B. ANSI: American National Standards Institute

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for PVC components specified.
2. Submit product data for pipe, fittings, flanges, gaskets, and bolting.
3. Submit proposed gasket material for each service. Submit document confirming gasket material selection is appropriate for fluid carried in system.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for PVC components.
2. Submit layout for PVC piping systems in accordance with and transmitted under appropriate piping system Specification section.

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing equipment of types and capacities indicated that have record of successful in-service performance.

B. Single-Source Responsibility: Obtain PVC components from single manufacturer with responsibility for entire system. Unit shall be representative product built from components that have proven compatibility and reliability and are coordinated to operate as unit as evidenced by records of prototype testing.

PART 2 – PRODUCTS

2.01 PVC MATERIAL

A. Type 1, Grade 1 conforming to ASTM D1784.

2.02 PIPE

A. Schedule 80 PVC conforming to ASTM D1785.

2.03 PERFORATIONS

A. Provide perforations where perforated pipe called for on Drawings or in other Specification section(s).

B. Perforation requirements: 5/8-inch diameter holes on 5-inch centers 120 degrees apart.

2.04 FITTINGS

A. Schedule 40 or 80 PVC to match piping system.

1. ASTM D2464 for threaded joint type.
2. ASTM D2467 for socket joint type.

2.05 JOINTS

A. Provide socket type at all locations except unions, valves, and equipment with threaded or flanged end connections.

B. Threaded connections are not acceptable for nominal piping size greater than 2 inches.

C. Do not provide threaded joints for piping systems identified on Drawings or in other sections to be provided without threaded joints.

2.06 FLANGES

A. One Piece – socket configuration, PVC, flat faced, conforming to ANSI B16.5 150-pound bolt-hole drilling pattern.

B. Van Stone Style – two-piece design with rotating flange ring, PVC, flat faced, conforming to ANSI B16.5 150-pound bolt-hole drilling pattern.

2.07 GASKETS

A. Full-face, 1/8-inch thick flat type.

B. When mating flange has raised face, use flat ring gasket and provide filler gasket between outside diameter of raised face and flange outside diameter to protect flange from bolting moment.

C. Material compatible with fluid carried in system.

2.08 BOLTING

A. Type 316 Stainless Steel, ASTM A193, Grade B8M hex head bolts and ASTM A194, Grade 8M

hex head nuts.

B. Bolts shall conform to ANSI B.1.20.1.

C. Provide washers same material as bolts.

2.09 SOLVENT CEMENT

A. Join socket connections with PVC solvent cement conforming to ASTM D2564.

B. As recommended by pipe and fitting manufacturer to assure compatibility fluid in piping system.

2.10 THREAD LUBRICANT

A. Teflon tape.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install PVC components in accordance with manufacturer's written instructions.

B. Install products as shown on Drawings, and as specified in applicable piping system Specification section(s).

3.02 IDENTIFICATION

A. Identification: pipe identification shall be in accordance with Section 40 05 97.

END OF SECTION

This page intentionally left blank.

SECTION 40 05 53
PROCESS VALVES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Plug Valves.
2. Check Valves.
3. Ball Valves.
4. Miscellaneous Valves.
5. Valve Accessories.

B. Some products specified in this Section may not be required for this Contract. Refer to piping system Specification section(s) and Drawings to determine particular products to be provided under this Contract.

1.02 DEFINITIONS

A. psi – pounds per square inch

B. w.c. – water column

C. FOG – fats-oils-grease

D. Deg F – Degree Fahrenheit

E. CWP – cold working pressure

F. SWP – steam working pressure

G. NPT – National Pipe Thread

1.03 REFERENCES

A. ANSI: American National Standards Institute

B. ASTM: American Society for Testing and Materials

C. ASME: American Society of Mechanical Engineers

D. AWWA: American Water Works Association

E. ISO: International Organization for Standardization

F. MSS: Manufacturers Standardization Society

G. NEMA: National Electrical Manufacture’s Association

H. NSF: National Sanitation Foundation

1.04 SUBMITTALS

A. Product Data and Shop Drawings:

1. Submit in accordance with Section 01 33 00 in sufficient detail to confirm compliance with the Drawings and this Section.
2. Submittal shall, at a minimum, include the items listed below.

a. Manufacturer's product data for each type of valve.
b. Coating systems. Submit in accordance with Section 09 96 00.
c. Valve schedule. Identify all valves by type number, pipeline, location, joint type, manufacturer, and model or catalog number.

B. Instructional Services Documentation:

1. Submit in accordance with Section 01 61 00.

C. Operation and Maintenance (O&M) Data:

1. Submit in accordance with Section 01 33 00.

1.05 QUALITY ASSURANCE

A. Manufacturer shall be responsible for all components identified for each valve type, accessory, and actuator specified in this Section.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. All equipment and parts shipped to the job site shall be properly protected from the elements so that no damage or deterioration occurs from the time of delivery to the time when the installation is complete and the units are placed into operation.

B. Manufacturer shall define the requirements to properly protect the equipment and parts shipped to the job site.

PART 2 – PRODUCTS

2.01 GENERAL

A. All valves shall be complete with all necessary operating hand wheels, chain wheels, extension stems, worm and gear operators, operating nuts, chains, wrenches, and other accessories that are required for proper completion of Work included under this section.

B. Valves installed in insulated piping systems shall be furnished with extended stem as required to allow operation of valve without damage to, or interference with, insulation system.

C. Unless otherwise shown, valves shall be same size as adjoining pipe.

D. All units shall have name of manufacturer and size of valve cast on body or bonnet or shown on permanently attached plate in raised letters.

E. Service for all items specified herein are shown on Drawings or in Specifications. Note, this is a general specification; some types listed herein may not be part of the Work.

2.02 PLUG VALVES

A. Type V005: Eccentric Plug Valve

1. Manufacturers:

    a. DeZurik.
    b. Val-Matic.

2. Non-lubricated, resilient seated eccentric plug valve in compliance with AWWA C517-09.
3. Drip-tight shut-off up to full pressure rating of valve with pressure in either direction.
4. Provide 100 percent full port valve for valves downstream of flow meters in the meter vaults. Port area shall be 100 percent of the connection pipe area.
5. Pressure rating for valves 12-inch and smaller: 175-psig.
6. Pressure rating for valves 14-inch and larger: 150-psig.
7. Cast iron body, ASTM A126, Grade B.
8. Bonnet shall be ASTM A126 Grade B cast iron or nickel aluminum bronze alloy C95500.
9. Buna-N, V packing, U-cup, or O-ring seals.
10. Nickel seats.
11. Balanced plug coated with NBR.
12. Flanged ends, 125-pound ANSI Standards.
13. Mechanical joint ends for buried piping.
14. Stainless steel bearings.
15. Valves 4-inch and smaller, maximum operating pressure 25 psig and less: lever actuator.
16. Valves 4-inch and smaller, maximum operating pressure greater than 25 psig: gear actuator.
17. Valves 6-inch and larger: gear actuator.

2.03 CHECK VALVES

A. Type V205: Air Cushioned Swing Check Valve

1. Manufacturers:

    a. DeZurik, APCO.
    b. Val-Matic

2. 2-1/2-in through 12-inch
3. Swing check with outside lever, weight, and air cushion chamber.
4. Suitable for flow direction horizontal or vertical up.
5. External adjustable counterweight to initiate valve closure.
6. External air cushion chamber to dampen valve closure. Closing speed adjustable.
7. Cast or ductile iron body, disc, and cover.
8. Stainless steel hinge shafts.
9. Flanged ends meeting 125-lb ANSI standards.
10. Rated 200-lb water-oil-gas (WOG).
11. Stainless steel body seat, resilient field replaceable seat ring on disc.

B. Type V274: PVC Swing Check Valve

1. Manufacturers:

    a. Spears, Quiet Check Valve.
    b. Or equal.

2. Designed to provide quiet operation in sump pump or sewage ejector pump systems.
3. 2-inch and smaller.

4. PVC construction.
5. True Union Socket Connection.
6. Spring assisted swing check style valve. Spring shall control rate of closure to prevent slamming.
7. Pressure rating 150 psi when open and 75 psi when closed at 73°F.

C. Type V295: Sanitary Slip-On Duckbill Check Valve

1. Manufacturers:

   a. Red Valve Company, Tideflex
   b. Or Equal.

2. “Duckbill” type check valve.
3. Rubber construction with Neoprene exterior wrap.
4. Slip on connection held in place with stainless steel clamps.
5. Maximum opening head required of 6-inch w.c. against no backpressure.
6. Designed to resist 20 feet of head back pressure.

2.04 BALL VALVES

A. Type V330: Stainless Steel, Threaded Ball Valve

1. Manufacturers:

   a. Apollo.
   b. Nibco.
   c. Watts.
   d. Or equal.

2. 2-inch and smaller.
3. Provide sizes as indicated on Drawings.
4. Stainless steel body and ball.
5. Blowout proof stem.
6. Reinforced Teflon seats and seals.
7. Full port design.
8. Threaded ends.
9. Hand lever actuator.
10. Rated at 1,000-lb WOG minimum, 250-psi SWP.

B. Type V355: PVC, Socket-Weld Ball Valve

1. Manufacturers:

   a. Spears Manufacturing.
   b. Nibco.
   c. Hayward Industrial Products, Inc.
   d. Or equal.

2. 3-inch and smaller.
3. Provide sizes as indicated on Drawings.
4. PVC construction, ASTM D1784.
5. Valve shall be true union type.
6. Provide with socket weld joints.
7. Full-port.

8. PTFE ball seats.
9. O-rings shall be EPDM.
10. All valve unions and nuts shall have Buttress threads.
11. Rated for 150-psi at 73 deg F.
12. Unless indicated otherwise, provide with double-stop polypropylene handle operator.

2.05 MISCELLANEOUS VALVES

A. Type V917: Sewage Combination Air Valve

1. Manufacturers:

a. Apco
b. ARI Flow Control Accessories Ltd.

2. Sewage Combination Air Valves shall be automatic float operated valves designed to exhaust large quantities of air during the filling of a piping system and close upon liquid entry. The valve shall open during draining or if a negative pressure occurs. The valve shall also release accumulated air from a piping system while the system is in operation and under pressure. The valve shall perform the functions of both air release and air/vacuum valves and furnished as a single body or dual body type as indicated on the drawings.
3. Meeting requirements of AWWA C512
4. Bolted cover for internal access.
5. Stainless steel body.
6. Stainless steel internals: linkage, stem, float, and fasteners.
7. BUNA-N or EPDM elastomers.
8. Design flow range: 0-220 gpm
9. System design pressure: 33 psi
10. System maximum pressure: 45 psi
11. Factory primed in accordance with Section 09 96 00. Finish coating by Contractor to match piping system in accordance with Section 09 96 00.

2.06 ACCESSORIES

A. Valve Actuators:

1. Open by turning counter-clockwise.
2. Valves with centerline 5-feet 6-inch or less above operating floor: Handwheel for gear-actuated valves, lever for lever-actuated valves. Shall require no more than 40-pound effort to unseat valve.
3. Valves 4-inch and larger, unless otherwise noted on drawings, with centerline greater than 5-feet 6-inch above operating floor: Chainwheel.
4. Valves 4-inch and smaller and 6-inch butterfly valves, maximum operating pressure 25 psig and less: Lever.
5. Valves 4-inch and smaller, maximum operating pressure greater than 25 psig: Gear.
6. Valves 6-inch and larger: Gear.

B. Tee Wrenches:

1. Provide for buried and submerged valves.
2. Provide wrenches of varying lengths as needed so that when in operation the handle is 36-40 inches above the operating floor for each valve application.
3. Provide dual Type 316 stainless steel wall hooks, one on each branch of tee, for hanging each wrench. Anchors and hardware shall be type 316 stainless steel. Coordinate location of tee wrench wall hooks with Owner.

4. Provide wrench compatible with connection to 2-inch nut.

C. Chain Wheels and Chain Levers:

1. Provide chain wheels with guides and chain having coil proof design.
2. Provide chain levers with chain having coil proof design.
3. Ductile iron chain wheels, chain levers, and chain guides.
4. Stainless steel chain.
5. Chain size as recommended by valve manufacturer.
6. Extend chains to within 4-feet of operating floor.
7. Provide chain hooks and tieback anchors for chains. Install so chain does not interfere with personnel traffic.

D. Buried and Submerged Valves:

1. Provide seals on shafts and gaskets on valve and actuator covers to prevent water entry.
2. Provide totally enclosed actuator mounting brackets with gasket seals.

E. Valve Boxes:

1. Provide for buried valves.
2. Three-piece screw type, cast iron box and cover.
3. Valve box diameter 5 ¼-inch, length as required for installation.
4. Provide extension stem as required for installation and 2-inch operating nut located within 6-inches from top of cover.

F. Locking Devices:

1. Provide for valves as shown on Drawings.
2. Locking device shall be integral to the valve/operator and shall accept a normal padlock. Locking devices using chains and cables are not acceptable.
3. Provide two padlocks (one duty and one spare) for each pad-lockable valve.
4. Provide one key for each pad-lockable valve.
5. All padlocks provided shall be compatible with all keys provided. Different keys for each padlock are not acceptable.

G. Worm and Gear Actuators:

1. Totally enclosed design.
2. Sized for valve operation under valve rated pressure with pull of 40-pounds on handwheel or chain wheel.
3. Self-locking to prevent valve position creep.
4. Hardened alloy steel worm.
5. Reduction gearing runs in lubricant.
6. Orient operators to avoid interference with adjacent piping, equipment, and structures.
7. Include valve position indication.

2.07 COATINGS

A. Provide in accordance with Section 09 96 00 unless specified otherwise in this Section.

B. Manufacturer is responsible for surface preparation, prime coat, and second coat of equipment in the factory prior to shipment unless otherwise noted.

C. Manufacturer is responsible for the surface preparation and all motor coatings in the factory

prior to shipment.

D. Contractor shall provide final third finish coat for equipment in the field and be responsible for touchup and any additional specified coatings.

E. Final color of exposed equipment and motors shall be selected by Owner.

F. Stainless steel, bronze, and nonmetallic surfaces shall not be coated.

G. Coat machined or bearing surfaces and holes with protective grease.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install valves in accordance with manufacturer's written recommendations and approved submittals. Plug valves installed in horizontal pipelines in applications with suspended solids, slurries, etc. shall be installed on their side so the plug rotates to the top of the pipeline when open.

B. Bolt holes of flanged valves shall straddle the vertical centerline of the pipe run. Before installing flanged valves, the flanged faces shall be thoroughly cleaned. After cleaning, insert gasket and bolts, and tighten the nuts progressively and uniformly. If flanges leak under pressure, loosen or remove the nuts and bolts, reseat or replace the gasket, retighten and/or reinstall the nuts and bolts, and retest the joints.

C. Provide equipment identification marker complete with equipment name and tag number in accordance with Section 40 05 97. Coordinate field location with Engineer.

3.02 FIELD QUALITY CONTROL

A. Tests:

1. Pressure test valves at same time connected piping is tested.
2. Repair leaking joints.
3. Protect parts of valves and actuators that could be damaged by test.

END OF SECTION

This page intentionally left blank.

SECTION 40 05 97
PIPING AND EQUIPMENT IDENTIFICATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Plastic pipe markers.
2. Underground type plastic line marker.
3. Engraved plastic laminate signs.
4. Plastic equipment markers.
5. Piping system color coding schedule.

B. Identification furnished as part of equipment is specified as part of equipment assembly in other sections and shall comply with requirements of this section.

C. Refer to Division 26 for identification requirements of electrical and instrumentation work, not Work of this Section.

1.02 REFERENCES

A. ANSI: American National Standards Institute.

1.03 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for piping and equipment identification specified.

C. Shop Drawings:

1. Submit piping system color coding schedule indicating flow stream identifier and proposed color. Submittal shall include color chart for reference. Schedule shall include all piping systems from Sections 40 05 05.

D. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. ANSI Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

B. Single-Source Responsibility: Obtain piping and equipment identification from single manufacturer with responsibility for entire system. Unit shall be representative product built from components that have proven compatibility and reliability and are coordinated to operate

as unit as evidenced by records of prototype testing.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver piping and equipment identification to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is made safe from such hazards.

B. Store piping and equipment identification in clean, dry location.

1.06 MAINTENANCE

A. Extra Materials:

1. Furnish extra materials matching products installed, as described below, packaged with protective covering for storage, and identified with labels describing contents.

a. Furnish minimum 5 percent extra stock of each mechanical identification material required for each piping system, additional piping system identification markers, and additional plastic laminate engraving blanks of assorted sizes.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Brady (W.H.) Company, Signmark Division.

B. Marking Services, Inc.

C. Seton Name Plate Corporation.

2.02 MECHANICAL IDENTIFICATION MATERIALS

A. Provide manufacturer’s recommended products as specified for each application.

B. Where more than single type is specified for application, selection is installer’s option, provide single selection for each product category.

C. Bands, markers, and identification materials used in mechanical rooms and process locations shall be rated for exterior application and suitable for withstanding occasional washdown.

2.03 LETTERING AND GRAPHICS

A. Coordinate names, abbreviations, and other designations used in mechanical identification work with corresponding designations shown, specified or scheduled. Provide numbers, lettering, and wording as indicated or if not indicated, as recommended by manufacturers or required for proper identification and operation and maintenance of mechanical systems and equipment.

B. Multiple Systems: Where multiple systems of same generic name are shown or specified, provide identification indicating individual system number as well as service (i.e., Boiler No. 3, Air Supply Unit No. 10-ASU-2).

2.04 PLASTIC PIPE MARKERS

A. Snap-on Type: Provide preprinted, semi-rigid snap-on, color coded plastic pipe markers complying with ANSI A13.1.

B. Strap-on Type: Provide preprinted, strap-on, color coded, plastic pipe markers complying with ANSI A13.1.

C. Adhesive Type: Provide preprinted, color coded, strap-on vinyl pipe markers complying with ANSI A13.1.

D. Small Pipes: For external diameters less than 6 inch (including insulation, if any), provide full circumference pipe markers, extending 360 degrees around pipe at each location, fastened by one of following methods:

1. Snap-on type pipe marker.
2. Adhesive type pipe marker, taped to pipe (or insulation) with color coded plastic adhesive tape not less than 4 inch wide, full circle at both ends of pipe marker, and tape lapped 1-1/2 inch.
3. For plastic chemical tubing use only snap-on type.

E. Large Pipes: For external diameter 6 inch and larger (including insulation, if any), provide either full circumference or strip pipe markers not narrower than 3 times letter height (and of required length):

1. Strap-on type pipe marker strapped to pipe (or insulation) with manufacturer's standard nylon bands.
2. Adhesive type pipe marker taped to pipe (or insulation), not less than 4 inch wide, full circle at both ends of pipe marker, tape lapped 3 inch.

F. Lettering: Comply with piping system nomenclature as specified, scheduled or shown and abbreviate only as necessary for each application length, and only with approval of Engineer. Lettering height shall be as follows:

Outside Pipe Diameter (inches)	Minimum Letter Height (inches)	Minimum Length of Marker (inches)
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1-1/4	12
8 to 10	2-1/2	24
Over 10	3-1/2	32

G. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

H. Label and band colors in accordance with ANSI A13.1-2015, Process-Mechanical Piping Schedule Section 40 05 05 and following:

1. Lettering and arrows:

a. White on green background for potable, cooling, boiler feed, and other waters.
b. White on red background for fire quenching fluids.
c. Black on orange background for toxic and corrosive fluids.
d. White on brown background for combustible fluids.
e. Black on yellow background for flammable and oxidizing fluids
f. White on blue background for compressed air
g. Black on white background for wastewater, sludge, and other services.

2. Banding:

a. Colors and band spacing as scheduled or as shown on Drawings.
b. Pipe marker tape: 4-inch wide vinyl self-adhesive tape with gloss finish.

2.05 UNDERGROUND TYPE PLASTIC LINE MARKERS

A. Permanent, bright colored, continuous printed plastic tape, intended for direct burial service; not less than 6 inch wide by 4 mils thick. Provide tape with printing most accurately indicating type of service of buried pipe.

B. Provide multi-ply tape consisting of solid aluminum foil core between 2 layers of plastic tape.

2.06 ENGRAVED PLASTIC LAMINATE SIGNS

A. Engraving stock melamine plastic laminate complying with FS L-P-387A(1) in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, white with black core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting necessary because of substrate.

B. Thickness: 1/16-inch for units up to 20 square inches or 8-inch length, 1/8-inch for larger units.

C. Fasteners: Self-tapping stainless steel screws except contact type permanent adhesive where screws cannot or should not penetrate substrate.

2.07 PLASTIC EQUIPMENT MARKERS

A. 2-ply, 1/8-inch thick laminated engraved plastic.

1. Color: Black letters on white background.

B. Nomenclature: Marker shall use terminology in Contract Documents as closely as possible:

1. Equipment Name (e.g., Chilled Water Pump No. 1).
2. Equipment Tag No. (e.g., 30-P-1).

C. Size: Provide approximate 3-inch by 6-inch (minimum) for equipment.

1. 1-inch high letters for equipment tag number.
2. ½-inch high letters for descriptive equipment name.

2.08 FLOW CONTROL AND MEASUREMENT DEVICE TAGS

A. Provide tags for all flow control devices (e.g., valves) and flow measurement devices (e.g., flowmeters) installed in piping of 4-inch diameter or larger.

B. Provide tags for all flow control devices (e.g., gates) that control flow from/in basins or channels.

C. 2-ply, 1/8-inch thick laminated engraved plastic.

1. Color: Black letters on yellow background.

D. Size: Adequate to accommodate letter height below.

1. 1/2-inch high letters for nomenclature.

E. Fastening: Fasten to device using stainless steel cable and crimping loop sleeve through metal eyelet in tag.

F. Nomenclature:

1. For devices that are named and tagged (e.g., electrically-actuated devices) in the Contract Documents, use the nomenclature in the Contract Documents.

   a. Equipment Name (e.g., Chilled Water Pump No. 1)
   b. Equipment Tag No. (e.g., 30-P-1)

2. For devices that are not named or tagged in the Contract Documents, use the nomenclature below.

   a. XXX-YYY-ZZZ where XXX = Structure Number, YYY = Device Type, ZZZ = Tag Number (e.g, 250-PV-001 represents plug valve 001 in Structure 250).
   b. Device Types, YYY shall be defined as follows: G = gate, PV = plug valve, BFV = butterfly valve, CV = check valve, GV = gate valve, ARV = air release valve, BV = ball valve, KV = knife valve, PRV = pressure regulating valve, PIV = pinch valve, MV = mud valve, SPV = specialty valve.

G. Submittal:

1. Submit device inventory in format shown below. Notes: [1] – example shows device that is not tagged in Contract Documents, [2] – example shows device that is named and tagged in Contract Documents.

Structure	Description	Tag Nomenclature
230	Butterfly Valve[1]	230-BFV-001
250	Ball Valve[1]	250-BV-001
230	Ball Valve[1]	250-BV-002

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install piping and equipment identification in accordance with manufacturer's written instructions.

B. Coordination: Where identification is to be applied to surfaces requiring insulation, painting or other covering or finish including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.02 IDENTIFICATION

A. Locate pipe markers with arrows and color bands as follows wherever piping exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums), and exterior non-concealed locations.

1. Near each valve and control device.
2. Near locations where pipes pass through walls or floors, ceilings or enter non-accessible enclosures.
3. At access doors, manholes, and similar access points permitting view of concealed piping.
4. Near major equipment items and other points of origination and termination.

5. Spaced intermediately at maximum spacing of 30 feet along each piping run, except reduce spacing to 20 feet in congested area of piping and equipment.
6. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

B. Locate color bands at each marker and at intermediate spacing not to exceed 10 feet between bands, and at lesser spacing as indicated or as required by local codes.

C. Locate directional arrows at each marker. Provide 3 arrows at each tee or branch fitting.

D. Where piping is normally visible from more than 1 side, provide 2 or 3 labels and arrows spaced at 120 degree intervals around pipe in accordance with ANSI A13.1.

E. Painting or Coating:

1. Painting of piping, ductwork, and equipment is work of Section 09 96 00.
2. Colors listed are general. Colors shall match existing piping system color coding.
3. For piping scheduled to be color-coded, but not scheduled for complete painting (such as plastic piping, stainless steel piping, or aluminum insulation jacketing) provide pipe marking tape banding to represent piping color-code. At each banding location provide following sequence:

   a. 8-inch wide tape of scheduled pipe color.
   b. 4-inch wide tape of scheduled band color (if pipe color-code calls for banding).
   c. 8-inch wide tape of scheduled pipe color (if pipe color-code calls for banding).

F. Underground Piping Identification:

1. During backfilling/top soil placement of each exterior underground piping system, install continuous underground type plastic line marker located directly over buried line at 6 to 8 inch below finished grade. Where multiple small lines buried in common trench and do not exceed overall width of 16 inch, install single line marker.

G. Process Valve Identification:

1. Install engraved plastic marker at each process valve, gate, or flow control device as identified by P&ID tag numbers on Drawings.

H. Mechanical Equipment Identification:

1. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, if not otherwise specified for each item or device. Provide signs for each unit having equipment tag number on Drawings or in Specifications.

3.03 FIELD QUALITY CONTROL

A. Final Survey and Repairs:

1. 1-year after date of substantial completion, Contractor shall perform walk-through survey of mechanical identification systems and shall remove and replace any bands, labels, tags or markers that are loose, discolored, or defective.
2. Replacement materials shall be provided by Contractor, not drawn from Owner’s extra material.

3.04 ADJUSTMENT AND CLEANING

A. Adjusting: Relocate any mechanical identification device visually blocked.

B. Cleaning: Clean face of identification devices.

END OF SECTION

This page intentionally left blank.

SECTION 40 61 13
PROCESS CONTROL SYSTEM (PCS) GENERAL PROVISIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Section covers general provisions and requirements for all work necessary for engineering, furnishing, installing, adjusting, testing, documenting, programming, and starting-up the complete process control system.

B. Unless otherwise noted, the System Integrator shall assume responsibility for specification sections:

1.	Process Control System – Configuration Services	Section 40 61 20.
2.	Process Control System – Testing	Section 40 61 21.
3.	Process Control System – Training	Section 40 61 26.
4.	Process Control System – O&M Data	Section 40 61 30.
5.	Operator Interface Terminals	Section 40 62 63.
6.	Programmable Logic Controllers (PLC)	Section 40 63 43.
7.	Control Panel-Mounted Uninterruptible Power Supply (UPS)	Section 40 67 63.
8.	Instrumentation of Process Systems	Section 40 70 00.
9.	Panel Mounted Instruments	Section 40 78 00.
10.	Miscellaneous Instruments	Section 40 79 00.

1.02 REFERENCES AND ABBREVIATIONS

A. References:

1. ANSI: American National Standards Institute
2. CSA: Canadian Standards Association
3. EN: European Standards (generic)
4. FM: Factory Mutual
5. IEC: International Electrotechnical Commission
6. IEEE: Institute of Electrical and Electronics Engineers
7. ISA: International Society of Automation
8. NEC: National Electrical Code
9. NEIS: National Electrical Installation Standards
10. NEMA: National Electrical Manufacturers Association
11. NIST: National Institute of Standards and Technology
12. NRTL: Nationally Recognized Testing Laboratory
13. NFPA: National Fire Protection Agency
14. OSHA: Occupational Safety and Health Administration
15. UL: Underwriters Laboratory

B. Abbreviations:

1. HMI: Human/Machine Interface
2. I&C: Instrumentation and Controls
3. I/O: Input / Output
4. LOS: Line of Sight
5. PC: Personal Computer
6. PCN: Process Control Network
7. PCS: Process Control System
8. PLC: Programmable Logic Controller
9. OIT: Operator Interface Unit

10. SCADA : Supervisory Control and Data Acquisition
11. UPS: Uninterruptible Power Supply

1.03 DEFINITIONS

A. Process Control System: a complete, integrated system of PLCs, computers, instruments, devices, wireless and wired process control networks, software, application engineering, and ancillary equipment for monitoring and control of process systems.

B. Process Control Network: a complete, integrated and secured communication network consisting of equipment and cabling providing communication between components of the Process Control System.

C. System Integrator: an organization whose principal function is to design, program, configure, manufacture, install, and service the PCS. Who, under the direction of the Contractor, shall assume complete responsibility for: detail design, manufacture, installation, configuration, technically advising on and certifying correctness of installation, testing and adjusting, documenting and starting-up, and training of the complete PCS.

1.04 SUBMITTALS

A. In addition to the requirements of Section 01 33 00, the following information shall be provided in tabbed, booklet format covering all Project work.

B. Shop Drawings:

1. General:

a. Drawings shall include ancillary devices such as terminal strips, relays, fuses, utility lights and receptacles, fans, heaters, etc.
b. Typical drawings for multiple circuits or systems are not acceptable.

2. Panel Layout Drawings - Drawings shall show all panel mounted devices to scale and dimensioned and shall include legend.

a. Include cross-reference to a bill of material for components used.
b. Component designations shall match those used on elementary schematic diagrams and physical component labeling required per Section 40 67 15.
c. Prepare in general accordance with NFPA 79, Annex D.

3. Elementary Schematic Diagrams – Ladder type circuit diagrams prepared to facilitate the understanding of the system function for maintenance and fault detection.

a. Control devices shall be shown between vertical lines that represent control power wiring, with the left line representing control circuits common and right representing operating coils common except where permitted by Clause 9 of NFPA 79.
b. Control devices shall be shown on numbered horizontal lines (rungs) between the vertical lines.
c. Drawings shall include a cross referencing scheme used in conjunction with each relay, output device, limit switch, and other devices so that any contact related to a device can be readily located on the drawing.
d. Component designations shall be included for all devices, with the same designations used on panel layout drawings.
e. Each panel terminal within a terminal strip shall be numbered; when multiple terminal strips exist each shall be given a unique identification. Terminal strip identification shall be included on panel layout drawings.

f. All wires shall be numbered; wire numbers shall be applied to labels. Wiring and devices external to panel shall be clearly identified.
g. Control devices shall utilize the symbology depicted in NFPA 79 and IEEE315.
h. Switch symbols shall be shown with utilities turned off and devices in their normal starting condition. Include control settings on the diagrams when available.

4. Panel Interconnection Diagrams – Wiring interconnection diagrams prepared to show all signal and power wiring for external connections to control panels provided for the project. Wire and cable tags information shall be provided to Contractor in an electronic format for use in physical wire and cable tagging.

    a. Drawings prepared on a per control panel basis.
    b. Show interconnecting wiring between field devices and control panel.
    c. Interconnecting wiring shall include wire and cable tag numbers.
    d. Field device information shall include device tag and description, signal description, signal electrical characteristics, and range.
    e. Control panel information shall include terminal strip identification and terminal number.
    f. Drawings shall indicate source of control signal power.
    g. Prepare drawings in accordance with requirements of NFPA 79.

5. PLC equipment layout drawings including processing equipment, I/O components, power supplies, and peripheral devices.
6. PCS equipment layout drawings including detailed enclosure layouts for servers, switches and communications systems with overall dimensions and equipment bill of
7. Process control network drawings showing connections between connected devices including servers, HMIs/OITs, PLCs, radios, VFDs, MCCs, and other network devices. Drawings shall indicate network domain and device addresses, subnet masks, gateways, and other pertinent network address information.
8. Detailed fiber optic system layout drawings including patch panel connections, cable ID and color code, and equipment bill of materials.
9. Electrical power, UPS, Grounding, and DC Power Schematics for all equipment.
10. Heat calculations for all enclosures.
11. UPS sizing calculations.
12. Test reports.

C. List of special tools (including software) required for instrument calibration, startup, checking, testing, parts replacement, troubleshooting, and maintenance of all components of the Process Control System. Identify any special tools specially designed or adapted for use on parts of this system.

D. Product Data:

1. Catalog Information - Provide catalog information and descriptive literature on all equipment associated with the PCS.
2. Product Data (Specification) Sheets – Provide product data sheets for each component provided under this Section. The purpose of the data sheets is to supplement the generalized catalog information provided by citing all specific features for each specific component (e.g., scale range, materials of construction, special options included). Product Data Sheets shall follow General ISA S20 format.

E. Test Outline and Procedure Submittal

1. A detailed description of each specified test procedure and demonstration shall be submitted for approval. The decision of Engineer upon the acceptability of the procedure shall be final.

2. It is required that this be a two-step submittal: outlines first followed, upon receipt of Engineer's approval, by specific test descriptions.
3. Test descriptions shall be in sufficient detail to fully describe the specific tests to be conducted to demonstrate conformance with these Specifications.
4. Provide detailed step-by-step in-factory and field test procedure in accordance with Section 40 61 21. Include proposed test documentation and sign-off sheets and punch list forms.
5. Identify complete inventory of equipment to be tested at factory including make, model, and serial number. Label each piece of equipment.

F. Operation and Maintenance (O&M) Data:

1. Process Control System - Submit in accordance with Section 40 61 30.
2. Fully document copy of all application programs including PLC, PC and Server-based applications. See Section 40 61 30 for requirements
3. Network, server and workstation setup instructions. See Section 40 61 30 for requirements.

G. Record Drawings: Submit in accordance with Section 40 61 30.

1.05 QUALITY ASSURANCE

A. Contractor shall engage the services of a qualified System Integrator for the purposes of furnishing the Process Control System, providing technical assistance on the installation of System, and certifying the correctness of said installation.

B. Equipment shall be of the latest and most modern design at the time of the Notice to Proceed.
C. All software and firmware used in this project shall be the latest version that is compatible with each other at the time of the Notice to Proceed.

D. Like items of equipment shall be end products of single manufacturer to achieve standardization for maintenance, spare parts, operation, and service.

E. Coordination - In order to ensure timely performance of the contract and the System's conformance with specifications, coordination meeting(s) shall be held during the course of the project.

1. Within 45 days of date of contract commencement, submit progress meeting schedule, submittal schedule, and activity schedule for final coordination by Owner/Engineer, Contractor, and Systems Integrator.
2. Progress meetings shall be held at the project site and designated by Owner with Owner, Engineer's, Contractor's, Application Engineer, and System Integrator's representatives in attendance.

3. Purpose of progress meetings is to obtain Owner/Engineer's clarification on intent of contract documents during submittal preparation and prior to OIT/HMI and PLC software configuration. Progress meeting(s) shall cover following:

a. Review of functional descriptions describing equipment operation.
b. Owner/Engineer selection of options.
c. Owner/Engineer review documentation.

4. Prepare and submit startup schedule, coordinated with overall Construction Schedule including the following:

a. Factory acceptance test(s).
b. Review of wiring sign-off forms by Owner/Engineer.
c. I/O checkout by System Integrator.
d. Plant startup.
e. Training.
f. Post-startup services.

1.06 SYSTEM INTEGRATOR RESPONSIBILITY

A. System Integrator shall inspect Equipment provided under this Section prior to shipment to Project sites.

B. System Integrator shall be responsible for Lift Station PLC and OIT Programing.

C. System Integrator shall coordinate work with Contractor to ensure that:

1. All components provided are properly installed.
2. All components provided are properly configured.
3. The proper type, size, and number of control wires with conduits are provided.
4. Proper electric power circuits are provided for all components and systems.

D. System Integrator shall be responsible for coordination of voltage levels and signal types for signals connected to Process Control System. Provide relays, signal isolators, termination or pull-up resistors, signal conditioners or other devices as required for proper interfacing and operation of non-compatible devices.

E. System Integrator shall supply all OIT and PLC software fully configured for the project requirements.

F. System Integrator shall coordinate Process Control Network addressing schemes with Owner and Application Engineer and incorporate agreed upon scheme for all equipment on the PCS including vendor supplied equipment.

G. All field located conduits, wiring and cables shall be provided in accordance with Division 26 – Electrical. Exceptions to this are copper Ethernet cable and fiber optic Ethernet cable which shall be provided in accordance with Division 40.

H. Contractor shall furnish Owner with copy of all configured PLC application programs after on-site acceptance test.

1.07 APPLICATION ENGINEERING SERVICES

A. Application Engineering Services shall be provided by System Integrator.

B. Application Engineering Services shall include the following:

1. Develop written loop descriptions from the Process Control Descriptions of Section 40 61 96. These loop descriptions will define the proposed operation and control of the plant equipment and treatment systems affected by the work on this project.
2. Develop sample human machine interface (OIT) graphic screen layouts.
3. Organize and lead one single day workshop with the Owner at the project site to review and discuss:

a. The written loop descriptions for operation and control of systems affected by the work on this project.

b. Sample OIT graphic screen layouts.
c. OIT navigation alternatives and approaches.
d. Trending requirements.
e. Alarm and event requirements.
f. OIT Security requirements.

4. Prepare draft meeting notes of workshop(s) including any mutually agreed-upon changes to the loop descriptions and the sample HMI graphics presented.
5. Develop PLC and HMI application software associated with the project in accordance with Section 40 61 20. Application software will be based on the standards established with the Owner during the pre-programming phase of the project.
6. Install and test PLC and HMI application software developed by Application Engineer. Modify tested software to incorporate changes agreed to between the Owner and Application Engineer.
7. Develop the alarm notification feature of the HMI software to alert Owner personnel of alarm conditions.
8. Develop standard trends and set up custom trend features.
9. Prepare an operation and maintenance manual for the new PLC and HMI application software. The manual will serve as the basis for training provided by Application Engineer.
10. Provide one day of on-site training of Owner's personnel in the use of the HMI and PLC application software configurations provided.
11. Deliverables:

    a. One electronic copy of PLC and HMI program documentation on flash drive or other media acceptable to Owner.
    b. Three hardcopy and one electronic copy of O&M Manual prepared for this project. O&M manual electronic copy will be MSWord with supporting material in PDF.

1.08 WORK FOR HIRE

A. All configuration, programming, setup, or other software functions (Software) performed on intelligent devices provided as part of this Project is to be considered "Work for Hire" under the 1976 Copyright Act as amended (Title 17 of the United States Code). The Software shall be owned by Owner and shall be turned over to Owner fully documented as the work is completed.

B. Owner intends only to obtain the Software for its own use.

C. Owner will not prevent the Software supplier from reuse of the Software concepts and ideas for other projects. Any reuse of the Software concepts and ideas generated under this Project is solely the responsibility of the Software supplier. The Software supplier shall defend, indemnify, and hold harmless Owner from all claims, damages, and expenses (including reasonable litigation costs), arising out of any use, misuse, or misapplication of Software concepts and ideas.

1.09 WARRANTY

A. System Integrator shall warranty the Process Control System for a period of one year from the date of substantial completion.

PART 2 – PRODUCTS

2.01 SYSTEM INTEGRATORS

A. Metropolitan Industries, Inc. Romeoville, IL

B. Gasvoda & Associates, Inc. Calumet City, IL

C. No substitutes permitted.

2.02 SYSTEM INTEGRATOR EXPERIENCE REQUIREMENT

A. The System Integrator shall have the following organizational and individual experience, knowledge, and capability:

1. Be regularly engaged in the design, installation, and servicing of wastewater treatment// process controls systems.
2. Have previously executed a minimum of five wastewater treatment PCS projects of similar size and complexity to this Project using the PLC and HMI platforms included in this project.
3. Have previously successfully executed wireless and wired networked projects of comparable size and complexity to this project.
4. The person(s) performing the required field work shall have a minimum of five years experience on similar PLC-based systems.
5. Provide an on-site control systems engineer for commissioning, functional testing, start-up, and training of the Process Control System. The individual shall have authored and commissioned control logic for no fewer than three projects of similar or greater complexity, and shall have a demonstrated proficiency in authoring logic in PLC Function Block Language.
6. Upon request of Owner and in addition to other specified requirements, Contractor shall provide a minimum of five System Integrator references to confirm compliance with these requirements.

2.03 EQUIPMENT, SYSTEMS, AND SERVICES

A. Equipment, systems, and services provided under this Section shall conform to the following requirements.

1. UL 508 - Standards for Safety, Industrial Control Equipment.
2. NEMA ICS 1 - General Standards for Industrial Control and Systems.
3. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
4. NEMA ICS 3 - Industrial Systems.
5. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
6. NEMA ICS 250 - Enclosures for Electrical Equipment.
7. NFPA 79 - Electrical Standard for Industrial Machinery
8. UL 698A Intrinsic Safe Circuits.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Contractor shall install and wire Process Control System equipment in accordance with System Integrator’s and instrument manufacturer’s written instructions and approved submittals.

B. PCS components shall be grounded in accordance with NEC requirements.

C. The System Integrator shall supervise final power and signal connections by Contractor to all equipment provided or interfacing with the Process Control System.

D. Instrumentation transmitters, displays, and other indicators shall be orientated such that they are easily readable and accessible from operating locations.

E. System Integrator shall field calibrate and completely configure equipment and instruments at time of startup on loop-by-loop basis and make adjustments necessary to place equipment in satisfactory operation.

3.02 FIELD QUALITY CONTROL

A. Protection during construction.

1. Throughout the contract Contractor shall provide protection for materials and equipment against loss or damage and the effects of weather. Prior to installation, store items in indoor, dry locations. Provide heating in storage areas for items subject to corrosion under damp conditions. Specific storage requirements shall be in accordance with the System Integrator's recommendations.

B. Cleaning and touch-up painting.

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

C. Panels and panel-mounted equipment.

1. Panels and panel-mounted devices shall be assembled as completely as possible at the System Integrator's facility. No work other than field terminations and correction of minor defects or minor transit damage shall be done on the panels at the job site.

D. Inspections.

1. System Integrator shall provide services of qualified service personnel to supervise and inspect equipment installation to ensure system is installed in accordance with System Integrator's recommendations.
2. All materials, equipment, and workmanship shall be subject to observation at any time by Engineer’s representatives.

END OF SECTION

SECTION 40 61 20
PROCESS CONTROL SYSTEM (PCS) – CONFIGURATION SERVICES

PART 1 – GENERAL

1.01 SUMMARY

A. Items specified in this section shall conform to general requirements of Section 40 61 13.

1.02 RESPONSIBILITIES

A. Configuration Services (PLC Programming) shall be provided by the System Integrator as defined in Section 40 61 13 using RSLogix 500software.

B. Configuration Services (Operator Interface Terminal Programming) shall be provided by the System Integrator as defined in Section 40 61 13 using PC editing software, DOPSoft.

C. Configuration Services (SCADA HMI Programming) shall be provided by the Owner under separate contract.

1.03 DEFINITIONS

A. Plant-Wide Process Network

1. A virtual network created by the Ethernet Switches. The Process Network shall primarily handle data communication between HMI Server and the PLC's in the system as well as the communications to the radio network. This traffic shall contain collected data and control commands.

1.04 SYSTEM DESCRIPTION

A. Design requirements:

1. System shall use PLC form factor I/O subsystems to connect local and remote Equipment.
2. System shall provide separate 24 volts direct current regulated power supplies to power I/O subsystem and to power analog instrumentation loops as required.
3. System shall provide peer-to-peer communication between PLCs, HMI computers, and other devices connected to System.
4. System shall be provided with quantity and type of I/O as specified in Section 40 61 93 and as shown on the drawings. System shall be expandable, at future date, to accommodate additional I/O.

B. Performance requirements:

1. HMI shall serve only as operator interface to PLCs and shall not contain automatic control functions. Automatic control functions shall be programmed into the PLCs. Timers, time clocks, and repeat cycle timers shall be a function of the PLC.
2. PLCs shall be programmed to be autonomous; a loss of the Process Control Network (PCN) shall not cause any PLC to lose the ability to maintain control of its respective processes.
3. System shall perform process monitoring and supervisory control using PLCs and HMI computers.
4. PLCs shall send/receive process data to/from field devices and be capable of following when configured:

a. Receive analog data from primary control elements; convert to engineering units,

process for alarms and responsibility checks, and store.
b. Receive digital data from primary control elements, check for alarm and status change, and store.
c. Perform control and arithmetic calculations, including software PID and other regulatory control functions, based on system parameters and real-time data and output the properly conditioned control commands to final control elements.
d. Perform sequential control functions.
e. Ascertain off-normal conditions of process parameters and generate alarms for monitoring at the HMI. The HMI shall not be the source of alarm generation.
f. Communicate with HMI computer over Ethernet data highway.
g. Respond to operator requests for data and to control commands from HMI.
h. Respond to inhibit, enable and interlock signals from other sources.
i. Respond to supervisory requests for data, to control commands and to process parameter setting changes from plant PCS.

5. HMI computers shall receive/send process data from/to PLCs, maintain databases, and be capable of following when configured.

a. Real-time data collection. Receive and store process data from PLCs.
b. Receive and store manually entered data from keyboard or pointing device such as operator changes and process parameter setting changes.
c. Send operator and process parameter setting changes to PLCs.
d. Display plant activity with alphanumeric and color graphic displays of I/O associated with PLC.
e. Data collection for maintenance management. Provide operating information from which to generate reports and logs.
f. Historical data storage and reporting.
g. Provide overall plant alarm and status monitoring with visual and audible alarming.
h. Record alarms and events on screen and store to file.
i. Allow operator input of data not collected automatically.

6. “Local” mode of field mounted Local/Remote selector switches shall enable field control of equipment. PLC control shall be inhibited in “Local” mode. “Remote” mode shall enable PLC based Manual or Automatic control. Field control shall be inhibited in “Remote” mode.
7. Control logic for “Automatic” mode shall be programmed functions of the PLC.

C. Control Panel Requirements:

1. Unless otherwise specified, “running” signals shall be derived from equipment motor starter normally open auxiliary contacts.
2. Equipment on panels shall be identified as follows:

a. Indicating Light Off: Equipment Not Running.
b. Indicating Light Green: Equipment in Operation.
c. Indicating Light Red: Equipment in Alarm Condition.
d. Indicating Light White: Power Supply Energized.

3. Fail Logic: Failure of equipment, after having been “called to run”, shall generate a Fail alarm. Typical points of failure are motor overload (overcurrent), motor undercurrent (blower surge), motor under voltage, fail-to-start and power fail. Power fail shall include, in addition to loss of control power, the tripping of equipment circuit breakers while equipment is called to run. Provide necessary logic to sense discrepancy between “called to run” and “running” signals and activate Fail Alarm signal after adjustable time delay.
4. References to “selector switch” refer to maintained contact type functions. Loss and return of control power to circuit does not change control mode or requirement as dictated by switch position.

5. References to “pushbutton” refer to momentary contact type functions. Loss and return of control power to circuit reverts control mode or requirement to default condition. Initiating pushbutton is required to re-establish control mode or requirement.

D. Instrumentation & Control

1. Design is based upon the concept of facilities with automatic and semi-automatic control of specific plant functions. With this in mind, the following design concepts were developed:

a. Use of custom fabricated, PLC – based control panels. Panels shall act as area controllers, located in several of the process areas.
b. Operator access to the PLC panels shall be through a system of distributed desktop type personal computers running HMI software (HMI terminal server computers). Wherever possible, these units shall be located in proximity to the PLC panels. PLC panels shall not incorporate panel-mounted PCs unless absolutely necessary.

c. Float Mode:

1) In the event of PLC, or level transmitter failure, relay back-up (Float Mode) shall operate critical pumps.
2) In the event of primary level transmitter or PLC failure, Float Mode back-up shall operate the associated pumps or grinders:

a) All floats used in back-up control shall be wired with mechanical latching relays back of panel.
b) Float Mode shall be accomplished through the use of an off-the-shelf microprocessor-based controller as described in Section 40 78 00. In normal PLC operation, level signals shall pass through the float mode controller. When a failure of the PLC, or primary level transmitter occurs, the float mode controller shall assume command of pumps or grinders.
c) When Float Mode control is initiated, an indicating alarm shall be generated for staff alert and HMI display.
d) Upon clearing of PLC or primary level transmitter failure, Float Mode control shall release operational responsibility back to the PLC.
e) Pump On/Off operation in Float Mode shall be initiated and stopped by the level as indicated by the Level Floats and speed shall be controlled by the Float Mode Controller.
f) Delay timers shall be provided to prevent simultaneous start-up of multiple pumps or grinders.

d. Use of a distributed HMI computer system to monitor critical and non-critical alarms, equipment run times, status conditions, plant flows and levels, and to act as input terminals for supervisory setpoint and timer function changes.
e. Use of locally mounted OIT’s provide monitoring and control of systems throughout the Plant along with operational status, critical, non-critical, and dial-out alarm conditions.
f. Vendor furnished panels with PLC’s or communications modules for data link interface small be connected to the PCN.

PART 2 – SERVICES

2.01 SUMMARY

A. Provide configuration services for Process Control System Control Panel PLC’s, Control Panel OIT’s, and Lift Station PLC’s.

B. Graphic displays (screens) shall be formatted as schematic or symbolic representations of

equipment shown on drawings.

C. Provide, as a minimum, one graphic display per major piece of process equipment.

2.02 PLC PROGRAMMING GUIDELINES

A. PLC programming shall follow existing Plant programming guidelines and standards. Any and all deviations shall be approved by the Owner prior to initiating programming work.

B. Set-points, alarm values, timer values, control loop tuning parameters, and other numeric values used within PLC and HMI programs shall be part of continuous common data table within program. Parameter changes shall not require modification to instructions within program. Parameter changes shall be adjustable by changing data table through operator input via HMI.

C. Unless specified otherwise, procedure for control power fail Restart for equipment shall be as follows:

1. Equipment shall shut down on loss of control power.
2. Upon restoration of power, previously running equipment shall be restarted using same sequence of startup used for “Auto” control.
3. Prior to Restart, Auxiliary equipment shall be placed in “Off” position.
4. Equipment Restart shall be sequenced through use of timer functions to prevent simultaneous restart.

D. PLC shall not be enabled to control equipment unless respective field Hand/Off/Auto, Local/Remote, On/Off/Remote or Open/Close/Remote selector switch is in “Remote” or “Auto” position. Equipment status monitoring/ displaying and process parameter logging/ trending shall continue in all modes of control.

E. Determination of high (low) Off-Normal conditions shall be by comparing an analog input value to Operator entered set-point values. Off-Normal status bit shall be set when rising (falling) input value is equal or greater (less) than entered set-point value. Off-Normal status bit shall be reset when falling (rising) input value is equal or less (greater) than entered set-point value minus (plus) entered deadband value. Operator entered high (low) set-point values are absolute values and deadband values are relative values. All values are entered through HMI.

F. Setting of Off-Normal status bits shall cause status conditions to be displayed and/or alarmed at HMI.

G. Resetting Off-Normal status bits shall cause status conditions displayed and/or alarmed at HMI to be cleared.

H. Adjustable delay timers on alarm points shall prevent nuisance alarming or nuisance clearing of alarms. Timer values shall be ranged 0-30 seconds. Initial setting, unless otherwise specified, shall be 5 sec.

I. All status conditions alarmed at HMI shall also be logged to data table.

J. Motor Running status shall be monitored and displayed at HMI continuously.

K. Setting of Motor Failed status bits:

1. If motor is required to run via PLC control (control station Hand/Off/Auto selector switch in “Auto”),
2. And If absence of Motor Running feedback status causes Motor Fail watchdog timer to time out,

3. Then Motor Failed status bit shall be set.

L. Setting a Motor Failed status bit shall cause motor command output to be inhibited and shall cause Motor Failed status to be displayed and alarmed at HMI.

M. Resetting of Motor Failed status bits:

1. If control station Hand/Off/Auto selector switch is in “Auto” position,
2. And if HMI On/Off/Auto control function is cycled to “Off” position from either “On” or “Auto” positions,
3. Then Motor Failed status bit shall be reset.

N. Resetting a Motor Failed status bit shall cause motor command output to be re-enabled and shall cause Motor Failed status displayed and alarmed at HMI to be cleared.

O. Unless specified otherwise the following watchdog timer values shall cause equipment fail status bits to be Set:

1. Valve fail to open: 30 sec.
2. Valve fail to close: 30 sec.
3. Equipment fail to start: 30 sec.

P. Adjustable filtering of analog inputs shall eliminate process upsets due to noise. Filtering shall be by running-average method.

Q. Integration algorithm shall be included for “Totalizing” analog flow signals.

R. Integration algorithm shall be included for “Totalizing” Equipment Run times (Elapsed Time Meter).

S. Proportional/Integral/Derivative (PID) control outputs shall utilize sample and hold algorithm. Intent is to allow slow reacting processes to stabilize before additional control output changes are made by maintaining constant output from PID control for adjustable time period. PID control shall utilize deviation set-points to reactivate controller in event deviation is exceeded during controller off time. Unless specified otherwise off time shall have an adjustable range of 0-30 minutes.

T. Equipment Sequencer:

1. When more than one piece of similar equipment controls a process, then a sequencing strategy shall be employed regarding the operational sequence for the equipment, when the equipment is in an “auto” mode.

    a. Lead: shall be the first called to run based on process demand.
    b. Standby: shall be equipment not normally called to run during the sequence of operation. Note: not every sequencer will have a Standby position.

2. Lead/Standby equipment is rotated within the sequencer based on: runtime hours, on-off cycles, day of the week, or manual selection as Owner preference dictates (see Section 40 61 96 Functional Descriptions for details).
3. When a piece of equipment fails, it is placed in the Standby position of the sequencer. Equipment previously in the Standby position, is moved into the last Lag position of the sequencer.

U. PLC input coils shall be configured as non-latched unless specified otherwise.

V. PLC output contacts shall be configured as maintained unless specified otherwise.

2.03 HMI COMPUTER PROGRAMMING GUIDELINES

A. HMI/OIT programming shall follow existing Plant programming guidelines and standards. Any and all deviations shall be approved by the Owner prior to initiating programming work.

B. For the purposes of this section, HMI and OIT functionality shall be functionally similar.

C. Screens:

1. Overview screens and reports shall be the first screens configured. Coordinate layout and information requirements with Owner prior to development of screens.
2. Graphic screens for HMI shall be formatted to resemble Process and Instrumentation Diagrams shown in the Drawings. As a minimum, one graphic display per process loop shall be provided.
3. Screens shall be simplified representation of process flow stream and associated equipment as shown on Drawings. Only major devices shall be shown. Non-reporting equipment (isolation valves, check valves, indicators) shall not be shown.
4. In addition to process related display screens, the following shall also be provided:

    a. Main Screen: Director for all other screens. Selection of any other screens shall be by cursor pick of description for that screen or function key identifier for that screen.
    b. Utility Screen: Equipment status, Motor Run totalizer (hours).
    c. Alarm Screens: Screen for points in alarm as selected by alarm selection matrix and screen for equipment in off-normal state (ie. Out of Service).
    d. Data Screens: Listing of all Operator and Engineering entered values.
    e. Trend Screen: Operator selected points for trending.
    f. Report Screen: Operator initiated report generator.

5. Operator and Engineering screens shall be segregated to allow password protection of engineering-entered values.
6. There shall be pick-fields on all screens that will allow for return to main menu or to adjacent process flow screen (continuation of all process flow paths, either entering or existing).
7. Pick-fields shall be activated by placing mouse cursor on object or text and clicking left mouse button, or by selection of associated function key (F1-F12).

D. Data Input:

1. Data entry areas shall be provided at HMI for adjustment of process and alarm set-points. Data entry areas shall be password protected.
2. Upper and lower limits shall be provided for all data entry values. Entry of values outside of limits shall not be accepted and shall generate appropriate error message on screen. Upper and lower limit values shall be adjustable at HMI and shall be password protected.
3. Upper and lower limits shall be provided for all logged analog input values. Logged values outside of limits shall generate appropriate alarm. Upper and lower limit values shall be adjustable at HMI and shall be password protected.
4. Upper and lower limits shall determine range of analog input value. Value shall be scaled in standard Engineering Units.
5. Password protection shall consist of alpha-numeric sequence and shall be intended for Plant Supervisor and Head Operator entry only.
6. Unless otherwise specified in Functional Descriptions, process points shall be scanned as follows:

    a. Critical Alarm points and analog input process points shall be scanned continuously.
    b. Non-Critical Alarm points shall be scanned only on change of state into alarm condition.

c. All other points scanned only when required for display at HMI/OIT.

7. All dynamic screen displays shall be updated every 2 seconds, minimum.

E. Display Objects – General

1. Process piping and pumps/fans/mixers may be animated with color to show active/non-active status.
2. Tankage shall be rendered in 3D.
3. Use graphic symbology for rendering of objects.

F. Display Objects – Process Lines and Inline Device Symbology

1. Where inline devices are dynamic in nature, their equipment symbols shall be formatted as Display Objects to change color based upon feedback. Coordinate color use with Owner's existing HMI configuration. Recommended color use:

a. Off – Gray.
b. On – Green.
c. Warning – Red, Solid.
d. Fail/Alarm – Red, Flashing.
e. Status – Amber.

2. Inline devices shall have alphanumeric tag identified near them, adjacent to associated symbol.
3. Arrow heads shall be used as pointers for flow direction at all points of entrance to equipment, at all points where process lines change direction and at points of merger.
4. Process lines entering or leaving screen shall have points of continuation identified by boxed text, indicating From/To screen. One end of box shall form arrow to show direction of flow and act as pick-field for selection of screen of continuation. Color shall be same as associated process line.
5. Process lines shall be identified with flow stream abbreviation as listed in standard symbolic table and as shown on P&IDs, where convenient.

G. Display Objects – Large Equipment Symbology

1. Symbol shape shall be simple reflection of true shape of equipment being depicted.
2. Outline color shall be white.
3. Equipment tag and description name shall be located within shape. If not practical, locate near shape. Text shall be white and enclosed in white border box. For example:

a. Tank levels shall be displayed within tank symbol as vertical bar, with bar color representative of fluid within tank.
b. Tank level bar height shall be proportional to analog input value scaled from 0 to 100%. 100% shall be equal to full vertical height of symbol.

H. Display Objects – Data Fields

1. Analog process data not conducive to graphic symbology shall be formatted as rectangular Data Fields:
2. Process values (i.e. Flow, pH, D.O., Elapsed Time) shall be displayed as Data Fields near associated device symbol and shall consist of: alphanumeric tag, green in color; data value, white in color, right justified; engineering unit, green in color. Entire field shall be grouped as one block.
3. Data Fields shall be configured with high and low limits as described above.

I. Display Objects – Status Displays

1. Status Displays shall be similar to Data Fields but shall be linked to discrete data points or status bits:
2. Discrete equipment parameters (i.e. Run, Fail, On/Off, Open/Close) shall be indicated as rectangular Status Displays and shall consist of: alphanumeric tag, green in color; single or dual-state equipment value, white in color, center justified. Entire field shall be grouped as one block.
3. Displays shall be classified as Alarms or Events (see below).

J. Control Objects

1. Control Objects shall reside on graphic screens as either visible objects or as pop-up objects.
2. Visible Control Objects shall be restricted to simple functions. For example:

    a. Single-State Pushbutton (i.e. Reset, Silence, Acknowledge, GoTo):

        1) Display alphanumeric tag of equipment or function to be manipulated. Function shall be independent of equipment control mode. There shall be graphic representation of one pushbutton, black in color with white or green text, center justified. Button shall act as pick-field and when selected by cursor and activated by clicking left mouse button, shall generate programmed output. Output shall not latch. Button, when activated, shall highlight with white border.

    b. Dual-State Pushbutton (i.e. Open/Close, On/Off, Start/Stop):

        1) Display alphanumeric tag of equipment or function to be manipulated. Function shall be dependent upon equipment control mode. There shall be graphic representation of one pushbutton, black in color with white or green text, center justified. Button shall act as pick-field and when selected by cursor and activated by clicking left mouse button, shall generate programmed output. Pick-field shall indicate change of state by changing text within object and/or changing color. Output shall latch, requiring mouse click to toggle back to original state. Button, when activated, shall highlight with white border.

    c. Data Entry Field:

        1) Similar to Data Display Field described above. Allows operator entry of process values such as set-points.

3. Pop-up activation for dynamic control of equipment shall be by pick-fields associated with symbol of device to be controlled. Pop-up shall be small window or graphic overlay on current screen in location that will not interfere with current operation. Pop-up will contain necessary symbolism for dynamic control and worded prompts as necessary. Examples of pop-up Control Objects:

    a. PID Controller Faceplate:

        1) Display alphanumeric tag of final element being controlled. Mode of field Hand/Off/Auto, On/Off/Remote or Open/Close/Remote selector switch shall be displayed. If in Auto, word “Auto” shall be displayed next to controller. If not in Auto, word “Hand” shall be displayed – depending on field condition. Set-point, Process Variable, and Control Variable shall be displayed in vertical bargraph and digital formats. Bargraph shall be graduated scale equal to range of final element. Display bar shall be equal in length to graduated scale. Set-point and Process Variables

shall be scaled in engineering units. Control Variable shall be scaled in percent of output. There shall be a graphic representation of a two-position pushbutton set (see below) labeled as “Auto-Manual” and shall act as pick-field. When selected by cursor and activated by clicking left mouse button, selector shall toggle between “Auto” and “Manual” modes of control. When selector is in “Auto”, PID controller calculates Control Variable. When selector is in “Manual”, Control Variable output shall follow setting by Operator. Control shall be available only when field selector switch is in “Auto”.

b. Flow Controller Faceplate:

1) Display alphanumeric tag of valve being controlled. Mode of field Hand/Off/Auto, On/Off/Remote or Open/Close/Remote selector switch shall be displayed. If in Auto, word “Auto” shall be displayed next to controller. If not in Auto, word “Hand” shall be displayed – depending on field condition. Set-point, Process Variable, and Control Variable shall be displayed in horizontal bargraph and digital formats. Bargraph shall be graduated scale equal to range of associated flow. Display bar shall be equal in length to graduated scale. Setpoint and Process Variables shall be scaled in engineering units. Control Variable shall be scaled in percent of valve position. There shall be a graphic representation of a two-position selector (see below) labeled as “Auto-Manual” and shall act as pick-field. When selected by cursor and activated by clicking left mouse button, selector shall toggle between “Auto” and “Manual” modes of control. When selector is in “Auto”, Flow Controller calculates Control Variable. When selector is in “Manual”, Control Variable output shall follow setting by operator. Control shall be available only when field selector switch is in “Auto”.

c. 2-Position Pushbutton Set (i.e. Manual/Auto, Start/Stop, Open/Close):

1) Operationally the same as Dual-state Pushbutton described above. Display alphanumeric tag of equipment to be controlled. Mode of field Hand/Off/Auto, On/Off/Remote or Open/Close/Remote selector switch shall be displayed. If in Auto , word “Auto” shall be displayed next to controller. If not in Auto, word “Hand” or “Off” shall be displayed – depending on field condition. There shall be graphic representation of two pushbuttons, one red in color, the other green in color. Buttons shall act as pick-fields and when selected by cursor and activated by clicking left mouse button, shall indicate and generate programmed output. Output shall remain latched until other button is activated. Button activated shall highlight with black border. Pick-fields shall be available only when field selector switch is in “Auto”.

d. 3-Position Switch Set (i.e. Local/Off/Remote, Hand/Off/Auto, Open/Stop/Close):

1) Display alphanumeric tag of equipment to be controlled. Mode of field Hand/Off/Auto, On/Off/Remote or Open/Close/Remote selector switch shall be displayed. If in Auto, word “Auto” shall be displayed next to controller. If not in Auto, word “Hand” or “Off” shall be displayed – depending on field condition. There shall be graphic representation of three pushbuttons, one red in color, one green in color, the other white (amber) in color. Buttons shall act as pick-fields and when selected by cursor and activated by clicking left mouse button, shall indicate and generate programmed output. Output shall remain latched until another button is activated. Button activated shall highlight with black border. Pick-fields shall be available only when field selector switch is in “Auto”.

e. Analog Output Control (i.e. “Speed-Pot”, Process Set-point Control):

1) Display alphanumeric tag of equipment to be controlled. Mode of field

Hand/Off/Auto, On/Off/Remote or Open/Close/Remote selector switch shall be displayed. If in Auto, word “Auto” shall be displayed next to controller. If not in Remote, word "Local" shall be displayed. Analog Output Control shall be displayed in vertical (horizontal) bargraph and digital formats. Bargraph shall be graduated scale equal to range of output. Display bar shall be equal in length to graduated scale. Process Variable units shall be scaled in engineering units. Speed or Valve Position units shall be scaled in percent of output. Control shall be available only when field selector switch is in “Auto”.

4. Pop-up Control Objects shall not be continually visible. Functions become complex depending upon numbers and types of smaller objects grouped together to create them. For example, a valve control object might be created by grouping a 2-Position Pushbutton Set (Local/Remote), a 3-Position Position Pushbutton Set (Open/Stop/Close) and Status Display Objects (Open, Closed) together.

K. Alarming Requirements

1. Alarms shall be provided for conditions which would result in a safety or health risk, environmental damage, property or equipment damage, or process failure.
2. Alarms are considered critical or non-critical in nature and are defined as follows:

    a. Critical Alarms are for conditions which would result in a safety or health risk, environmental damage, significant property or equipment damage, failure of process operations critical to meeting effluent limitations if not attended to and corrected immediately, or other conditions the Owner wishes to be notified of immediately.
    b. Non-Critical Alarms are for conditions which if not attended to and corrected within a specific timeframe, may eventually cause a safety or health risk, environmental or property damage, or process failure.

3. Critical Alarms shall be annunciated at a location where personnel responsible for operation of the facilities are expected to be stationed or on call at all times. Critical alarms generated after working hours shall notify the on-call plant operator.
4. Non-critical Alarms shall be indicated at a location where the presence of an operator is expected periodically. Non-critical alarms generated after working hours will not call out.
5. Operator shall be provided with a matrix to designate each alarm as Critical or Non-Critical.
6. Alarms and Events shall be logged to data file.
7. Provide alarm summary screen(s) at HMI.
8. Display only current alarms. Acknowledged alarms which are no longer active shall not be displayed.
9. Allow operator to acknowledge alarms using single keystroke or cursor pick at alarm summary screen.
10. Alarm Display shall include following information:

    a. Time and date alarm initially occurred.
    b. Alarm point identification.
    c. Alarm value and engineering units for alarms generated from analog process points.
    d. Description of alarm (up to 40 characters).

11. Events shall be logged to separate data file. Events shall not be displayed unless evoked and shall not be annunciated.

L. Data Logging requirements – Analog and Discrete

1. All input process points shall be logged to the hard disk of the HMI computer.
2. Procedure for data collection and storage shall be as follows:

a. HMI I/O driver shall poll process points as specified on I/O list and transfer data to image table.
b. HMI shall scan image table for analog process points once every second, and log value to data base.
c. HMI shall calculate minimum, maximum and average for each analog process point and log to data base.
d. HMI shall scan image table for discrete process points on status change only, and log value to data base.

M. Trend Display Requirements

1. Configure HMI computer to display logged data in graphical trend format.
2. Trend Display Requirements:

a. Identification of process point being displayed. Use same nomenclature as used on HMI screens.
b. Start and end time of data being displayed.
c. Display shall incorporate movable vertical cursor along time axis. Parameter values at cursor date and time shall be displayed digitally.
d. Initial configuration of displays shall display data from present time back to 72 hrs prior to present time. Provide capability for operator to enter new start time for data being displayed to view parameter trend more than 72 hrs old.
e. Displays shall include y-axis range identification, including values and engineering units.
f. Configure trend displays to use maximum of computer screen area possible for purpose of increased resolution.
g. Trend displays shall be accessible, via single keystroke, from graphic screen displaying trended point.

3. Organize graphics screens for trend displays into categories by process:

a. Provide separate graphic screen within each category to display each process point trend. Provide different color for each process point.
b. Provide separate category for manually entered data from HMI computer.

PART 3 – EXECUTION

3.01 PERFORMANCE

A. Configure PLC's and HMI computers consistent with Drawings and Specifications.

B. During course of Work and Warranty period, furnish all software and firmware with latest revisions published.

C. Label hardware revision levels on equipment and spares installed.

END OF SECTION

This page intentionally left blank.

SECTION 40 61 21
PROCESS CONTROL SYSTEM (PCS) – TESTING

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes in-factory and field testing requirements.

B. Testing of Process Control System (PCS) in conjunction with following Sections.

1. Section 40 61 93 Process Control System I/O List.
2. Section 40 61 96 Process Control Descriptions.

1.02 SUBMITTALS

A. In addition to submittal requirements of Section 40 61 13, provide the following:

1. Test Results:

a. Pass/fail status of all digital I/O.
b. Results of analog I/O testing.

2. Miscellaneous:

a. Detailed step-by-step in-factory and field test procedure at least 6 wks in advance of scheduled test date. Include sign-off sheets and punch list forms and description of configurations to be tested.
b. Complete inventory of equipment to be tested at factory including make, model, and serial number. Label each piece of equipment.

3. Submit in accordance with Section 01 33 00.

PART 2 – SERVICES

2.01 PREPARATION

A. In-Factory Testing Aids and Equipment:

1. Provide following documents.

a. One copy of submittals applicable to equipment to be tested.
b. One copy of Drawings and Specifications, with Addenda and Change Orders.
c. One copy of test procedure.
d. Complete inventory of equipment to be tested including make, model, and serial number.

B. Meet following criteria prior to start of test.

1. Complete submittals and resolve disputes, if any.
2. Engineer review of test procedure.
3. Include PLC processor and OIT computer in testing.
4. Coordinate test date agreeable to each party.

C. Schedule:

1. At end of test, meet to review list of deficiencies. Engineer will indicate those items which

must be corrected prior to shipment.
2. Confirm, in writing, times and dates 2 weeks before tests.

2.02 IN-FACTORY INSPECTION AND PLC I/O TESTING

A. In-Factory inspection and testing shall be performed at site of panel fabrication.

B. Owner and Engineer shall be invited to witness inspection and testing.

C. Process Control System PLC shall pass in-factory inspection and testing prior to shipment to job site.

D. In-Factory Inspection.

1. In-Factory inspection will verify following in accordance with approved submittals:

a. Panel dimensions.
b. Equipment layout.
c. Wiring.
d. Wire and terminal identification.

2. Verify proper access to equipment for maintenance.
3. Verify proper access to field wire termination points.
4. Inspect for neatness of wiring and wire harness construction.

E. In-Factory Testing and Demonstration.

1. Install PLC programming software, furnished as part of the project, to permit following:

a. Diagnostic test of PLC processor to assure proper run mode operation.
b. Diagnostic test of remote I/O to assure proper operation.
c. Inspection of PLC data table to allow viewing of discrete input on/off status.
d. Inspection of PLC data table to view register contents when inputs are tested at 0, 4, 12, and 20 mAdc.
e. Forcing of all digital outputs.
f. Generation of 4, 12, and 20 mAdc signals for all analog outputs.

2. Test as follows:

a. Verify equipment and manuals against inventory lists.
b. Run hardware diagnostics.
c. Testing of all input and output (I/O) signals at terminal strip used for field terminations.

1) Test change of state for all discrete inputs.
2) Test analog inputs at 0, 4, 12, and 20 mAdc.
3) Manipulate PLC data table or use forces to test response of all discrete output signals.
4) Manipulate PLC data table to test response of all analog output signals at 4, 12, and 20 mAdc.

3. Correct any deficiencies discovered prior to shipment to job-site.

F. Documentation

1. Prepare in-factory inspection and testing sign-off document. Document shall include following as a minimum.

a. Project description and number.
b. Company name for PLC supplier, Owner, and Engineer.
c. Section labeled “In-Factory Inspection”, with listing of items to be inspected as described above.

    1) For each item, include area for initials of PLC supplier, Owner, and Engineer representative indicating passing of inspection.
    2) Include area for handwritten notes of any corrections required.

d. Section labeled “In-Factory Testing”, with listing of items to be tested as described above.

    1) For each item, include area for initials of PLC supplier, Owner, and Engineer representative indicating passing of inspection. Include separate line for I/O point to be tested.
    2) Include area for handwritten notes of any corrections required.

2.03 FIELD I/O AND SOFTWARE TESTING

A. General:

1. Field testing is intended to check installation of the Process Control System PLC’s in addition to providing a diagnostic check of field equipment and wiring.
2. Testing shall begin after Process Control System PLC has been installed and all terminations are complete.
3. Use PLC configuration utilized for In-Factory Testing.
4. Test as follows:

    a. Run hardware diagnostics.
    b. Testing of all input and output (I/O) signals by activation or injection of signal at field device.

        1) Digital input signals:

            a) For all equipment run signals, test by on/off operation of equipment. If operation of equipment is deemed inadvisable by Owner or PLC supplier due to potential process upset, inaccessibility of generating device, hazard to personnel or other factors, test by jumpering of motor starter auxiliary contact or other source of run signal.
            b) For all alarm or status signals, test by activation of device generating alarm. If generation of alarm is deemed inadvisable by Owner or PLC supplier due to potential process upset, inaccessibility of generating device, hazard to personnel or other factors, test by jumpering of alarm contact at nearest accessible location to generating device.
            c) For signals designated as spare, test by jumpering of signal at Process Control System PLC panel field termination point.
            d) Demonstrate change of state in PLC data table.
            e) Demonstrate change of state at Operator Interface Terminal.

        2) Digital or Relay output signals:

            a) Manipulate PLC data table or use forces to test response of all discrete output signals.
            b) Verify proper response of other devices in loop to signals.
            c) For signals designated as spare, test by checking signal at Process Control

System PLC panel field termination point.

3) Analog input signals:

a) Verify impedance capabilities of transmitting device has not been exceeded by installation of Process Control System PLC.
b) Disconnect transmitting device and inject 0, 4, 12, and 20 mAdc into loop.
c) Demonstrate proper response to various signals in PLC data table.
d) Demonstrate change of value at Operator Interface Terminal.
e) Verify proper response of other devices in analog loop to various signals.
f) For signals designated as spare, test by injection of signal at Process Control System PLC panel field termination point.

4) Analog output signals:

a) Verify impedance capabilities of analog outputs are not exceeded.
b) Generate 4, 12, and 20 mAdc signals for all analog outputs through PLC data table.
c) Demonstrate change of value at Operator Interface Terminal.
d) Verify proper response of other devices in analog loop to various signals. Verify proper loop current through measurement.
e) For signals designated as spare, test by measuring of signal at Process Control System PLC panel field termination point.

5. Documentation

a. Prepare field testing sign-off document. Document shall include following as a minimum:

1) Project description and number.
2) Company name for Owner, PLC supplier, and Engineer.
3) For each I/O point, include area for initials of PLC supplier, Owner, and Engineer representative indicating passing of inspection. Include separate line for I/O point to be tested.
4) Include area for handwritten notes of any corrections required.

6. Problem field devices or wiring.

a. Provide written documentation of any problems encountered with Owner's existing field devices or wiring during testing.

PART 3 – EXECUTION

3.01 PERFORMANCE

A. Test PLC's, and Operator Interface Terminal consistent with Drawings and Specifications.

END OF SECTION

SECTION 40 61 26
PROCESS CONTROL SYSTEM (PCS) – TRAINING

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes process control system training requirements.

B. Include training on the following subjects:

1. Overview of equipment and how it interacts with equipment and processes.
2. Operation and use of control programs residing at each PLC and HMI.
3. Overview of equipment areas and how they interact with field panels and instruments and other area equipment.
4. Care-taking procedures for PLC's.
5. Overview of plant communications hardware and equipment.

C. Comply with requirements of Section 01 61 00.

1.02 ABBREVIATIONS AND REFERENCES

A. HMI Human Machine Interface

B. OIT Operator Interface Terminal

C. PLC Programmable Logic Controller

D. SCADA Supervisory Control And Data Acquisition

1.03 SUBMITTALS

A. General:

1. Two weeks prior to training provide to Engineer a copy of the training documents to be presented to participants.
2. Material shall be arranged in a 3-ring tabbed binder separated by primary subjects as defined below.
3. Material shall be comprensive, yet arranged in a manner easy to find or reference key information.
4. Partial submittals are not acceptable.

PART 2 – PRODUCTS – Not Applicable

PART 3 – EXECUTION

3.01 MAINTENANCE TRAINING

A. Cover following areas as a minimum:

1. Testing programs which can isolate faults to functional area.
2. Theory, logic flow, physical hardware awareness, and interface connections and assembly of each equipment item.
3. Diagnostic procedures using special and general purpose test equipment. Theory, testing, and troubleshooting procedures given for special test equipment.
4. Operation of computers and peripherals.

5. Operation of Float Mode Backup Controller.
6. Operation of submersible pump monitoring systems.
7. Programming routines and procedures to enable students to take advantage of on-line and standby equipment for maintenance and performance verification.
8. Present short operator's course to ensure students understand operator functions and man/machine interfaces. Explain displays and printouts so students understand how information is derived, when it is presented incorrectly, and use of guidelines to differentiate between software and hardware problems.

3.02 INSTRUMENT TRAINING

A. Cover following areas as a minimum:

1. General principle of operation.
2. Calibration schedule.
3. Calibration procedure.
4. Calibration equipment required (if needed).
5. Recommended spare parts.
6. Consumable part – recommended replacement schedule (e.g. reagents, filters, probe tips) and procedure.
7. General care and maintenance with special consideration to all instruments that may require cleaning such as level elements, etc.

3.03 HMI/OIT/PLC TRAINING

A. OIT functionality.

B. How key components work; shall include, but not be limited to:

1. Entering of set points.
2. Using Dialer alarm matrix.
3. Acknowledging and clearing alarms.

C. Block diagram of how PLC program works.

END OF SECTION

SECTION 40 61 30
PROCESS CONTROL SYSTEM (PCS) – O&M DATA

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes requirements for Operations and Maintenance (O&M) data for Process Control System.

B. Comply with requirements of:

1. Section 01 33 00 Submittal Procedures.

PART 2 – SERVICES

2.01 HARDWARE MANUALS

A. General:

1. Include equipment comprising system. Provide instructions for O&M of installed system and individual equipment units comprising system.
2. Provide level of comprehension so experienced electronics technician can understand them. Convey understanding of how system operates and provide sufficient procedures for O&M. Use abbreviated tabular data such as charts, tables, checklists, and diagrams whenever practical, in lieu of written text. Make Drawings and tables integral part of manuals.
3. Standard hardware manuals are acceptable, if errata sheets are included to reflect specific equipment provided.

B. Organization and Content:

1. Introduction Section: Brief explanation of function of equipment covered. Be concise and do not include detailed descriptions. Provide quick orientation to use and purpose of manual and its relationship to system and equipment.
2. Safety Precautions: Major hazards to personnel and equipment peculiar to equipment or jobs covered. Intersperse specific hazard information, cautions or warning notes at appropriate points throughout other sections of manual.
3. Physical Description: Physical description (size, dimension, weight, special attachments, and physical orientation or clearances) for installation and operation. Identify special environmental (cooling, exhausting or noise) constraints.
4. Functional Description: How various functions operate together to cause desired results. Include block diagrams and flow diagrams for clarification and understanding. Provide text and diagrams which mutually support each other.
5. Operating procedures: Include maintenance-oriented operating procedures for individual equipment so maintenance personnel will be able to verify proper operation.

    a. Describe each equipment, unit, and assembly in detail with regard to technical or theoretical operation. Include information to component level. Describe each circuit and mechanical mechanism. Cross-reference descriptions so functions of each piece of equipment are covered. Use schematic diagrams, sketches, equivalent diagrams, tables, and graphs to supplement text.
    b. Applicable checkout, troubleshooting, servicing, removal and replacement, and in-place repair procedures which are performed on system basis. Provide written procedures for every adjustment point of equipment.

6. Checkout Procedures: Verify satisfactory operation of system, subsystem or unit as

applicable. If checkout requires detailed step-by-step procedure include such procedures. Indicate why checkout is performed and what conditions are to be satisfied.

7. Troubleshooting Procedures: Isolate faulty components. Sequence troubleshooting procedures in logical progression from malfunction indication to location of faulty component(s). Indicate special connections or test equipment required for troubleshooting.
8. Servicing Requirements: Cleaning, lubricating, replenishing, and other housekeeping and preventive maintenance procedures applying to particular equipment. Make reference to applicable manuals which describe various servicing procedures.
9. Removal and Replacement Procedures: Step-by-step instructions for removal and replacement of items subject to frequent replacement. If special tools are required, identify by name and part number.
10. Diagrams: Schematic diagrams, logic diagrams, and associated data necessary for maintenance personnel to trace circuits, make continuity checks, and accomplish general and specific troubleshooting on inoperative or malfunctioning circuits. Provide pin wiring diagrams and cabling and plug tables showing to-and-from wiring information. Provide symbol chart where necessary to explain graphic symbols appearing on diagrams.
11. Tabular Listing: Special tools, equipment, and test equipment applicable to test, adjustment, and fault isolation procedures. Write systems maintenance instructions to enable correct use of test equipment.
12. Parts Lists: Provide clear traceability from equipment to replaceable component. Identify each component part with original manufacturer's name and part number. Identify component parts or assemblies modified for Project by part number. Parts lists may be tabulated or supplied in form of engineering or manufacturing drawings.

2.02 SOFTWARE AND CONFIGURATION MANUALS

A. General:

1. Manufacturer's standard PLC programming and software manuals.
2. Manufacturer's standard PLC data highway network programming and software manuals.

B. Provide complete, organized, and standardized documentation. Structure documentation so each level develops different degree of detail. Begin with broad approach (Systems Manual), focus on smaller pieces of overall system (Subsystem Documentation), and finally pinpoint finest detail (Program Documentation).

C. Systems Manual: Describe overall content of systems software. Describe what is included in software and not how components function. Provide global view of system and complete description of interaction of various software subsystems. Include following.

1. Table of contents.
2. Overall narrative of system including special techniques and general philosophies.
3. Block diagram showing subsystem interaction.
4. List of subsystems including brief discussion of purpose of each.
5. List of programs included, categorized by subsystem, to which each belongs.
6. Description of files or tables within system which are not unique to any particular subsystem. Files or tables used uniquely within subsystem may be defined therein.

D. Cold Boot Manual and Boot Disks: Provide detailed instructions and bootstrap software for restoring all configured equipment to normal operation in the event of an equipment crash. Document all soft and hard points used, both in programming code and in Excel format.

2.03 SYSTEM CONFIGURATION DRAWING AND MANUALS

A. System configuration drawing showing Process Control System Equipment including, but not limited to PLC, HMI's, OITs, remote I/O controllers, and local area network hardware. Show

cabling and interconnection between system components.

B. Configuration data manual describing how final system configured. Describe unique data and system parameters.

2.04 DRAWINGS

A. Provide following for Process Control System elements.

1. Block Diagram: Diagram showing major Process Control System components. Identify components by manufacturer and model number. Show interconnecting cables diagrammatically.
2. Power and Grounding Interconnection Diagrams:

    a. Power diagrams shall detail interconnections from power source through power conditioning equipment, to process control system equipment.
    b. Grounding diagram shall illustrate grounding philosophy and implementation.

3. Interconnecting Wiring Diagrams: Show Process Control System elements, interconnecting cables and wiring terminations, and terminations to interacting elements and subsystems. Number terminations. Label terminations for circuits extending outside PLC assemblies.

    a. Coordinate external circuit portion of diagram with Work specified under Division 26 and bear Contractor's mark showing Work is complete.
    b. Nomenclature for external connections shall be in accordance with I/O lists in these Contract Documents and on Drawings.

4. Shop Drawings for specifically assembled Process Control System equipment such as panels, consoles, and cabinets. Drawings shall include, but not be limited to, following.

    a. Complete connection diagram.
    b. Bill of materials listing each major item of assembly. Provide data sheets for each item, annotated as necessary to describe specific items/options furnished.
    c. Layout and fabrication drawings showing locations of components.
    d. Installation and mounting detail drawings.
    e. Anchor bolt size and location.
    f. Equipment weights.
    g. Cabinet details and location.

        1) Exterior dimensions.
        2) Cable ingress and egress areas.
        3) Cable routing.
        4) Power termination location.
        5) Ground lug location.
        6) Cable termination points.
        7) Nameplate schedules.

PART 3 – EXECUTION

NOT USED

END OF SECTION

This page intentionally left blank.

SECTION 40 62 63
OPERATOR INTERFACE TERMINALS

PART 1 – GENERAL

1.01 SUMMARY

A. Items specified in this section shall conform to general requirements of Section 40 61 13.

B. Section includes panel-mount Operator Interface Units for Process Instrumentation and Control Systems and Equipment.

1.02 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section.
2. Submit Product Data and Shop Drawings in one complete submittal package.
3. Partial submittals are not acceptable.

B. Product Data:

1. Catalog cuts and product specifications for devices specified.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for control devices specified.
2. Submit in accordance with Section 01 33 00.

D. Operation and Maintenance (O&M) Data:

1. Operating instructions and maintenance data for materials and products for inclusion in O&M Manual.
2. Manufacturer's written instructions for periodic cleaning for Operator Interface Units in service.
3. Submit in accordance with Section 01 78 23.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing instrumentation of types and capacities indicated that have record of successful in-service performance.

B. Devices shall be latest and most modern design at time of bidding.

C. As much as possible devices shall be products of one manufacturer to achieve standardization for maintenance, spare parts, operation, and service.

D. All equipment specified in this Section shall be the product of a single manufacturer.

PART 2 – PRODUCTS

2.01 OPERATOR INTERFACE TERMINALS

A. Manufacturer:

1. Delta Electronics, Model DOP-B05S11.
2. No substitutes

B. General:

1. 24Vdc power.
2. 5.6-inch (320 x 234 pixels) TFT LCD 65536 colors
3. 3 sets of COM ports, supports RS-232 / RS-422 / RS-485
4. For data transfer/download: RS-232, USB
5. Supports USB Host for direct connection to USB disk, printer and mouse
6. Complies with IP65 standard
7. Supports horizontal / vertical display
8. PC editing software, DOPSoft

    a. Compatible with operating systems: Windows XP, Windows Vista, Windows 7

PART 3 – EXECUTION

3.01 TRAINING

A. Manufacture's training shall be provided on-site prior to Substantial Completion of project in accordance with Section 40 61 26.

3.02 INSTALLATION

A. Install and wire in accordance with equipment manufacturer's written instructions, approved submittals, applicable requirements of the NEC, NEIS, and recognized industry practices.

END OF SECTION

SECTION 40 63 43
PROGRAMMABLE LOGIC CONTROLLERS

PART 1 – GENERAL

1.01 SUMMARY

A. Specification includes hardware required for a fully functional Programmable Logic Control System.

B. Programmable Logic Control System shall be from single manufacturer.

1.02 ABBREVIATIONS

A. IEC: International Electrotechnical Commission

B. I/O: Input/Output

C. PLC: Programmable Logic Controller

D. RTD: Resistance Temperature Detector

1.03 REFERENCES

A. NEC: National Electrical Code

B. NEIS: National Electrical Installation Standards

C. UL: Underwriters Laboratories

1.04 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are not acceptable.

B. Product Data:

1. Catalog cuts and product specifications for hardware specified.
2. Dimensional data of PLC equipment.
3. Interface terminations and cable data for each module.
4. Hardware manuals (4 sets).
5. Detailed bill of materials with manufacturer’s part numbers for each rack.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for hardware.
2. Wiring Diagrams: Show control connections and distinguish between factory-installed and field-installed wiring.
3. Addressing system and card layout, including special configuration rules and limitations for each rack.
4. Submit in accordance with Section 40 61 13.

D. Operation and Maintenance (O&M) Data:

1. Provide in accordance with Sections 01 78 23 and 40 61 30.
2. Operating instructions and maintenance data for materials and products for inclusion in O&M Manual.
3. Manufacturer's written instructions for periodic replacement of any backup batteries used on equipment including estimated battery replacement calendar dates.

1.05 QUALITY ASSURANCE

A. Items provided under this section shall be listed or labeled by Underwriters Laboratories Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

B. Single Source Responsibility: Obtain hardware from single manufacturer with responsibility for entire system. Unit shall be representative product built from components that have proven compatibility and reliability.

1. An exception to this is the use of Prosoft communications modules.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment and system components to their final location in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage. Remove protection only after equipment is made safe from such hazards and ready to install.

B. Store items in a clean, dry, secure location.

1.07 MAINTENANCE

A. Extra Materials:

1. Furnish extra materials matching products installed, as described below, packaged with protective covering for storage, dated, and identified with labels describing contents.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Allen Bradley.

B. No Substitute Permitted.

2.02 MICRO1400

A. Processor:

1. 10K program steps.
2. 20Kb user data.
3. 24Vdc power supply.
4. 10/100Base T, RJ-45, Ethernet I/P and Modbus TCP Communication Interface (built into

processor).
5. Built in serial port (Modbus RTU Master/Slave, ASCII/Binary, CIP Serial).
6. DIN rail or panel mounted.
7. Ladder diagram, function block diagram, and structured text programming.
8. 19 embedded I/O points.
9. One embedded 0-10V analog output.
10. Provide orderly shutdown on power failure, saving register contents with automatic restart on power restoration.

B. Remote Operator Interface (2080-REMLCD) for maintenance and troubleshooting. Continually update display when data requested. Provide capability to monitor or change following.

1. Discrete I/O.
2. Analog I/O.
3. Pulsed I/O.
4. Communication parameters.
5. Configuration data.
6. Internal program data values.

C. I/O Modules:

1. Plug-in I/O modules specifically designed for interfacing of signals to PLC processor.
2. Include sufficient I/O modules to accommodate signals with provisions for:

a. 25% spare I/O for digital I/O minimum.
b. 2 spares each for analog I/O minimum.

3. Digital Input Modules:

a. 2080-IQ4.
b. 30Vac/dc max.
c. 4 points per module.
d. LED indication of on/off status of each point.

4. Relay Output Modules:

a. 2080-OW4I.
b. 5-125Vdc, 5-240Vac isolated relay contact outputs.
c. Contact Rating: 2.0 amps continuous at 240Vac.
d. Contact configuration: Normally open contacts.
e. 4 points per module.
f. LED indication of on/off status of each point.

5. Analog Input:

a. 2080-IF4.
b. Single-ended (unipolar) non-isolated.
c. 4 points per module.
d. Accepts 0-10V or 0-20 mAdc.

6. Analog Output:

a. 2080-OF2.
b. Single-ended (unipolar).
c. 2 points per module.
d. Transmit 0-10V or 0-20 mAdc.

e. Current resistive load: 500 ohms.

7. RTD:

a. 2080-RTD2.
b. 2 channel.
c. Non-isolated.
d. 100/200/500/100 ohm Platinum 385, 100/200/500/100 ohm Platinum 392, 10 ohm Copper 427, 120 ohm Nickel, 604 ohm Nickel-Iron 518.

2.03 PLC PROGRAMMING

A. PLC shall be programmed using Rockwell Automation RSLogix500 Software.

1. Latest firmware version compatible with all supporting operating systems and hardware.
2. IEC 61131-3 compliant (as standard).

2.04 EXECUTION

PART 3 – INSTALLATION

A. Install and wire in accordance with System Integrator and/or Equipment manufacturer's written instructions and approved submittals, applicable requirements of the NEC, NECA "Standard of Installation", and recognized industry practices.

B. Each installation shall monitor raw incoming power (prior to a UPS) in order to identify plant power failures. This power failure shall be monitored by a normally closed (utility power available) discrete input.

C. Provide orderly shutdown on PLC Panel power failure, saving register contents with automatic restart on power restoration.

D. Each input shall be individually fused.

1. Exception: when a group of inputs serve a common device or common function such as a remote control station for equipment.

E. Include sufficient I/O modules to accommodate 25% spare I/O prewired to terminal strips. Where no I/O of a listed type (digital input, digital output, analog input, analog output, etc.) is shown, provide one spare prewired module.

F. I/O shall be configured such that any single I/O module failure shall not prevent operation of all equipment for a given unit process. The objective of this configuration is to avoid a total unit process failure because of a single I/O module failure. For example, if a treatment system includes 4 pumps, the I/O for each pump should be placed such that the failure of an I/O module will only affect one of the four pumps so the remaining pumps can operate normally.

G. Analog I/O shall use specialty field terminal blocks specifically designed for 4-20mA signal wiring.

H. Communication software and configuration shall meet monitoring and control requirements of each process in accordance with functional descriptions.

I. Each hardware unit communicating over data highway shall include executive routines or traffic controller to control and coordinate activities on communication links. Use integrated, standard products for communication software to manage transmission protocols, line error detection, and

message switching.

J. Provide Owner one hardcopy (in 3-ring binder format) of fully-commented PLC programs at the completion of the project for each processor installed.

END OF SECTION

This page intentionally left blank.

SECTION 40 67 63
CONTROL PANEL-MOUNTED UNINTERRUPTIBLE POWER SUPPLY

PART 1 – GENERAL

1.01 SUMMARY

A. Items specified in this section shall conform to general requirements of Section 40 61 13.

B. Section includes UPS equipment.

C. Site Conditions:

1. Input power: 120Vac utility grade.

1.02 ABBREVIATIONS AND REFERENCES

A. NEC National Electrical Code

B. NEIS National Electrical Installation Standards

C. PLC Programmable Logic Controller

D. UL Underwriters Laboratories

E. UPS Uninterruptible Power Supply

1.03 SUBMITTALS

A. General:

1. Tabulated listing of all device and equipment power loads connected to UPS for each installation. This shall be used to identify UPS sizing requirements together with requirements listed below.
2. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section.
3. Submit Product Data and Shop Drawings in one complete submittal package.
4. Partial submittals are not acceptable.

B. Product Data:

1. Catalog cuts and product specifications for equipment specified.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for equipment specified.
2. Submit in accordance with Section 01 33 00.

D. Operation and Maintenance (O&M) Data:

1. Operating instructions and maintenance data for materials and products for inclusion in O&M Manual.
2. Manufacturer's written instructions for periodic test for equipment in service.
3. Manufacturer's written instructions for periodic battery replacement for equipment in service.
4. Submit in accordance with Section 01 78 23.

PART 2 – PRODUCTS

2.01 UNINTERRUPTIBLE POWER SUPPLY

A. Manufacturer:

1. APC
2. Emerson
3. Eaton
4. ABB
5. Or equal

B. Features:

1. UPS shall power all PLC control panel devices, external instruments, and equipment as shown on Drawings.
2. Size UPS at 125% of connected electrical load (minimum).
3. Minimum UPS size shall be 750VA.
4. Tower form factor shall be used unless stated otherwise on Drawings or Specifications.
5. Provide true on-line non switching uninterruptible power supply (UPS).
6. Double power conversion on-line operation including rectifier and inverter, constantly conditioned AC output.
7. UL Listed.
8. Provide bypass contactor (A/B 100-A18ND3 or equal) or other means to automatically bypass UPS allowing operation of system controls in event of UPS failure. Device contacts shall be rated for inductive loads and shall meet or exceed current protection of circuit.
9. Each system shall consist of a static dc to ac sine wave inverter, a battery charger, sealed batteries, a monitor and transfer switch, and accessories as listed below.
10. Each system shall operate on a 120-volt, 60-Hz ac branch circuit. The input ac circuit shall supply energy to the battery charger which shall supply energy to the inverter as well as to the battery to maintain its charge. The output of the inverter shall supply energy to the load. If the input ac circuit is interrupted, the inverter shall continue to supply energy to the load without interruption, drawing power from the battery. If the input ac circuit is restored prior to discharge of the battery, the charger shall resume the supply of energy to the inverter and shall restore the battery to full charge. In the event of malfunction of the battery charger, battery or inverter that results in interruption of the output from the inverter, the monitor shall detect this condition and shall automatically transfer the load to the system's ac input circuit within 25 milliseconds. After the malfunction is corrected, the load shall be retransferred to the inverter manually.
11. System output voltage shall be regulated within plus or minus 5 percent of 120 volts and frequency stability shall be plus or minus 1/2 percent of 60-Hz. The output characteristic shall be sinusoidal with not more than 5 percent total harmonic distortion at full load with input ac circuit at 120 volts. For a 20 percent instantaneous load change, voltage overshoot or undershoot shall be not more than plus or minus 10 percent. For a 10 to 90 percent load change, recovery time shall be not longer than 100 milliseconds.
12. Input protection shall be provided by a panel-mount circuit breaker. Each inverter shall be the load current-limiting type and each shall have overload and short circuit protection provided by a circuit breaker. Efficiency shall be 75 percent for the inverter and 85 percent for the battery charger minimum.
13. UPS shall supply power to PLC, OIT, Ethernet Switches, DC power supplies, field instruments, and other low voltage control devices as specified and as shown on Drawings and Plans.
14. UPS shall power the Motor Protection Relays used to protect submersible pumps.
15. UPS shall have enough capacity to power connected devices for a period of 15 minutes after the utility power has failed. Provide with extended battery module(s) to meet this requirement.

a. Additional batteries shall be contained within panel enclosure unless approved by Owner and Engineer.
b. UPS shall include dry contact status signal outputs including as minimum: low battery, equipment malfunction/failure.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Condition power as required to provide stable Process Control System.

B. Install and wire in accordance with equipment/instrument manufacturer's written instructions, approved submittals, applicable requirements of the NEC, NEIS, and recognized industry practices.

END OF SECTION

This page intentionally left blank.

SECTION 40 70 00
INSTRUMENTATION OF PROCESS SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section identifies instrumentation types and initial parameters.

B. Items specified in this section shall conform to general requirements of Section 40 61 13.

C. Provide devices/instrumentation/equipment as listed herein and as shown on Drawings:

1.02 ABBREVIATIONS AND REFERENCES

A. NEC: National Electrical Code

B. NEIS: National Electrical Installation Standards

C. NEMA: National Electrical Manufacturers Association

1.03 DEFINITIONS

A. The Rating column of instrument tables refers to the NEC hazardous environment rating the device is to be installed in.

1. CID1 – Class I Division 1 Group D
2. CID2 – Class I Division 2 Group D
3. CIID1 – Class II Division 1 Group G
4. CIID2 – Class II Division 2 Group G
5. NR – Not Rated

PART 2 – PRODUCTS

2.01 MAGNETIC FLOW ELEMENT AND TRANSMITTER

Tag	Description	Service	Pipe Dia.	Liner	Range (gpm)	Rating
100-FIT-0140 100-FE-0140	Benton Station Flow	RWW	4 Inch	Hard Rubber	0-500	CID2
200-FIT-0240 200-FE-0240	Greenfield Station Flow	RWW	4 Inch	Hard Rubber	0-500	CID2

A. Manufacturer:

1. ABB
2. Siemens
3. Or Equal

B. Design is based on startup average velocity of 3 ft/sec through meter. Meters requiring greater velocities to meet specified accuracy and proper performance are not acceptable.

C. Flowmeter system accuracy shall be ±0.25% of flow rate over 10:1 turndown minimum. Repeatability shall be ±0.1% and response time programmable from 1 sec to 100 sec.

D. Meters shall be furnished with NIST certification of calibration.

E. Flow Element:

1. Low frequency, electromagnetic induction type producing dc pulse signal directly proportional and linear to liquid flow rate.
2. Splashproof and weather-resistant NEMA 6P design housing (when provided with remote transmitter). Watertight external and internal electrical conduit connections.
3. Provide power from signal converter.
4. Unless otherwise specified, materials of construction shall be:

    a. Flow meter liner: Hard Rubber
    b. Electrode materials: Hastalloy C.
    c. Electrode type; Bullet nose.
    d. Grounding rings: 316 Stainless Steel.

5. Use grounding rings or gaskets on each end of magnetic flow meter to provide ground path and prevent interference with flow signal. Probes are not acceptable.
6. Sensing head interchangeable with meter body of same manufacturer without performing flow recalibration.
7. High impedance device of not less than 1012 ohms to minimize span shift due to electrode coating.
8. Approved by Factory Mutual Research when sensor is located in hazardous area.
9. Laying length of meters shall be minimum of 1-1/2 times nominal meter size.

F. Transmitter:

1. Remote mounted according to Drawings and Plans, microprocessor controlled.
2. Operate on 120Vac, 60 Hz power.
3. Provide pulsed dc voltage to magnet coils of magnetic flow meter to establish magnetic field.
4. Convert flow signal from magnetic flow meter to analog and digital output signals, for bidirectional flow.
5. Span to be continuously adjustable between 2 and 31 ft/sec. Adjustment shall be by keypad.
6. Display shall have 2 rows of 16 alpha numeric characters minimum. Top row shall indicate instantaneous flow rate in direct engineering units, field selectable.
7. Converter interchangeable with magnetic flow meter of same manufacturer and requires no additional flow calibration adjustment.
8. 4-20 mAdc analog current output into 0 to 900 ohm load and 24Vdc scaled, pulse output software adjustable.
9. Locate flow rate indicator within each converter.
10. House in cast aluminum enclosure to meet NEMA 4X requirements.
11. Noise reduction feature to minimize effects of noise generating processes.
12. Automatic empty pipe detection.
13. Suitable for -5°F to +140°F ambient temperature (-40°F to +140°F for outdoor applications).
14. Provide thermostatically controlled condensate heater to allow use in condensate environments.

G. Cable:

1. Provide sufficient standard length of manufacturer’s signal cable connecting meter and converter without splice.

2.02 LEVEL SWITCH, BALL FLOAT

Tag	Location	Setting (Elev)	Rating
100-LSLL-0121	Benton Wet Well Low Level Ball Float Switch	531.50	CID1
100-LSL-0122	Benton Wet Well Pump Stop Ball Float Switch	532.50	CID1
100-LSH-0123	Benton Wet Well Pump Start Ball Float Switch	535.50	CID1
100-LSHH-0124	Benton Wet Well High Level Ball Float Switch	536.50	CID1
200-LSLL-0221	Greenfield Wet Well Low Level Ball Float Switch	583.50	CID1
200-LSL-0222	Greenfield Wet Well Pump Stop Ball Float Switch	584.50	CID1
200-LSH-0223	Greenfield Wet Well Pump Start Ball Float Switch	588.50	CID1
200-LSHH-0224	Greenfield Wet Well High Level Ball Float Switch	589.00	CID1

A. Manufacturers:

1. Contegra FS 90.
2. Evoqua Water Technologies 9G-EF.
3. Or Equal

B. Requirements:

1. Float: 316 Stainless Steel.
2. Provide sufficient length of PVC jacketed cable.
3. For hazardous (classified) locations, provide intrinsically safe relays in corresponding control panel.
4. Mounting Hardware: 316 Stainless Steel on vertical mounting pipe or Stainless Steel cable with anchor weight as indicated on Drawings.
5. Switch: Non-Mercury tilt type 1A @ 150VAC/VDC non-inductive.

2.03 LEVEL SWITCH, VERTICAL

Tag	Location	Setting (Elev)	Rating
100-LSHH-0133	Benton Valve Vault Flooded Vertical Float Switch	*	CID2
100-LSHH-0141	Benton Meter Vault Flooded Vertical Float Switch	*	CID2
200-LSHH-0233	Greenfield Valve Vault Flooded Vertical Float Switch	*	CID2
200-LSHH-0241	Greenfield Meter Vault Flooded Vertical Float Switch	*	CID2

* - for mounting height reference detail N275 on 999-N drawings.

A. Manufacturers:

1. Contegra FS 202.
2. Or Equal

B. Requirements:

1. Stem: PBT.
2. Float: Buna-N.
3. Retention clip: PVDF (Kynar).
4. When located in hazardous (classified) locations, provide intrinsically safe relay in corresponding control panel.
5. Mounting shall be in accordance with manufacturer's recommendations.
6. Switch: Magnetically actuated, hermetically sealed, snap action reed switch for low potential, low current, dry circuit applications.

2.04 MICROWAVE RADAR LEVEL ELEMENT

Tag	Location	Range (ft)	Rating
100-LE/LT-0120	Benton Wet Well Level	0-20	CID1
200-LE/LT-0220	Greenfield Wet Well Level	0-20	CID1

A. Manufacturers:

1. VEGAPULS C21.
2. No Substitutes

B. Level transmitter consisting of variable capacitance, hydrostatic head-pressure sensing assembly enclosed in submersible Type 316 stainless steel housing with pressure sensing diaphragm and special cable containing breather tube and signal wiring.

C. Provide intrinsically safe barriers when used in hazardous areas.

D. Transducer:

1. Designed for continuous submergence.
2. Low movement Teflon-faced diaphragm, 0.87 inch diameter.
3. Oil-filled.
4. Barometrically compensated
5. Internal temperature compensation.
6. Variable capacitance type internal sensing element.
7. 2-wire, 4-20 mAdc HART.
8. Span and off-set adjustable.
9. Active transient protection.
10. Long Term Stability: 0.1% of upper range value per year.
11. Accuracy: ± 0.20% of span.
12. Loop powered.

E. Cable Assembly:

1. Positive seal where entering transducer housing.
2. Contains breather tube.
3. Provide sufficient length to accommodate installation.

F. Junction Box and Breather Assembly:

1. Provide polycarbonate terminal box for submersible cable landing with filtered breather opening for atmospheric pressure compensation of breather tube.
2. Desiccant systems not allowed.

2.05 PRESSURE GAUGE/INDICATOR

Tag	Location	Seal Type	Range	Rating
100-PI-0131	RWW Pump 1 Discharge Pressure Gauge	Diaphragm	0-100 psi	NR
100-PI-0132	RWW Pump 2 Discharge Pressure Gauge	Diaphragm	0-100 psi	NR
200-PI-0231	RWW Pump 1 Discharge Pressure Gauge	Diaphragm	0-100 psi	NR
200-PI-0232	RWW Pump 2 Discharge Pressure Gauge	Diaphragm	0-100 psi	NR

A. Manufacturer:

1. Ashcroft
2. U.S. Gauge, Division of Ametek, Inc.
3. Wika.
4. Or Equal

B. Requirements:

1. Gauge Housing Material: 316 Stainless Steel
2. Mounting: Stem
3. Dial Size: 4-1/2 inch
4. Units shall be bellows or Bourdon tube actuated pressure gauges. Gauges shall be stem mounting with 3-1/2-inch dial size, unless otherwise noted.
5. Accuracy shall be ±1% of span at ambient conditions of 73.4°F and 29.92" Hg barometric pressure. ASME B40.100 Grade 1A minimum.
6. The sensing element material shall be phosphor-bronze if coupled with diaphragm seal, otherwise provide type 316 stainless steel.
7. Element shall sense pressure or vacuum.
8. Element shall be suitable for temperatures of media monitored.
9. Liquid filled for alleviation of vibration.

C. Accessories:

1. Include isolation valve to isolate from process when being serviced.
2. Provide with diaphragm seal as specified in this Section.

D. Diaphragm Seal

1. Manufacturer:

   a. Ashcroft Type 101.
   b. Ametek, Mansfield and Green Division, Type SG.
   c. Chemline Plastics (for FeCl or corrosive applications)
   d. Or Equal

2. Requirements:

   a. Lower Housing Material: Unless otherwise noted, type 316 Stainless Steel with flushing connections.
   b. Diaphragm Material: Unless otherwise noted, type 316 Stainless Steel.
   c. Upper Housing Material: Steel with bleed screw.
   d. Connections: Threaded Female NPT.
   e. Filling Fluid: Silicone (Temperature Range: -40° to 600°F).
   f. Volumetric displacement of the seal must be greater than the attached instrument.
   g. Unit shall be pressure-sensing suitable for measuring dirty or corrosive fluids.
   h. Unit shall be arranged and designed to directly transmit the process pressure by means of the fluid through an opening in the lower housing to a pressure-sensing device attached and sealed to the upper housing by a drilled and threaded boss.
   i. Seal shall be suitable for fluid pressures to 500 psig.
   j. Unit shall have fill connections and other features required permitting refill of the seal volume and calibration of unit in the field.
   k. Unit shall be suitable of for temperature of media monitored.
   l. For pressure applications less than 10psi:

      1) Diaphragm/frame size as required for specified pressures.
      2) Diaphragm Material: 316 stainless steel as standard.
      3) Filling Fluid: Silicone.

4) Suitable for vacuum application.
5) Volumetric displacement: 0.40in^3 or greater.
6) Ashcroft 700 series or equal.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install and wire in accordance with equipment/instrument manufacturer's written instructions, approved submittals, applicable requirements of the NEC, NEIS, and recognized industry practices.

B. Instrumentation transmitters, displays, and other indicators shall be configured to display information in the units given in this section and shall be orientated such that they are easily readable and accessible from operating locations.

3.02 IDENTIFICATION

A. Provide Type 316 stainless steel tag permanently affixed to each unit (where sensor and transmitter separately mounted).

B. Place tags for instruments near point of installation for instruments not readily accessible.

C. Include Engineer tag number as listed in Specifications and on Drawings.

END OF SECTION

SECTION 40 78 00
PANEL MOUNTED INSTRUMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Items specified in this Section shall conform to general requirements of Section 40 61 13.

B. Section includes control panel devices for Process Instrumentation and Control Systems.

1.02 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section.
2. Submit Product Data and Shop Drawings in one complete submittal package.
3. Partial submittals are not acceptable.

B. Product Data:

1. Catalog cuts and product specifications for devices specified.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for control devices specified.
2. Submit in accordance with Section 01 33 00.

D. Operation and Maintenance (O&M) Data:

1. Operating instructions and maintenance data for materials and products for inclusion in O&M Manual.
2. Manufacturer's written instructions for periodic test/calibration/cleaning for instrumentation and controls in service.
3. Submit in accordance with Section 01 33 00.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing instrumentation of types and capacities indicated that have record of successful in-service performance.

B. Devices shall be latest and most modern design at time of bidding.

C. As much as possible devices shall be products of one manufacturer to achieve standardization for maintenance, spare parts, operation, and service.

PART 2 – PRODUCTS

2.01 PILOT DEVICES

A. Manufacturer:

1. Allen Bradley 800T/800H.
2. Square D Class 9001, Type K.

3. No Substitute Permitted

B. Construction:

1. Heavy duty.
2. Watertight.
3. Oil-tight.
4. Flush panel mounting.
5. Size to mount in 30.5-mm diameter cutout.
6. Match NEMA rating of device with the installed location environmental classification.

C. Pushbuttons:

1. Flush head unless specified elsewhere.
2. Contact Blocks:

    a. Double break silver contacts.
    b. Ac Ratings: 7,200 va make, 720 va break.
    c. Single pole, single throw.
    d. Up to six tandem blocks.

3. Momentary contact unless specified elsewhere.
4. Non-illuminated.
5. Legend plates, as required, for type of operation or as specified elsewhere.

D. Emergency Stop:

1. Jumbo red mushroom head.
2. Contact Blocks:

    a. Double break silver contacts.
    b. Ac Ratings: 7,200va make, 720va break.
    c. Single pole, single throw.
    d. Up to six tandem blocks.

3. Push/pull.
4. Maintained contact.
5. Non-illuminated.
6. Legend plates:

    a. Extra large.
    b. Yellow.
    c. Round.

E. Selector Switches:

1. Maintained position unless specified elsewhere.
2. Contact Blocks:

    a. Double break silver contacts.
    b. Ac Ratings: 7,200va make, 720va break.
    c. Single pole, double throw or double pole, single throw.
    d. Up to six tandem blocks.

3. Operators:

a. Number of positions as specified elsewhere.
b. Standard knob type unless specified elsewhere.

4. Field mounted Local/Remote selector switches shall be provided with extra contact blocks for monitoring of “Remote” mode at the PLC.
5. Legend plates as required for type of operation or specified elsewhere.

F. Pilot Lights:

1. LED Lamp.
2. Transformer type.
3. Bayonet, 6Vac bulb.
4. Colored lens as specified elsewhere.
5. Interchangeable lenses.
6. Transformer rated for 120Vac
7. Push to test.
8. Legend plates as specified elsewhere.

2.02 SURGE PROTECTION DEVICES

A. Provided with the following features:

1. See 007 Series Drawings for circuit breaker disconnect size.
2. IEEE C62.41, selected to meet requirements for service entrance rating.
3. Protection modes and UL 1449, third edition or latest edition, clamping voltages coordinated with circuit system and circuit voltage.
4. Factory mounted with UL listed and labeled mounting device.
5. 200 kiloamp (kA) per phase surge current capacity minimum.
6. Door mounted diagnostic lights.
7. Audible alarm, with silencing switch, to indicate when protection has failed. Switch shall be accessible from outside of enclosure and not require enclosure door to be opened to access.
8. Replaceable modular design.
9. One Form C contact to indicate suppressor is operational.
10. Minimum of 10 year warranty

2.03 MOTOR STARTER CONTROL RELAYS

A. Manufacturer:

1. Square D.
2. Cutler-Hammer.
3. Or Equal

B. Construction:

1. Industrial type.
2. 300Vac rated.
3. Ac operation.
4. Used for operation of large motor starter coils or other 120Vac loads whose current requirements (continuous or inrush) exceed capacity of control relays listed below.
5. Overload protection module - load side.

a. Resettable

C. Operating data:

1. Pickup time: 11 ms maximum.
2. Dropout time: 6 ms maximum.

D. Coil:

1. Molded construction.
2. 120Vac, 60Hz.
3. Continuous rated.
4. 155va inrush, maximum.
5. 22va sealed, maximum.

E. Contacts:

1. Double break.
2. Silver alloy.
3. Convertible.
4. Color-coded to indicate status.
5. 60 amp make, 6 amp break (120Vac inductive).

F. DIN rail-mounting capability.

G. Accessories:

1. Add-on pole attachment.

a. 4 NO and 4 NC contacts.
b. Add-on to 0 to 4-pole relay.

2. Latch attachment.

2.04 CONTROL RELAYS

A. Manufacturer:

1. Allen Bradley
2. Potter and Brumfield.
3. Idec.
4. Magnecraft.
5. No Substitute Permitted

B. Operating Data:

1. Pickup Time: 13 ms maximum.
2. Dropout Time: 10 ms maximum.
3. Operating Temperature: -45°F to 150°F.

C. ac Coil:

1. 120Vac.
2. Continuous rated.
3. 3.5va inrush maximum.
4. 1.2va sealed, maximum.
5. 50-60 Hz.
6. Light to indicate energization.
7. Minimum Dropout Voltage: 10% of coil rated voltage.

D. dc Coil:

1. 24Vdc.
2. Continuous rated.
3. Light to indicate energization.
4. Minimum Coil Resistance:

a. 24Vdc: 450 Ω.

E. Contacts:

1. Gold flashed fine silver, gold diffused for 1 amp or less resistive load.
2. Silver cadmium oxide.
3. 3 form C.
4. 300Vac.
5. 10 amp make, 1.5 amp break, (inductive).

F. Rated at 10 million operations.

G. 11 pin, square socket.

H. DIN rail mountable.

I. Enclosed and protected by polycarbonate cover.

J. Visible indication of energized coil.

K. Provide relay-retaining clips.

2.05 TERMINAL BLOCKS

A. Manufacturer:

1. Phoenix Contact.
2. Weidmuller.
3. No Substitute Permitted

B. 300 v rating for 120 v circuits and below, 600 v rating for 480 v circuits.

C. Clamping screw type.

D. Isolating end caps for each terminal.

E. Identification on both terminals.

F. Clip-mounted on DIN rail.

G. Accepts AWG 12 to 22.

H. Feed-Through Terminals:

1. 20 Amp rating

I. Switched Terminals:

1. Knife disconnect with test sockets.
2. 10 Amp rating.

J. Fused Terminals:

1. Hinged fuse removal/disconnect.
2. 10 Amp rating.
3. Include blown fuse indication.

2.06 DC POWER SUPPLIES

A. Manufacturer:

1. Phoenix Contact
2. Sola/Hevi-Duty
3. Or Equal

B. General:

1. Power supply shall be fully enclosed, and provide screw terminations. All wiring points and plug connections shall be "touch safe" with no live voltages that can make contact with a misplaced finger in accordance with IEC 529. Housing shall be at IP20 or equal minimum.
2. Power Supplies shall have an efficiency of at least 80% with high efficiency models (~90%) available
3. The power shall have an MTBF (Mean Time Between Failures) greater than 500,000 hours according to IEC 1709.
4. The power supply shall be able to withstand shock of 30G in all space directions according to IEC 68-2-27 and vibration up to 2.3G 90 min. (<15hz, amplitude = +/-2.5mm/15-150hz) according to IEC 68-2-6.
5. Power supplies shall be UL-508A listed to allow the use of the power supply at full rated output amperage with no "de-rating".

C. Mounting:

1. All power supplies shall have integral metal mounting foot to attach to 35mm DIN-rail conforming to DIN EN50022.

D. Wire Connections:

1. Attach wires to the power supplies by means of a cable-clamping terminal block activated by a screw. Connections shall be gas-tight, and the terminal block shall be fabricated with non-ferrous, non-corrosive materials.
2. Wire connection for currents less than 20A shall use pluggable terminals on both input and output ends.
3. Pluggable terminals shall accept wire sizes 24 through 14 AWG.

E. Equipment:

1. Nominal current rating to be based on an operating temperature of 60°C or higher
2. Power supplies shall have a visible "DC Power OK" indicator. This indicator will flash when the output drops below 10% of the adjusted output voltage.
3. Ambient temperature range for operation shall be at least -25°C to +70°C
4. Residual ripple shall not exceed 100 mV peak to peak at nominal current values
5. Integral "fine" surge suppression shall be incorporated into the power supply
6. Power supplies shall conform to CE electromagnetic compatibility as described in EN61000-6-2 and EN 50081-2.

7. Power supplies shall have means of limiting DC current in case of short circuit or an overload and shall automatically reset themselves when the fault is corrected.
8. Power supplies when wired in parallel will not require external circuitry.
9. Power supplies shall have a voltage monitoring relay contact and signaling output.
10. Input must auto-range between 85 to 264VAC and 90 to 350VDC for 1 phase power supplies with no manual intervention.
11. Input must auto-range between 320 to 575VAC and 450 to 800VDC for 3 phase power supplies with no manual intervention.
12. Power supplies shall have a power factor of at least 0.6, with higher power factor models available as described by EN61000-3-2.

2.07 DATA OUTLET – FRONT PANEL

A. Manufacturer:

1. Grace Port
2. Hubbel
3. Automation Direct Zipport Series
4. Or equal

B. Features:

1. NEMA Rating to match panel
2. Flush Mount
3. Polycarbonate hinged cover
4. GFI outlet wired to convienace outlets in panel
5. RJ-style plug for each Vlan on network minimum
6. Include padlock provision

2.08 SURGE PROTECTORS

A. Manufacturer:

1. Islatrol - IE-100 series
2. SOLA STFE Elite Series.
3. Or Equal

B. High frequency noise filter/surge protector to protect control panel incoming power supply.

C. Wire to protect specified microprocessor based process control system devices including:

1. PLC
2. Ethernet Switches
3. HMI
4. Radio
5. Any other microprocessor based equipment located in or powered from PLC Panel.

D. Input power:

1. 120 or 240Vac, model dependant.
2. 47-63 Hz.

E. Peak surge current: Minimum 10,000 amp line-neutral, line to ground, and neutral to ground.

F. Frequency response:

1. Normal mode: 90 dB max, 100 kHz to 50 MHz.
2. Common mode: 60 dB max, 5 MHz to 50 MHz.

G. Response time:

1. < 0.5 ns normal mode.
2. <5 ns common mode.

H. Transient protection per IEEE C62.41:

1. Category A Ringwave (6kV, 200A, 100 MHz): < 60 V peak.
2. Category B Ringwave (6kV, 500A, 100 MHz): < 100 V peak.

I. LED status indicator.

J. Form C contact for remote status indication.

2.09 ETHERNET SURGE PROTECTORS

A. Manufacturer:

1. Emerson/Edco CAT6-5 POE Series
2. Phoenix Contact
3. Or Equal

B. Suitable for Category 5 and Category 6 Power over Ethernet applications.

C. Operating Voltage: 60 VDC

D. Clamping Voltage: 65 VDC

E. Operating Current: 300 mA

F. Peak Surge Current: 60 A (10 x 1000 1/4 second)

2.10 FLOAT MODE CONTROLLER

A. Manufacturer:

1. MoorE Industries – 532 ¼ DIN Auto/Manual Station

B. Mounting – Panel Mountable

C. General

1. Operates in Local or Auto/HOST Mode
2. In HOST mode controller passes signal from PLC to field device without degradation.
3. Switches to Local Mode upon Keypad selection, Digital input or Loss of Host Signal.
4. Generates Control Signal as either Last-In Value or predetermined Control Value.
5. Hot swappable without signal interruption.
6. Isolated Inputs and Outputs
7. Has Digital Display with Status indicators

2.11 INTRINSICALLY SAFE BARRIERS

A. Manufacturer:

1. PR Electronics
2. No substitutes

B. Intrinsically safe barrier located in safe area, allow intrinsically safe interface to devices located in Class I, Division 1 or 2, Group C or D hazardous (classified) locations per National Electrical Code ANSI/NFPA 70 (NEC).

C. Non-Zener Diode mode of protection

D. UL and CE listed, FM approved.

E. Operating temperature range -20 to 60 degrees F.

F. Supply voltage: 20–35 VDC.

G. DIN rail mounted.

H. Isolation: 250 V rms between safe and hazardous area terminals.

I. LED indication of operation status and malfunction.

J. Discrete Input

1. Suitable for monitoring of switch closure, NAMUR sensors.
2. Capable of line fault detection when specified, provide series and parallel resistors at switch location when line fault detection specified.
3. Safe area contact ratings: 125 VAC, 0.5 A, resistive.

K. Analog Input

1. Suitable for monitoring of 4-20 mAdc signals.
2. Safe area output: Isolated 4-20 mAdc, active or passive dependant on application.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install and wire in accordance with equipment/instrument manufacturer's written instructions, approved submittals, applicable requirements of the NEC, NEIS, and recognized industry practices.

END OF SECTION

This page intentionally left blank.

SECTION 40 79 00
MISCELLANEOUS INSTRUMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Items specified in this Section shall conform to general requirements of Section 40 61 13.

B. Section includes instrumentation and control devices for Process Instrumentation and Control Equipment.

1.02 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are not acceptable.

B. Product Data:

1. Catalog cuts and product specifications for instrumentation specified.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for instrumentation and control devices specified.
2. Submit in accordance with Section 01 33 00.

D. Operation and Maintenance (O&M) Data:

1. Operating instructions and maintenance data for materials and products for inclusion in O&M Manual.
2. Manufacturer's written instructions for periodic test/calibration/cleaning for instrumentation and controls in service.
3. Submit in accordance with Section 01 33 00.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms experienced in manufacturing instrumentation of types and capacities indicated that have record of successful in-service performance.

B. Items provided under this Section shall be listed or labeled by Underwriters Laboratories Inc. (UL) or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
2. Terms "listed" and "labeled" shall be as defined in National Electrical Code (NEC), Article 100.

PART 2 – PRODUCTS

2.01 (M32) INTRUSION PROXIMITY SWITCHES

A. Manufacturers:

1. Sentrol.
2. GE Interlogix.
3. ADT.
4. Or Equal

B. Proximity switch for monitoring of building or control panel door position.

C. Solid State Hall Effect sensor with magnetic actuating bar.

D. Switch shall be industrial grade. Inductive, tubular or barrel type switches are not acceptable.

E. Provide dry contact suitable for connection to PLC input. Use switch manufacturer's recommended switching relay/amplifier as necessary to affect proper interface. Relay/amplifier shall be installed in PLC panel.

PART 3 – **EXECUTION**

3.01 INSTALLATION

A. Install and wire in accordance with equipment/instrument manufacturer's written instructions, approved submittals, applicable requirements of the NEC, NEIS, and recognized industry practices.

B. Instrumentation transmitters, displays, and other indicators shall be orientated such that they are easily readable and accessible from operating locations.

END OF SECTION

DIVISION 43

PROCESS GAS AND LIQUID HANDLING EQUIPMENT

This page intentionally left blank.

SECTION 43 25 13
SUBMERSIBLE CENTRIFUGAL PUMPS

PART 1 – GENERAL

1.01 SUMMARY

A. System Supplier shall provide as a single functional system the pumps, controls, instrumentation, and electrical equipment as specified in this Section. System supplier shall be the System Integrator and Application Engineer for PLC provided as part of the package. Wireless radio, switch, and application engineering for City SCADA shall be provided by the City. System Supplier shall coordinate with the City for installation.

B. Section Includes:

1. Benton RWW Pump 1 and 2 (100-P-0101, -0102).
2. Greenfield RWW Pump 1 and 2 (200-P-0201, -0202).
3. Pump monitoring modules
4. Pump removal mechanism for each pump.
5. Reference Division 26 for electrical equipment.
6. Reference Division 40 for panel control components.
7. Station Control Panel:

    a. Benton Lift Station Control Panel (100-CP-1)
        i. Benton Lift Station PLC Panel (100-PLC-1)

    b. Greenfield Control Panel (200-CP-1)
        i. Greenfield Lift Station PLC Panel (200-CP-1)

C. Included in other Divisions:

1. Instrumentation per 40 70 00.

1.02 REFERENCES

A. ANSI: American National Standards Institute.

B. ASTM: American Society of Testing and Materials.

C. NEC: National Electrical Code.

D. NEMA: National Electrical Manufacturers Association.

1.03 SYSTEM DESCRIPTION

A. Design and Performance Requirements:

1. Pumping equipment shall comply with Submersible Centrifugal Pump Schedule(s) of this Section. Pumping equipment shall be able to operate continuously at the design operating point described in the Submersible Centrifugal Pump Schedule(s) of this Section.
2. Equipment shall be suitable for the pumping applications indicated in Submersible Centrifugal Pump Schedule(s).
3. Equipment shall be suitable for continuous operation at maximum fluid temperature of 104 degrees Fahrenheit (F) at all operating speeds specified and without external cooling fluid.
4. Motor horsepower of each pump shall be non-overloading throughout entire pump

performance curve.

5. Design motor for up to 15 evenly spaced starts per hour.
6. Pumps shall be capable of passing 3-inch diameter spherical solids.
7. Equipment shall be free from shock, vibration, cavitation, overheating, and noise while operating at specified conditions.
8. Motor housing shall be air filled to provide dissipation of heat, permanent bearing lubrication and prevent airborne moisture contamination.
9. Equipment shall be capable of continuous operation without damage while operating under load and unsubmerged.
10. Design equipment for continuous submergence under water without loss of watertight integrity to depth of 65-feet.
11. Design equipment for removal and reinstallation of pumps without need to enter wet well and without removal of fasteners.
12. Design pump removal guide mechanism and permanently mounted discharge connection elbow so no part of pump bears on wet well structure.
13. Connection of pump to permanently mounted discharge elbow shall not leak.
14. Design equipment so parts readily accessible for inspection and repair, easily duplicated and replaced, and suitable for service specified.
15. Entire pumping unit, including pump, motor and power cable assembly, monitoring equipment, and pump removal system shall be suitable for installation in Class I, Division 1, Group D hazardous classified locations as approved by Factory Mutual. Locations specified in Submersible Centrifugal Pump Schedule(s) of this Section.
16. Casing shall be end suction with centerline discharge.

B. Pump supplier to provide pump package including control panels of this Section and related control instrumentation and equipment of Division 40.

1.04 SUBMITTALS

A. General:

1. Submit Product Data in sufficient detail to confirm compliance with requirements of this Section. Submit Product Data and Shop Drawings in one complete submittal package. Partial submittals are unacceptable.

B. Product Data:

1. Catalog cuts and product specifications for submersible centrifugal pumps specified.
2. Motor data.
3. Coating systems. Submit in accordance with Section 09 96 00.

C. Shop Drawings:

1. Installation and assembly drawings and specifically prepared technical data for submersible centrifugal pumps.
2. Wiring Diagrams: Show power and control connections and distinguish between factory-installed and field-installed wiring.

D. Test Results:

1. Certified reports of manufacturers' factory production and final tests indicating compliance of submersible centrifugal equipment with referenced standards.
2. Certified reports of field tests and observations.
3. Pump supplier shall provide model tested station design to assure trouble-free pump operation.

E. Submit in accordance with Section 01 33 00.

F. Operation and Maintenance (O&M) Data:

1. Operating instructions and maintenance data for materials and products for inclusion in O&M Manual.
2. Manufacturer's written instructions for periodic tests of submersible centrifugal equipment in service.
3. Submit in accordance with Section 01 33 00.

G. Submit Instructional Services information in accordance with Section 01 61 00.

1.05 SOURCE QUALITY CONTROL

A. Factory Certified Performance Test(s):

1. Perform on each pump in accordance with test requirements of Hydraulic Institute (HI14.6 – Grade 2B).
2. Determine capacity, head, brake horsepower and hydraulic efficiency.
3. Test each pump at minimum of 6 points including shutoff, at rated capacity specified, and at flow rate greater than maximum capacity specified in Submersible Centrifugal Pump Schedule(s).
4. Prepare and submit certified performance curves.
5. Test actual assembled pumps to be provided. Results of prior tests on similar or identical pumps are not acceptable.

B. Factory Certified Hydrostatic Test(s):

1. Perform on each pump.
2. Minimum test pressure shall be 1.5 times pump shutoff head.
3. Prepare and submit report of results.
4. Test actual assembled pumps to be provided. Results of prior tests on similar or identical pumps are not acceptable.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver submersible centrifugal pumps and system components to their final locations in protective wrappings, containers, and other protection that will exclude dirt and moisture and prevent damage from construction operations. Remove protection only after equipment is made safe from such hazards.

B. Store submersible centrifugal pumps in clean, dry location.

C. Manufacturer shall define the requirements to properly protect the equipment and parts shipped to the job site.

1.07 MAINTENANCE

A. Extra Materials:

1. Furnish extra materials matching products installed, as described below, packaged with protective covering for storage, and identified with labels describing contents.

a. One set of bearings for each pump model.
b. One mechanical seal set for each pump model.

c. One gasket set complete for each pump model.

2. Provide special tools required for checking, testing, parts replacement, and maintenance.
3. Spare parts shall be suitably packaged and labeled with the name and number of the equipment to which they belong.

PART 2 – PRODUCTS

2.01 SYSTEM SUPPLIER

A. Metropolitan Pump

B. Gasvoda

C. Or Equal

2.02 PUMP MANUFACTURERS

A. Flygt.

B. Barnes

C. Wilo.

D. Grundfos

E. KSB

2.03 MATERIALS

A. Suitable for application specified in Submersible Centrifugal Pump Schedule(s) of this Section and as specified below:

1. Pump case: Cast iron, ASTM A-48, Class 35B C.I.
2. Motor housing: Cast iron, ASTM A-48, Class 35B C.I.
3. Impeller: ASTM A-532 (Alloy III A) 25% chrome cast iron.
4. Seal housing: Cast iron, ASTM A-48, Class 35B C.I.
5. Discharge base elbow: Cast iron, ASTM A-48, Class 35B C.I.
6. Pump/motor shaft: ASTM A479 S43100T or A276 Type 420 Stainless Steel
7. O-rings: Viton or NBR.
8. Fasteners: Stainless steel, ASTM A276, Type 316.
9. Lower seal faces: Tungsten-carbide (rotating seal ring) versus Tungsten-carbide.
10. Upper seal faces: Silicon or Tungsten-carbide (rotating seal ring) versus Tungsten-carbide.
11. Guide rails and brackets: Stainless steel, ASTM A276, Type 316.
12. Lift chain or cable: Stainless steel, Type 316 Stainless Steel.
13. Power/control cable: chloropene rubber or neoprene.
14. Anchor bolts: Stainless steel, ASTM A276, Type 316. See Section 05 50 00.

2.04 PUMP FABRICATION

A. General:

1. Provide metal-to-metal contact machined surfaces.
2. Machine and fit mating surfaces with O-rings where watertight sealing is required. All mating surfaces shall be flame proof joints with special labyrinth joint to prevent flame or

spark travel to pumped media.
3. Rectangular cross sectioned gaskets, elliptical O-rings, grease, or secondary sealing compounds are not acceptable.
4. Pump with attached rail guides and discharge sealing flange.

B. “N” Impeller (Flygt):

1. Non-clog type, semi-open, multi-vane, back swept design passing minimum spherical solid size specified in Submersible Centrifugal Pump Schedule(s) of this Section.
2. Impeller design shall handle solids, fibrous materials, heavy sludge, rag-laden and other matter found in waste water.
3. Leading edges shall be mechanically self-cleaned upon each rotation across a spiral groove located on volute bottom.
4. The volute shall have replaceable suction cover insert ring which is cast spiral-shaped, sharp-edged grooves, insert ring shall be ASTM A-532 (Alloy III A) 25% chrome cast iron.
5. Internal volute bottom shall provide effective sealing between pump volute and impeller.
6. Sharp spiral grooves shall provide shearing edges across which each impeller vane leading edge shall cross during its rotation in order to remain unobstructed.
7. Clearance between internal volute bottom and impeller leading edges shall be adjustable.
8. Impeller vanes shall have screw-shaped leading edges hardened to Rockwell (Rc) 45.
9. Balance statically and dynamically.
10. Impellers shall be locked to the shaft.
11. All impellers shall be coated with an alkyd resin primer.

C. Impeller (Others):

1. Non-clog type, multi-vane, passing minimum spherical solid size specified in Submersible Centrifugal Pump Schedule(s) of this Section.
2. Impeller design shall handle solids, fibrous materials, heavy sludge, rag-laden and other matter found in waste water.
3. Balance statically and dynamically.
4. Impellers shall be keyed to the shaft.
5. All impellers shall be coated with wear resistant coating.
6. Impeller wear rings shall be stainless steel. Casing wear rings shall be hardened stainless steel to 45 Rockwell.

D. Shaft:

1. Provide common pump/motor shaft. Pump shaft shall be extension of motor shaft. Pump shaft and motor shaft with connection coupling is not acceptable.

E. Shaft Seals:

1. Provide 2 totally independent mechanical seals each with its own independent spring system, installed in tandem, with an oil chamber between seals.
2. Provide 1 stationary and 1 positively driven rotating seal ring for each seal.
3. Easily inspected and replaced.
4. Shall not require maintenance or adjustment.
5. Shall not depend on direction of rotation for sealing.
6. Shall not rely on pumped media for sealing.
7. Lower seal shall be replaceable without disassembly of seal chamber or use of special tools.
8. Pump-out vanes shall be present on backside of impeller to keep contaminants out of seal area.
9. Provide seal leak detection probe in motor housing.
10. Provide drain and inspection plug with positive anti-leak seal easily accessible external to

pump.

F. Bearings:

1. Heavy-duty single row to provide minimum L-10 life of 100,000 hours at axial and radial loadings while operating at specified operating conditions.

G. Motor:

1. Horsepower as specified in Submersible Centrifugal Pump Schedule(s) of this Section.
2. 460v, 3-ph, 60 Hz.
3. 1.15 minimum service factor per NEMA Standards.
4. Inverter Duty Rated; NEMA MG Part 31.
5. Moisture resistant, Class H insulation rated for 180 degrees Celsius (C).
6. Use trickle impregnation method using Class F monomer-free polyester to fill voids in windings. Shall meet 95 percent fill factor. Multiple step dip and bake-type stator insulation process is not acceptable.
7. Explosion proof rated for Class I, Division 1 or 2 area where specified in Submersible Centrifugal Pump Schedule(s) in this Section.
8. Suitable for continuous operation at 40 degrees C over ambient temperature.

H. Cooling system: Provide motor cooling to comply with design and performance requirements.

I. Power/Control Cable:

1. Size in conformance with National Electric Code (NEC) standards.
2. Provide watertight cable entry seal to comply with design and performance requirements.
3. Provide length to connect to splice box without splicing.

2.05 PUMP MONITORING MODULES

A. Pump monitoring modules and sockets to be installed by systems integrator on 100-CP-1 and 200-CP-1 under Division 40 of the Project Documents for all pumps listed in the Submersible Centrifugal Pump Schedule(s) of this Section.

B. Pump monitor shall provide dual function monitoring for both over-temperature via bi-metal, thermistor, or RTD sensor and seal failure via moisture sensor or float switch. Only low-voltage leakage system allowed.

C. Each module shall provide dual color (red/green) light-emitting diodes (LED) for alarm status (one for each fault indication), power LED as well as Test and Reset push buttons.

D. Module shall provide independent 100 ma, 24 Volt AC or 5 amps, 120 Volt AC rated Form C outputs for both over-temperature and seal failure. Module shall have a 24 Volt AC or 24-240 Volt AC input power range, a 2.8 watt power consumption, and shall be UL approved.

2.06 PUMP REMOVAL SYSTEM

A. Guide system - Provide two Type 316 stainless steel guide rails, upper and intermediate guide brackets as recommended by pump manufacturer for connecting rail(s) to structure, and slide bracket for connecting pump to guide rail(s). Guide cables in lieu of guide rails are not acceptable.

1. Guide rail diameter and thickness as recommended by pump manufacturer.
2. Provide upper guide rail bracket with integral hooks on both sides of guide plate that fastens

to structure.
3. Contractor to verify elevations during submittal process.

B. Discharge base elbow:

1. Provide for automatic, leak-tight connection to pump discharge.
2. ANSI B16.1 Class 125 flange for connection to piping.
3. Provide for connection of guide rails.

C. Lifting system: Furnish pump lifting-chain positive-recovery system consisting of the following:

1. Provide Grip-Eye System or equal for each pump.
2. Provide high tensile strength proof-tested Type 316 stainless steel chain, minimum 10 links, of required capacity to lift pump. Connect short-length of lifting chain to lifting bail of submersible pump.
3. Provide length of Type 316 Stainless Steel guide cable (wire-rope) connected to short-length of lifting chain to extend min. 5-feet beyond top of wet well.

a. Guide cable shall be suitably sized to support chain and length of cable hanging.
b. Connecting link between guide cable and chain shall be sized to allow grip-eye to slip over to access chain links.
c. Ends of cable shall not be frayed. Weld or epoxy ends to prevent fraying.
d. Contractor shall coil additional length at top of wet well and use Type 316 stainless steel wire to hold coil shape.
e. If no hooks are provided with upper guide bracket, Contractor shall provide Type 316 stainless steel hook at top of wet well from which to hang guide cable. Type 316 stainless steel wire tie coil to hook.
f. At free end of guide cable attach plastic tag or stainless steel tag with the words “NOT FOR LIFTING PUMP” stamped into tag. Grip-Eye shall be able to slip over attached tag without interference.

4. Furnish forged Grip-Eye of stainless steel, provided separately to connect to the end of the lifting cable or chain of Owner’s pump lifting device.
5. Grip-Eye shall be sized per pump manufacturer’s recommendation.
6. Provide miscellaneous hardware for installation, including shackles to connect short-length of lift chain to pump lifting bail and link to connect short-length of lift chain to guide cable. Material: Type 316 Stainless Steel.

D. Provide anchor bolts in compliance with pump manufacturer’s requirements and Section 05 50 00.

2.07 COATINGS

A. Provide in accordance with Section 09 96 00 unless specified otherwise in this Section.

B. Manufacturer is responsible for surface preparation, prime coat, second, and third coat of equipment in the factory prior to shipment unless otherwise noted.

C. Contractor shall be responsible for touchup and any additional specified coatings.

D. Stainless steel, bronze, and nonmetallic surfaces shall not be coated.

E. Coat machined or bearing surfaces and holes with protective grease.

2.08 CONTROLS

A. Benton Lift Station

1. The lift station will have two constant speed submersible centrifugal pumps, one duty one standby. The duty/standby equipment will be rotated based on: runtime hours, on-off cycles, day of the week, or manual selection. Failure of the duty pump shall cause the standby pump to become the duty pump. A radar sensor in the wet well will monitor the level for pump control. In addition, a float mode backup system shall be included as a secondary means of pump control.

B. Greenfield Lift Station

1. The lift station will have two constant speed submersible centrifugal pumps, one duty one standby. The duty/standby equipment will be rotated based on: runtime hours, on-off cycles, day of the week, or manual selection. Failure of the duty pump shall cause the standby pump to become the duty pump. A radar sensor in the wet well will monitor the level for pump control. In addition, a float mode backup system shall be included as a secondary means of pump control.

C. System Supplier to provide instrumentation per 40 70 00.

2.09 STATION CONTROL PANELS

A. General

1. Enclosure:

a. Refer to Space Environment and Hazardous Ratings Schedule on Drawings for determination of the Exposure type of each space in which enclosures are to be installed. Refer to Material Schedule on Drawings for materials to be utilized within each Exposure type. Enclosures shall conform to the NEMA ratings given on the drawings and specified herein.
b. In addition to NEMA standards, conform to the following requirements:

i. Minimum metal thickness: 14 Ga.
ii. Indoor enclosures: equip with rubber-gasketed doors with continuous metal hinges. Equip doors with 3-point lockable latches.
iii. Exterior enclosures: equip with hinged dead-front inner doors and rubber-gasketed, continuous metal hinged outer weather doors. Equip weather doors with toggle style door clamps.
iv. Equip exterior enclosures with thermostatically controlled heaters capable of maintaining internal panel temperature of 50°F with 20mph wind at ambient temperature of -20°F. Heater shall operate at 120Vac, 60Hz power.
v. NEMA 4X enclosures shall be furnished with door gaskets.
vi. NEMA 7 enclosures located in wet or exterior locations as noted on the Drawings shall be provided with an O-ring or gasket for the cover to prevent water entry.
vii. Size to adequately dissipate heat generated by equipment mounted in or on panel.

2.10 BENTON LIFT STATION

A. Benton Lift Station Control Panel (100-CP-1)

1. Features

a. Outdoor Enclosure - NEMA 3R Stainless, Lockable.
b. Service Rated Enclosure 480VAC.
c. Free Standing, Minimum 20” Air Gap clearance.

i. See mounting detail N181on drawing 999-N-1.

d. Dimensions (Nominal): 72”H x 72”W x 20”D
e. 480 VAC Power.
f. Generator Receptacle, Lockable.

2. Door Mounted Devices

a. None.

3. Interior Panel Mounted Devices

a. Main Circuit Breaker Disconnect – Shall be mechanically interlocked with portable generator receptacle.
b. Portable Generator Circuit Breaker Disconnect – Shall be mechanically interlocked with main circuit breaker disconnect.
c. Surge Protection Device:

1) Provide with dedicated circuit breaker disconnecting means to isolate device from system without interrupting service.
2) Protection modes and UL 1449, third edition or latest edition, clamping voltages coordinated with circuit system and circuit voltage.
3) Factory mounted with UL listed and labeled mounting device.
4) Form C relay contact for failure notification.
5) 100 kiloamp (kA) per phase surge current capacity minimum.
6) Door mounted diagnostic lights.
7) Audible alarm, with silencing switch, to indicate when protection has failed. Switch shall be accessible from outside of enclosure and not require enclosure door to be opened to access.
8) Surge counter with reset button.
9) Replaceable modular design.
10) Minimum of 10 year warranty.

d. 480VAC Distribution Block
e. 480-120/240VAC Power Transformer
f. 480/120VAC Control Power Transformer
g. Flow Meter Transmitter.
h. Panel Light
i. Station PLC Panel (see below)
j. See 007 Series Drawings for additional requirements.

B. Benton Lift Station PLC Panel (100-PLC-1)

1. Features

a. Interior Enclosure, NEMA 12.
b. 480VAC main power.
c. Wall Mountable
d. Dimensions (Approximate): 48”H x 36”W x 14”D

2. Door Mounted Devices

a. OIT 7”
b. Phase Fail Pilot Light
c. Pump 1 Run Hand-Off-Auto Selector Switch (x2)
d. Pump 1 Run Pilot Light (x2)
e. Pump 1 HI Temp/ Overload Pilot Light (x2)
f. Pump 1 Seal Fail Pilot Light (x2)
g. Pump 1 Elapsed Time Meter (x2)

3. Interior Panel Mounted Devices.

a. Main Breaker
b. Surge Protection Device
c. Phase monitors.
d. Pump Circuit Breakers
e. 480VAC Distribution Block
f. Motor Starters with overload relays.
g. Allen Bradley Micrio1400 PLC.
h. Line Filter.
i. 24VDC Power Supply.
j. 12VDC power Supply
k. Intrinsically Safe Barriers.
l. Relays and Timers (as required).
m. RWW Pump Motor Protection Relay.
n. Cooling fan with thermostat (as required).
o. Panel Heater.

4. Provide panel space to allow for mounting of network switch and cellular modem (provided under separate contract).

C. PLC I/O signals

a. Provide in accordance with Section 40 61 93.

2.11 GREENFIELD LIFT STATION

A. Greenfield Lift Station Control Panel (200-CP-1)

1. Features

a. Outdoor Enclosure - NEMA 3R Stainless, Lockable.
b. Service Rated Enclosure 277/480VAC.
c. Free Standing, Minimum 20” Air Gap clearance.

i. See mounting detail N181on drawing 999-N-1.

d. Dimensions (Nominal): 72”H x 72”W x 20”D
e. 480 VAC Power.
f. Generator Receptacle, Lockable.

2. Door Mounted Devices

a. None.

3. Interior Panel Mounted Devices

a. Main Circuit Breaker Disconnect
b. Surge Protection Device:

1) Provide with dedicated circuit breaker disconnecting means to isolate device from system without interrupting service.
2) Protection modes and UL 1449, third edition or latest edition, clamping voltages coordinated with circuit system and circuit voltage.
3) Factory mounted with UL listed and labeled mounting device.
4) Form C relay contact for failure notification.
5) 100 kiloamp (kA) per phase surge current capacity minimum.
6) Door mounted diagnostic lights.
7) Audible alarm, with silencing switch, to indicate when protection has failed. Switch shall be accessible from outside of enclosure and not require enclosure door to be opened to access.
8) Surge counter with reset button.
9) Replaceable modular design.
10) Minimum of 10 year warranty.

c. 480VAC Distribution Block
d. 480-120/240VAC Power Transformer
e. 480/120VAC Control Power Transformer
f. Flow Meter Transmitter.
g. Panel Light
h. Station PLC Panel (see below)
i. See 007 Series Drawings for additional requirements.

B. Greenfield Automatic Transfer Switch (200-ATS-1)

1. See Section 26 36 00.

C. Greenfield Lift Station PLC Panel (200-PLC-1)

1. Features

a. Interior Enclosure, NEMA 12.
b. 480VAC main power.
c. Wall Mountable
d. Dimensions (Approximate): 48”H x 36”W x 14”D

2. Door Mounted Devices

a. OIT 7”
b. Phase Fail Pilot Light
c. Pump 1 Run Hand-Off-Auto Selector Switch (x2)
d. Pump 1 Run Pilot Light (x2)
e. Pump 1 HI Temp/ Overload Pilot Light (x2)
f. Pump 1 Seal Fail Pilot Light (x2)
g. Pump 1 Elapsed Time Meter (x2)

3. Interior Panel Mounted Devices.

a. Main Breaker
b. Surge Protection Device
c. Phase monitors.
d. Pump Circuit Breakers

e. 480VAC Distribution Block
f. Motor Starters with overload relays.
g. Allen Bradley Micrio1400 PLC.
h. Line Filter.
i. 24VDC Power Supply.
j. 12VDC power Supply
k. Intrinsically Safe Barriers.
l. Relays and Timers (as required).
m. RWW Pump Motor Protection Relay.
n. Cooling fan with thermostat (as required).
o. Panel Heater.

4. Provide panel space to allow for mounting of network switch and cellular modem (provided under separate contract).

D. PLC I/O signals

1. Provide in accordance with Section 40 61 93.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install submersible centrifugal pumps in accordance with manufacturer's written instructions.

3.02 IDENTIFICATION

A. Provide equipment identification marker complete with equipment name and tag number in accordance with Section 40 05 97. Coordinate field location with Engineer.

3.03 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:

1. Supplier's or manufacturer's representative for equipment specified herein shall be present at jobsite or classroom designated by Owner for man-days indicated, travel time excluded, for assistance during plant construction, plant startup, and training of Owner's personnel for plant operation. Include:

a. Benton Lift Station

i. 1 workdays for Installation Services.
ii. 1/2 workday for Instructional Services.
iii. 1/2 workday for Post Startup Services.

b. Greenfield Lift Station

i. 1 workdays for Installation Services.
ii. 1/2 workday for Instructional Services.
iii. 1/2 workday for Post Startup Services

2. In addition to the services specified above, provide manufacturer’s services as required to successfully complete systems demonstration as specified in Section 01 79 10.

SCHEDULE 1 TO SECTION 43 25 13
BENTON LIFT STATION PUMPS

Name of Pump(s)	RWW Pump 1 and 2
Tag Number(s)	100-P-0101 and -0102
Fluid Pumped	Raw Wastewater
Suction and Discharge Size	3 inch
Submerged or Dry Pit Installation	Submerged
Motor	460 volt, 3-phase, 60 Hertz
Motor Horsepower	3
Full Load Amps	4.3
Maximum RPM	1,800
Constant Speed or Variable Frequency Drive	Constant Speed
Hazardous Classification	Class I, Division 1, Group D
Design Operating Point 1 (Design Operating Condition)- HI 2B Rating	
Capacity (gpm)	170
Head (ft)	21
Minimum Efficiency	47
Operating Point 2 (Maximum Operating Condition)	
Capacity (gpm)	540
Head (ft)	8
Operating Point - Shut-off	
Capacity (gpm)	0
Minimum Head (ft)	32

Note: Items listed above including horsepower and sizing is for “A” manufacturer. If another manufacturer requires higher horsepower, Contractor shall provide at no additional cost all electrical changes and motor.

SCHEDULE 2 TO SECTION 43 25 13
GREENFIELD LIFT STATION PUMPS

Name of Pump(s)	RWW Pump 1 and 2
Tag Number(s)	200-P-0201 and -0202
Fluid Pumped	Raw Wastewater
Suction and Discharge Size	3 inch
Submerged or Dry Pit Installation	Submerged
Motor	460 volt, 3-phase, 60 Hertz
Motor Horsepower	7.5
Full Load Amps	8.2
Maximum RPM	3,440
Constant Speed or Variable Frequency Drive	Constant Speed
Hazardous Classification	Class I, Division 1, Group D
Design Operating Point 1 (Design Operating Condition)-HI 2B Rating	
Capacity (gpm)	110
Head (ft)	77
Minimum Efficiency	36
Operating Point 2 (Maximum Operating Condition)	
Capacity (gpm)	460
Head (ft)	8
Operating Point - Shut-off	
Capacity (gpm)	0
Minimum Head (ft)	101

Note: Items listed above including horsepower and sizing is for “A” manufacturer. If another manufacturer requires higher horsepower, Contractor shall provide at no additional cost all electrical changes and motor.

END OF SECTION

APPENDIX A

Geotechnical Borings

This page intentionally left blank.



LEGEND

SB-1 APPROXIMATE BORING LOCATION

PROJECT LOCATION

N

VICINITY MAP
SCALE: NONE



NO	DATE	REVISIONS	BY

DRAWN SW
DESIGNED SW
APPROVED CWG

SEECO Consultants, Inc.
7350 Duvan Drive, Tinley Park, Illinois 60477
OFFICE: (708) 429-1666 FAX: (708) 429-1689

CLIENT: The City of Joliet

PROJECT NAME AND LOCATION: Rowell Ave. New Sanitary Sewer, Joliet, IL

BORING LOCATION PLAN

DATE 9/12/2022
SCALE NONE
JOB NO. 13120G

SHEET 1 OF 2

BORING LOG

CLIENT: City of Joliet

PROJECT: 2023 Rowell Ave. New Sanitary Force Main

ENGINEER: City of Joliet

LOCATION: Joliet, IL

BORING NUMBER: SB-1

APPROX. SURFACE ELEVATION (M.S.L.): +/-

STATION:

OFFSET from CL:

DEPTH ELEVATION	SAMPLE NO.	SAMPLER TYPE	SAMPLE REC. (%)	DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)	OVM ppm
		HS		FILL: 24" CRUSHED STONE, Light Gray, Dry	
	1A	SS	78		0
	1B			FILL: SILTY CLAY, Brown, Trace Dark Brown, Trace Sand and Gravel, Stiff, Moist (A-6)	0
2.5		HS			
	2	SS	67	SANDY CLAY, Brown, Trace Gravel, Stiff, Moist (A-6)	0
5.0		HS			
	3	SS	72	SILTY CLAY, Brown, Trace Gray, Trace Reddish Brown, Trace Sand and Gravel, Very Stiff, Moist (A-6)	0
7.5		HS			
	4	SS	56	CLAY, Brown, Trace Gravel, Stiff, Moist (A-6)	0
10.0		HS			
	5	SS	89	CLAY, Brown, Trace Gray, Trace Sand and Gravel, Very Stiff, Moist (A-6)	0
12.5		HS			
	6	SS	83		0
15.0		HS			
	7	SS	44	SAND, Brown, And Gravel, Medium Dense, Moist to Dry (A-3)	0
17.5		HS			
	8A	SS	44		0
	8B			APPARENT DOLOMITE LIMESTONE BEDROCK, Light Gray, Weathered	0

Unconfined Compressive Strength, Tons/Ft.^{2}: 1 2 3 4 5

PL MC LL

STD "N" PENETRATION BLOWS PER FT.: 10 20 30 40 50

REMARKS: 110 /12" Refusal

⊗ Calibrated Penetrometer Unconfined Compression

Water Level Observations		
W.L.		
W.L.	Dry WS/WD	Dry ACR
W.L.		

SEECO Consultants, Inc.
7350 Duvan Drive, Tinley Park, IL 60477

Approved: CWG | Job No.: 13120G

Boring Started	9/19/22		
Boring Completed	9/19/22		
Driller	EN	Rig	D-50
Drawn By	SW	Sheet	1 of 2

BORING LOG

CLIENT **City of Joliet**

PROJECT **2023 Rowell Ave.New Sanitary Force Main**

OWNER **City of Joliet**

LOCATION **Joliet, IL**

BORING NUMBER **SB-1**

SURFACE ELEVATION

N | E

DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)

DEPTH ELEVATION	SAMPLE NO.	SAMPLER TYPE	SAMPLE REC. (%)	SOIL GRAPHIC LOG	OVM ppm	Unconfined Compressive Strength, Tons/Ft.^{2} / STD "N" PENETRATION BLOWS PER FT.	REMARKS
22.5		HS					
	9	SS	6		0	100	SPT N=100 Blows/1" Refusal
25.0		HS					

End of Boring at 25 Feet

Note:

1. The apparent top of weathered dolomitic limestone bedrock is approximately 19 feet below the existing grade level and the apparent top ofsolid dolomitic limestone bedrock is approximately25 feet below the existing grade due to hollow stem auger refusal

2. All soil samples were screened with aMiniRae300 OVM photo-ionization detector (PID)and by utilizing olfactory senses. No petroleumodors were detected in all samples and all PID = 0ppm.

Unconfined Compressive Strength, Tons/Ft.^{2}: 1 2 3 4 5

PL MC LL

STD "N" PENETRATION BLOWS PER FT.: 10 20 30 40 50

Calibrated Penetrometer Unconfined Compression

BORING LOG

CLIENT **City of Joliet**

PROJECT **2023 Rowell Ave. New Sanitary Force Main**

OWNER **City of Joliet**

LOCATION **Joliet, IL**

BORING NUMBER **SB-2**

APPROX. SURFACE ELEVATION (M.S.L.) +/-

STATION | OFFSET from CL

DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)

Unconfined Compressive Strength, Tons/Ft.^{2} (1, 2, 3, 4, 5)

PL | MC | LL

STD "N" PENETRATION BLOWS PER FT. (10, 20, 30, 40, 50)

DEPTH ELEVATION	SAMPLE NO.	SAMPLER TYPE	SAMPLE REC. (%)	SOIL GRAPHIC LOG	DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)	OVM ppm	REMARKS
		HS			FILL: CLAY, Dark Brown and Black, Trace Brown		
	1	SS	67		FILL: CLAY, Dark Brown, Trace Black, Trace Brown, Trace Sand and Gravel, Trace Roots, Very Stiff, Wet (A-4)	0	
2.5		HS					
	2	SS	56			0	
5.0		HS					
	3	SS	78		CLAY, Brown and Gray, Trace Reddish Brown, Trace Sand and Gravel, Stiff, Moist (A-6)	0	
7.5		HS					
	4	SS	83		SILTY CLAY, Brown, Trace Reddish Brown, Trace Sand and Gravel, Trace Shale, Medium, Moist (A-6)	0	
10.0		HS					
	5	SS	50		CLAY, Brown and Gray, Trace Sand and Gravel, Hard, Moist (A-6)	0	ACR
12.5		HS					
	6	SS	89			0	
15.0		HS					
	7	SS	39		CLAY, Brown and Gray, Trace Sand and Gravel, Medium, Saturated (A-6)	0	WS
17.5		HS					
	8	SS	72		CLAY, Gray, Trace Sand and Gravel, Very Stiff to Hard, Saturated (A-6)	0	

⊗ Calibrated Penetrometer Unconfined Compression

Water Level Observations		
W.L.		
W.L.	16' WS	11' ACR
W.L.		

SEECO Consultants, Inc.
7350 Duvan Drive, Tinley Park, IL 60477

Approved CWG | Job No. 13120G

Boring Started	9/26/22
Boring Completed	9/26/22
Driller EN	Rig D-50
Drawn By SW	Sheet 1 of 2

BORING LOG

CLIENT **City of Joliet**

PROJECT **2023 Rowell Ave. New Sanitary Force Main**

OWNER **City of Joliet**

LOCATION **Joliet, IL**

BORING NUMBER **SB-2**

SURFACE ELEVATION

N | E

DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)

DEPTH ELEVATION	SAMPLE NO.	SAMPLER TYPE	SAMPLE REC. (%)	SOIL GRAPHIC LOG	OVM ppm	REMARKS
22.5		HS				
	9	SS	75		0	
25.0						
27.5						
30.0						
32.5						
35.0						
37.5						
40.0						

End of Boring at 25 Feet

Note:

1. Boring offset 35 feet south of orignial location due to the underground lines

2. All soil samples were screened with aMiniRae300 OVM photo-ionization detector (PID)and by utilizing olfactory senses. No petroleumodors were detected in all samples and all PID = 0ppm.

Unconfined Compressive Strength, Tons/Ft.^{2}

1 2 3 4 5

PL MC LL

STD "N" PENETRATION BLOWS PER FT.

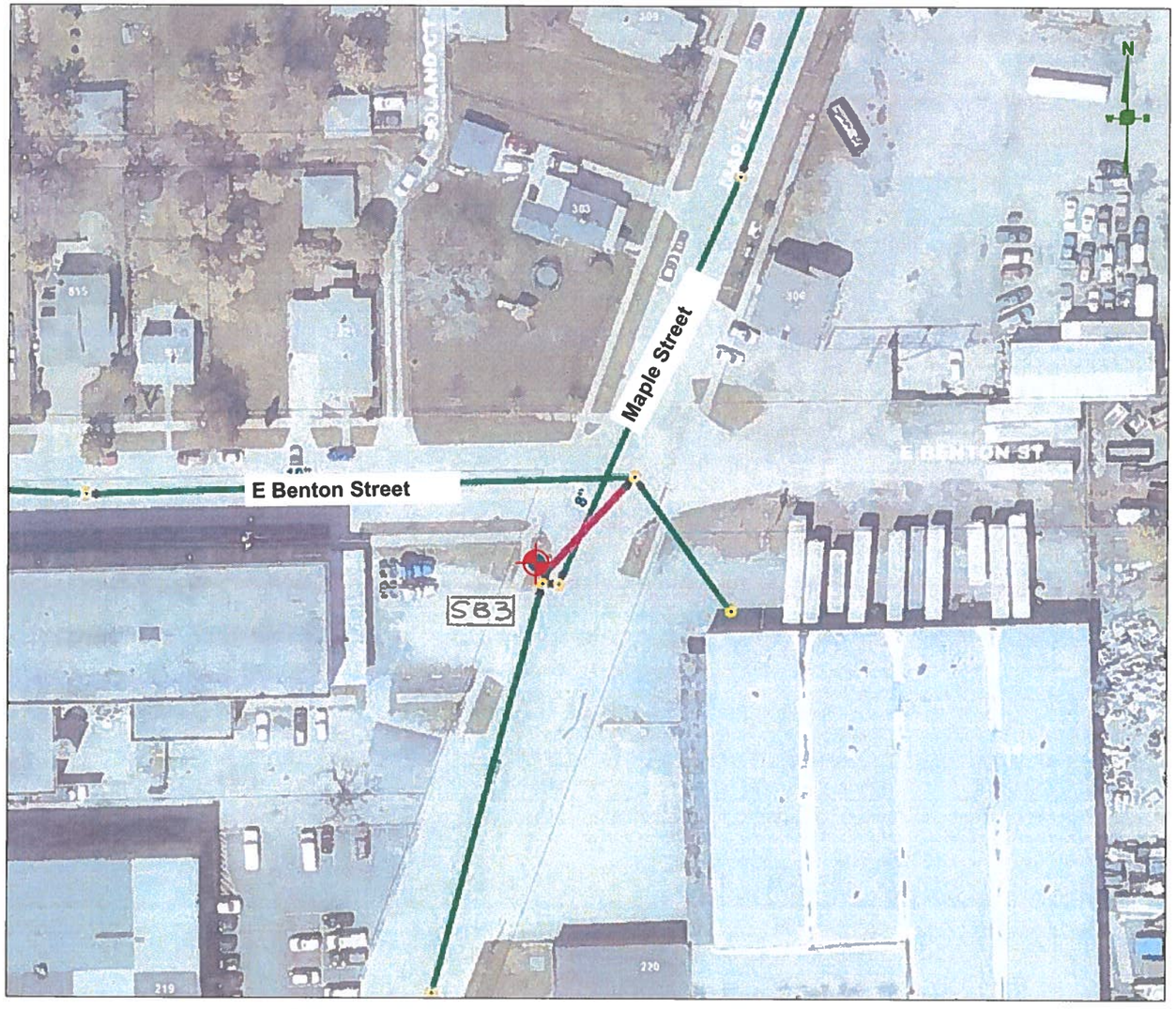
10 20 30 40 50

⊖ Calibrated Penetrometer Unconfined Compression

SEECO Consultants, Inc.

Job No. **13120G**

Sheet **2 of 2**



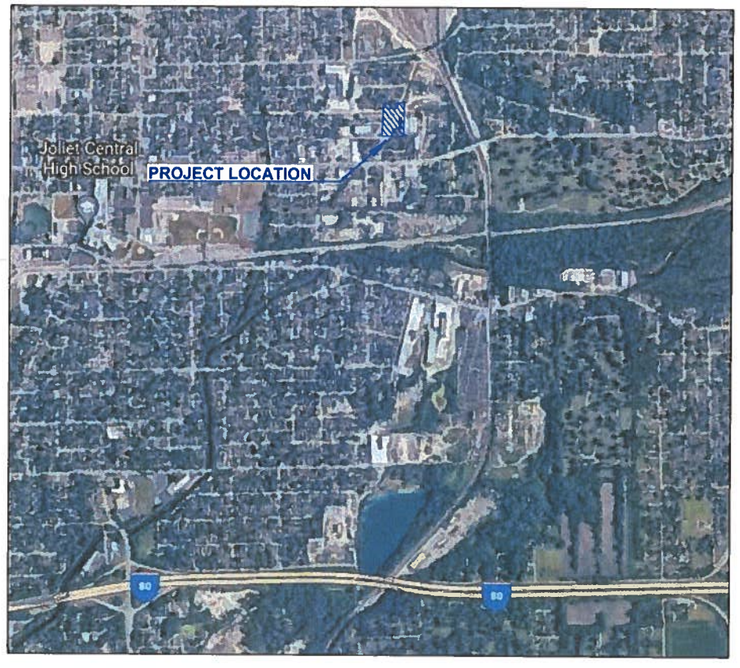
LEGEND

SB-3 APPROXIMATE BORING LOCATION

PROJECT LOCATION



VICINITY MAP
SCALE: NONE



NO	DATE	REVISIONS	BY

DRAWN SW
DESIGNED SW
APPROVED CWG

SEECO Consultants, Inc.
7350 Duvan Drive, Tinley Park, Illinois 60477
OFFICE: (708) 429-1666 FAX: (708) 429-1689

CLIENT: The City of Joliet

PROJECT NAME AND LOCATION: Maple St. New Sanitary Sewer, Joliet, IL

BORING LOCATION PLAN

DATE 9/12/2022
SCALE NONE
JOB NO. 13120G

SHEET 2 OF 2

BORING LOG

CLIENT: City of Joliet
PROJECT: 2023 Maple St. New Sanitary Sewer Lift Station
OWNER: City of Joliet
LOCATION: Joliet, IL

BORING NUMBER: SB-3
APPROX. SURFACE ELEVATION (M.S.L.): +/-
STATION:
OFFSET from CL:
DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)

Unconfined Compressive Strength, Tons/Ft.^{2}: 1 2 3 4 5
PL MC LL
STD "N" PENETRATION BLOWS PER FT.: 10 20 30 40 50

DEPTH ELEVATION	SAMPLE NO.	SAMPLER TYPE	SAMPLE REC. (%)	SOIL GRAPHIC LOG	DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)	OVM ppm	REMARKS
		HS			7.5" BITUMINOUS CONCRETE PAVEMENT		
					4.5" CRUSHED STONE		
	1	SS	56		FILL: SAND, Light Brown and Brown, Contain Crushed Stone, Dense, Dry (A-3)	0	
2.5		HS					
	2	SS	44			0	
5.0		HS					
	3	SS	17		DOLOMITIC LIMESTONE BEDROCK, Tan, Weathered	0	SPT N=50 Blows/1" Refusal
7.5	R1	NX			DOLOMITIC LIMESTONE BEDROCK, Light Gray, Tan, Moderately Weathered, Closely Spaced Horizontal Joints, Widely Spaced Vertical JOints, Fine to Medium Grained, Weak HCL Reaction, Poor Discontinuity Condition, Rock Quality Designation is Good, Rock Strength is Medium Strenght (R3)		RQD= 42%
	R2	NX					RQD= 47%
10.0					DOLOMITIC LIMESTONE BEDROCK, Light Gray, Tan, Moderately Weathered, Closely Spaced Horizontal Joints, Widely Spaced Vertical JOints, Fine to Medium Grained, Weak HCL Reaction, Poor Discontinuity Condition, Rock Quality Designation is Good, Rock Strength is Medium Strenght (R3)		
12.5	R3	NX			DOLOMITIC LIMESTONE BEDROCK, Light Gray, Tan, Moderately Weathered, Closely Spaced Horizontal Joints, Widely Spaced Vertical JOints, Fine to Medium Grained, Weak HCL Reaction, Poor Discontinuity Condition, Rock Quality Designation is Good, Rock Strength is Medium Strenght (R3)		RQD= 83%
15.0					End of Boring at 15 Feet		
17.5					Note: 1. Total split spoon sampler refusal was encountered at approximately 6.6 feet below the existing ground surface level, and total hollow stem auger refusal was encountered at approximately 7 feet below the existing ground surface level. A Tri-Cone rock roller bit was used to clean out the borehole before rock coirng was started. At approximately 7 feet below the existing grade level, a NX size (2-1/8" diameter) double tube 10 foot		

Calibrated Penetrometer Unconfined Compression

Water Level Observations		SEECO Consultants, Inc.		Boring Started	9/26/22	
W.L.				Boring Completed	9/26/22	
W.L.	Dry WS/WD	7350 Duvan Drive, Tinley Park, IL 60477		Driller	EN	Rig D-50
W.L.		Approved CWG	Job No. 13120G	Drawn By	SW	Sheet 1 of 2

BORING LOG

CLIENT **City of Joliet**

PROJECT **2023 Maple St. New Sanitary Sewer Lift Station**

OWNER **City of Joliet**

LOCATION **Joliet, IL**

BORING NUMBER **SB-3**

SURFACE ELEVATION

N | E

DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)

Unconfined Compressive Strength, Tons/Ft.^{2} — 1 2 3 4 5

PL MC LL

STD "N" PENETRATION BLOWS PER FT. — 10 20 30 40 50

DEPTH ELEVATION	SAMPLE NO.	SAMPLER TYPE	SAMPLE REC. (%)	SOIL GRAPHIC LOG	DESCRIPTION OF MATERIALS (LABORATORY CLASSIFICATION)	OVM ppm	REMARKS
					long diamond bit core barrel attached to the drill rods was then used to core the bedrock. 2. The apparent top of weathered dolomatic limestone bedrock is approximately 6.6 feet below the existing grade level and the apparent top ofsolid dolomatic limestone bedrock is approximately7 feet below the existing grade level. 3. All soil samples were screened with aMiniRae300 OVM photo-ionization detector (PID)and by utilizing olfactory senses. No petroleumodors were detected in all samples and all PID = 0ppm.		
22.5							
25.0							
27.5							
30.0							
32.5							
35.0							
37.5							
40.0							

⊗ Calibrated Penetrometer Unconfined Compression

APPLICATION AND CERTIFICATION FOR PAYMENT

AIA DOCUMENT G702

TO OWNER:

PROJECT:

APPLICATION NO:

Distribution to:

☐ OWNER
☐ ARCHITECT
☐ CONTRACTOR
☐
☐

PERIOD TO:

FROM CONTRACTOR:

VIA ENGINEER:

PROJECT NO:

CONTRACT FOR:

CONTRACT DATE:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM		$ 0.00
2. Net change by Change Orders		$ 0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$ 0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)		$ 0.00
5. RETAINAGE:		
a. 10 % of Completed Work (Column D + E on G703)	$ 0.00	
b. ____ % of Stored Material (Column F on G703)	$	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)		$ 0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$ 0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		$ 0.00
8. CURRENT PAYMENT DUE		$ **0.00**
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)		$ 0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order	$0.00	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

SUBCONTRACTOR:

By: _____ Date: _____

State of: County of:
Subscribed and sworn to before me this day of
Notary Public:
My Commission expires:

ENGINEER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the Engineer certifies to the Owner that to the best of the Engineer's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED . . . . . $ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and onthe Continuation Sheet that are changed to conform with the amount certified.)
ENGINEER:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

APPLICATION AND CERTIFICATION FOR PAYMENT

AIA DOCUMENT G702

TO OWNER:

PROJECT:

APPLICATION NO:

Distribution to:

☐ OWNER
☐ ARCHITECT
☐ CONTRACTOR
☐
☐

PERIOD TO:

FROM CONTRACTOR:

VIA ENGINEER:

PROJECT NO:

CONTRACT FOR:

CONTRACT DATE:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM		$ 0.00
2. Net change by Change Orders		$ 0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$ 0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)		$ 0.00
5. RETAINAGE:		
a. 10 % of Completed Work (Column D + E on G703)	$ 0.00	
b. _____ % of Stored Material (Column F on G703)	$	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)		$ 0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$ 0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		$ 0.00
8. CURRENT PAYMENT DUE		$ **0.00**
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)		$ 0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order	$0.00	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

SUBCONTRACTOR:

By: _____ Date: _____

State of: County of:
Subscribed and sworn to before me this day of
Notary Public:
My Commission expires:

ENGINEER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising the application, the Engineer certifies to the Owner that to the best of the Engineer's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED . . . . . $ _____

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and onthe Continuation Sheet that are changed to conform with the amount certified.)

ENGINEER:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CONTINUATION SHEET *AIA DOCUMENT G703* PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing
Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO: 0
APPLICATION DATE: 01/00/00
PERIOD TO: 01/00/00
PROJECT NO: 0

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED FROM PREVIOUS APPLICATION (D + E)	WORK COMPLETED THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE (C - G)	RETAINAGE (IF VARIABLE RATE)
1	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
2	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
3	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
4	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
5	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
6	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
7	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
8	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
9	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
10	**CHANGE ORDERS (IF APPLICABLE):**	$ -	$ -	$ -		$ -			$ -
	SCHEDULED VALUE (INCLUDING CHANGE ORDERS)								
	Total Labor:	$ -							
	Total Materials:	$ -							
	Total Tax:	$ -							
	Total Scheduled Value:	$ -							
	GRAND TOTALS	$ -	$ -	$ -	$ -	$ -	0.00%	$ -	$ -

CONTINUATION SHEET *AIA DOCUMENT G703* PAGE OF PAGES

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing
Contractor's signed certification is attached.
In tabulations below, amounts are stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO: 0
APPLICATION DATE: 01/00/00
PERIOD TO: 01/00/00
PROJECT NO: 0

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED FROM PREVIOUS APPLICATION (D + E)	E WORK COMPLETED THIS PERIOD	F MATERIALS PRESENTLY STORED (NOT IN D OR E)	G TOTAL COMPLETED AND STORED TO DATE (D+E+F)	G % (G ÷ C)	H BALANCE (C - G)	I RETAINAGE (IF VARIABLE RATE)
1	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
2	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
3	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
4	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
5	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
6	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
7	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
8	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
9	**NAME OF ITEM:**	$ -	$ -	$ -		$ -			$ -
10	**CHANGE ORDERS (IF APPLICABLE):**	$ -	$ -	$ -		$ -			$ -
	PLEASE BREAKDOWN THE TOTAL SCHEDULED VALUE (INCLUDING CHANGE ORDERS)								
	Total Labor:	$ -							
	Total Materials:	$ -							
	Total Tax:	$ -							
	Total Scheduled Value:	$ -							
	GRAND TOTALS	$ -	$ -	$ -	$ -	$ -	0.00%	$ -	$ -

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

CERTIFICATE OF SUBSTANTIAL COMPLETION

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

This [preliminary] [final] Certificate of Substantial Completion applies to:

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

Date of Substantial Completion

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

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

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

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

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

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

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.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

This page intentionally left blank.

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Work Change Directive No.

Date of Issuance:	Effective Date:
Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

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

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

☐ Non-agreement on pricing of proposed change.

☐ Necessity to proceed for schedule or other Project reasons.

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

Contract Price $ [increase] [decrease].

Contract Time days [increase] [decrease].

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price

☐ Cost of the Work ☐ Other

RECOMMENDED:	AUTHORIZED BY:	RECEIVED:
By:	By:	By:
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title:	Title:	Title:
Date:	Date:	Date:

Approved by Funding Agency (if applicable)

By: Date:

Title:

This page intentionally left blank.

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

Field Order No. _____

Date of Issuance:	Effective Date:
Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference: _____ Specification(s) _____ Drawing(s) / Detail(s)

Description:

Attachments:

ISSUED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____
Date: _____	Date: _____

Copy to: Owner

This page intentionally left blank.

CERTIFICATE OF INSTALLATION SERVICES

Project

Equipment

Specification Section

Contract

I hereby certify the equipment supplier/manufacturer has inspected this equipment and that it has been properly installed, adjusted, and calibrated. I further certify this equipment may now be operated for test purposes and/or normal use.

MANUFACTURER'S REPRESENTATIVE

Signature	Date

Name (print)

Title

Representing

CONTRACTOR

Signature	Date

Name (print)

Title

Comments:

This form shall be completed and submitted to ENGINEER prior to training of OWNER'S personnel in accordance with Section 01 61 00.

This page intentionally left blank.

CERTIFICATE OF INSTRUCTIONAL SERVICES

Project

Equipment

Specification Section

Contract

I hereby certify the equipment supplier/manufacturer has instructed OWNER'S personnel in the startup, operation, and maintenance of this equipment as required in the Specifications.

CONTRACTOR

Signature	Date

Name (print)

Title

I hereby certify that my operating personnel received _____ days instruction from

_____

for startup, operation, and maintenance of this equipment.

OWNER

Signature	Date

Name (print)

Title

Comments:

This form shall be completed and submitted to ENGINEER after training of OWNER'S personnel in accordance with Section 01 61 00.

This page intentionally left blank.

CERTIFICATE OF POST STARTUP SERVICES

Project

Equipment

Specification Section

Contract

I hereby certify the equipment supplier/manufacturer has inspected this equipment, made adjustments and calibrations, and that it is operating in conformance with the design, Specification, and manufacturer's requirements. Notation of improper operation shall be detailed and recommendations made and attached to this form.

MANUFACTURER'S REPRESENTATIVE

Signature | Date

Name (print)

Title

Representing

CONTRACTOR

Signature | Date

Name (print)

Title

OWNER

Signature | Date

Name (print)

Title

Comments:

This form shall be completed and submitted to OWNER upon completion of the 1-year reinspection as required by the Specifications.

This page intentionally left blank.

CHANGE ORDER NO. ____

CHANGE ORDER DATE OF ISSUANCE _____

COMMENCEMENT OF CONTRACT TIME _____

OWNER _____

CONTRACTOR _____

PROJECT _____ CONTRACT NO. _____

ENGINEER _____

YOU ARE DIRECTED TO MAKE THE FOLLOWING CHANGES IN THE CONTRACT DOCUMENTS:
DESCRIPTION:

REASON FOR CHANGE ORDER:

ATTACHMENTS:

CHANGE IN CONTRACT PRICE
Original Contract Price: $_____
Net increase (decrease) from previous Change Orders: $_____
Net increase (decrease) of this Change Order: $_____
Revised Contract Price: $_____

CHANGE IN CONTRACT TIMES
Original Contract Times: *(days or dates)* Substantial Completion: _____ Ready for Final Payment: _____
Net increase (decrease) from previous Change Orders: *(days)* Substantial Completion: _____ Ready for Final Payment: _____
Net increase (decrease) of this Change Order: *(days)* Substantial Completion: _____ Ready for Final Payment: _____
Revised Contract Times: *(days or dates)* Substantial Completion: _____ Ready for Final Payment: _____

CONTRACTOR agrees that this Change Order includes any and all costs associated with or resulting from the change ordered herein, including all impacts, delays, and accelerated costs. Other than the dollar amount and time allowance listed above, there shall be no other dollar or time compensation as a result of this Change Order.

THIS DOCUMENT SHALL BECOME AN AMENDMENT TO THE CONTRACT AND ALL STIPULATIONS AND COVENANTS OF THE CONTRACT SHALL APPLY HERETO.

RECOMMENDED:	APPROVED:	ACCEPTED:
By: _____ ENGINEER *(signature)*	By: _____ OWNER *(signature)*	By: _____ CONTRACTOR *(signature)*
Date: _____	Date: _____	Date: _____

Note: OWNER is required to complete the Change Order Authorization form on the back if change increase or decrease is for $10.000 or more, or time of completion is 30 days or more.

CONTRACTOR'S REQUEST FOR SUBSTITUTION

(Include With Submittal)

Provisions requiring submittal of this form are described in Specification Sections 01 33 00 and 01 61 00 and paragraph 6.05 of the General and Supplementary Conditions.

Substitution Request No.: _____

Project: _____

Contract: _____

We hereby apply for consideration of _____
(*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:_____ KW or 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_____
   If yes, attach an explanation.

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.)

_____

_____

INSTALLATION LIST

Location:_____ Telephone No.:_____

Date Installed:_____ Date Started Up:_____

Owner's Representative to be Contacted:_____

Engineer's Representative to be Contacted:_____

Firm's Name:_____ Telephone No.:_____

*****

Location:_____ Telephone No.:_____

Date Installed:_____ Date Started Up:_____

Owner's Representative to be Contacted:_____

Engineer's Representative to be Contacted:_____

Firm's Name:_____ Telephone No.:_____

*****

Location:_____ Telephone No.:_____

Date Installed:_____ Date Started Up:_____

Owner's Representative to be Contacted:_____

Engineer's Representative to be Contacted:_____

Firm's Name:_____ Telephone No.:_____

*****

Location:_____ Telephone No.:_____

Date Installed:_____ Date Started Up:_____

Owner's Representative to be Contacted:_____

Engineer's Representative to be Contacted:_____

Firm's Name:_____ Telephone No.:_____

This page intentionally left blank.

REQUEST FOR INFORMATION

Request No.	Date:
Contractor:	Specification Section / Drawing No.:
Project:	
Contract:	
This is a request for a information on the following:	
Prepared By:	Date Response Needed:
Response:	
Prepared By:	Date:
Response Returned to Contractor On:	
cc: Owner: Nick Gornick Resident Project Representative: Peter Sathissarat	

This page intentionally left blank.

CONTRACTOR'S SUBMITTAL TRANSMITTAL

CONTRACT: BENTON AND GREENFIELD LIFT STATIONS REPLACEMENT

To:	**From:**

Specification Title:	
Description:	

Applicable Contract Clarification / Interpretation Request(s) were submitted and response(s) received:

___ No ___ Yes If Yes, List RFI Numbers: _____

Submittal includes variations from the requirements of the Contract Documents:

___ No ___ Yes If Yes, Variations are identified below and in accordance with paragraph 7.16 of the General Conditions:

Variations are as follows:

1.

Contractor certifies that this submittal has been prepared in accordance with paragraph 7.16 of the General Conditions and Contractor has reviewed and approved this submittal in accordance with paragraph 7.16 of the General Conditions:

___ Yes ___ No

Contractor:	
Signature:	Date:
Name *(print):*	
Title:	

This page intentionally left blank.