



Catawba County

Blackburn MSW Advance Site Work and Utility Relocation

Construction Documents Project Manual

Issued for Bidding

5/16/25

HDR Project No. 10400064



This page intentionally left blank.

TABLE OF CONTENTS

DIVISION 00 — PROCUREMENT AND CONTRACTING REQUIREMENTS

- 00 11 13 - ADVERTISEMENT FOR BIDS (2013 EJCDC)
- 00 21 13 - INSTRUCTIONS TO BIDDERS (EJCDC C-200-2018)
- 00 41 13 - BID FORM (EJCDC C-410-2018)
- 00 43 13 - BID BOND PENAL SUM FORM (EJCDC C-430-2018)
- 00 43 14 - BID BOND DAMAGES FORM (EJCDC C-435-2018)
- 00 45 13 - QUALIFICATIONS STATEMENT (EJCDC C-451-2018)
- 00 52 13 - AGREEMENT (EJCDC C-520-2018)
- 00 61 13.13 - PERFORMANCE BOND (EJCDC C-610-2018)
- 00 61 13.16 - PAYMENT BOND (EJCDC C-615-2018)
- 00 72 13 - GENERAL CONDITIONS (EJCDC C-700-2018)
- 00 73 01 - SUPPLEMENTARY CONDITIONS (EJCDC C-800-2018)
- 00 73 83 - SPECIAL PROVISIONS
- 00 91 13 - ADDENDUM FORM

DIVISION 01 — GENERAL REQUIREMENTS

- 01 11 00 - SUMMARY OF WORK
- 01 14 16 - COORDINATION WITH OWNER'S OPERATIONS
- 01 14 17 - MITIGATION OF CONSTRUCTION ON THE PUBLIC
- 01 14 19 - USE OF SITE
- 01 14 33 - WORK IN RIGHTS-OF-WAY
- 01 22 00 - MEASUREMENT AND PAYMENT
- 01 25 00 - SUBSTITUTION PROCEDURES
- 01 26 00 - CONTRACT MODIFICATION PROCEDURES
- 01 29 73 - SCHEDULE OF VALUES
- 01 29 76 - PROGRESS PAYMENT PROCEDURES
- 01 31 13 - PROJECT COORDINATION
- 01 31 19 - PROJECT MEETINGS
- 01 31 26 - ELECTRONIC COMMUNICATION PROTOCOLS
- 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE
- 01 32 33 - PROJECT PHOTOGRAPHIC DOCUMENTATION
- 01 33 00 - SUBMITTAL PROCEDURES
- 01 35 44 - SPILL PREVENTION CONTROL AND COUNTERMEASURES PLAN
- 01 41 24 - PERMIT REQUIREMENTS
- 01 41 26 - STORMWATER POLLUTION PREVENTION PLAN AND PERMIT
- 01 42 00 - REFERENCES
- 01 51 05 - TEMPORARY UTILITIES
- 01 52 11 - ENGINEER'S FIELD OFFICE
- 01 52 13 - CONTRACTOR'S FIELD OFFICE AND SHEDS
- 01 55 13 - VEHICULAR ACCESS AND PARKING
- 01 55 26 - TRAFFIC CONTROL
- 01 57 05 - TEMPORARY CONTROLS
- 01 57 33 - TEMPORARY SECURITY
- 01 58 13 - TEMPORARY PROJECT SIGNAGE
- 01 61 03 - COMMON WORK RESULTS FOR EQUIPMENT
- 01 65 00 - PRODUCT DELIVERY REQUIREMENTS
- 01 66 00 - PRODUCT STORAGE AND HANDLING REQUIREMENTS
- 01 71 14 - MOBILIZATION AND DEMOBILIZATION
- 01 71 23 - FIELD ENGINEERING
- 01 71 33 - PROTECTION OF THE WORK AND PROPERTY
- 01 74 00 - CLEANING
- 01 77 19 - CLOSEOUT REQUIREMENTS
- 01 78 23 - OPERATION AND MAINTENANCE DATA
- 01 78 36 - WARRANTIES
- 01 78 39 - PROJECT RECORD DOCUMENTS
- 01 78 43 - SPARE PARTS AND EXTRA MATERIALS

DIVISION 02 — EXISTING CONDITIONS

02 41 00 - DEMOLITION

DIVISION 26 — ELECTRICAL

26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

26 05 26 - GROUNDING AND BONDING

26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

26 05 43 - UNDERGROUND WORK FOR ELECTRICAL SYSTEMS

DIVISION 31 — EARTHWORK

31 10 00 - SITE CLEARING

31 23 00 - EARTHWORK

31 23 19 - DEWATERING

31 23 33 - UTILITIES - TRENCHING AND BACKFILLING

31 32 19 - GEOTEXTILES

31 37 00 - RIPRAP

DIVISION 32 — EXTERIOR IMPROVEMENTS

32 15 40 - CRUSHED STONE SURFACING

32 91 13 - TOPSOILING AND FINISHED GRADING

32 92 00 - SEEDING, SODDING AND LANDSCAPING

DIVISION 33 — UTILITIES

33 05 15 - PRECAST CONCRETE UTILITY STRUCTURES

33 05 33.23 - POLYETHYLENE PRESSURE PIPE AND TUBING (AWWA C901 AND AWWA C906)

33 05 33.53 - POLYETHYLENE GAS UTILITY PIPE

33 40 00 - STORM DRAINAGE SYSTEM

DIVISION 40 — PROCESS INTERCONNECTIONS

40 05 00 - PIPE AND PIPE FITTINGS - BASIC REQUIREMENTS

40 05 31 - PIPE - PLASTIC

40 05 34 - PIPE CORRUGATED POLYETHYLENE

40 05 51 - COMMON REQUIREMENTS FOR PROCESS AND UTILITY VALVES

40 05 60 - LANDFILL GAS SYSTEM VALVES

40 05 61 - GATE VALVES

40 05 62 - PLUG VALVES

40 05 63 - BALL VALVES

ATTACHMENTS

Attachment A - CQA Plan

Attachment B - Unit 4 Monitoring Well Logs and Water Levels

ADVERTISEMENT FOR BIDS

BID NO. 25-1019

CATAWBA COUNTY
BLACKBURN MSW LANDFILL UNIT 4 CONSTRUCTION
ADVANCE SITEWORK AND UTILITY RELOCATION

ISSUED: May 16, 2025

Sealed Bids for the **Blackburn MSW Landfill Unit 4 Construction Advance Sitework and Utility Relocation project** will be received, by **Catawba County**, in the **2nd floor meeting room, Government Center, located at 25 Government Drive, Newton, North Carolina 28658**, until **3:00 PM** local time on **Thursday, June 26, 2025**, at which time the Bids which have been duly received will be **publicly** opened and read. The Project consists of the completion of advance sitework and utility relocation to support the planned construction of the Blackburn Unit 4 MSW landfill expansion located at 3993 Rocky Ford Road, Newton, North Carolina, 28658.

A mandatory pre-bid conference will be held at 10:00 AM local time on **Thursday June 5, 2025**, at the **Blackburn Landfill Administrative Building, 4017 Rocky Ford Road, Newton, North Carolina 28658**. Bids will not be accepted from Bidders that do not attend the mandatory pre-bid conference. The purpose of the mandatory conference and site visit is for prospective Contractors to apprise themselves of the conditions and requirements that will affect the performance of work called for in the Bid Documents. Any Bidders who are not present by 10:00 AM will not be able to participate in the pre-bid conference.

Bids will be received for a single prime Contract. Bids shall be on a lump sum and unit price basis as indicated in the Bid Form.

The Issuing Office for the Bidding Documents is:

HDR ENGINEERING INC. OF THE CAROLINAS
555 Fayetteville St., Suite 900
Raleigh, North Carolina 27601
Contact: Michael Plummer, PE, Michael.Plummer@hdrinc.com
Tel: 704.338.6843

Prospective Bidders may examine the Bidding Documents at the Issuing Office on Mondays through Fridays between the hours of 8:00 AM and 5:00 PM, by appointment, and may obtain copies of the Bidding Documents from the Issuing Office as described herein.

Bidding Documents may be ordered online by registering with the Issuing Office. Contact Sydney Davies at 980.337.5009 or Sydney.Davies@hdrinc.com to register and receive plans. Following registration, complete sets of Bidding Documents may be downloaded from the Issuing Office's website as "zipped" portable document format (PDF) files. The cost of printed Bidding Documents from the Issuing Office will depend on the number and size of the Drawings and Project Manual, applicable taxes, and shipping method selected by the prospective Bidder. The cost of Bidding Documents and shipping is non-refundable. Upon Issuing Office's receipt of payment, printed Bidding Documents will be sent via the prospective Bidder's delivery method of choice; the shipping charge will depend on the shipping method chosen. The date that the Bidding Documents are transmitted by the Issuing Office will be considered the Bidder's date of receipt of the Bidding Documents. Partial sets of the Bidding Documents will not be available from the Issuing Office. Neither the County nor the Engineer will be responsible for full or partial sets of Contract Documents, including any addenda obtained from any source other than the Issuing Office.

Bidding Documents will also be available for inspection, by appointment, at the Catawba County Purchasing Department, 25 Government Drive, Newton, North Carolina 28658, Phone: 828-465-8224.

In addition, Bidding Documents may be downloaded from the following designated County website at no charge:

<https://www.catawbacountync.gov/county-services/purchasing/bid-notice/>

This website will be updated periodically with addenda and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only as detailed in this Advertisement. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the methods listed herein.

The table below shows the *intended* bid schedule for this Project. Owner will make every effort to adhere to this schedule:

Event	Responsibility	Date and Time
Advertisement Issued	Owner	May 16, 2025
Pre-Bid Conference	Owner/Contractor	June 5, 2025, 10:00 AM
Submit Written Questions	Contractor	June 16, 2025, 5:00 PM
Provide Responses to Questions	Owner	June 18, 2025, 5:00 PM
Bid Opening	Contractor	June 26, 2025, 3:00 PM
Contract Award	Owner	TBA
Contract Effective Date	Owner	Upon Execution

If submitting Bid by mail, the Bid must be submitted in a sealed envelope, plainly marked on the outside as described in the Instructions for Bidders, and mailed to the address shown below:

Mailing address for delivery of bid via US Postal Service	Office Address of delivery by any other method (hand delivery, overnight, or any other carrier)
Catawba County Government Center Attn: Purchasing Department Post Office Box 389 Newton, North Carolina 28658	Catawba County Government Center Attn: Purchasing Department 25 Government Drive Newton, North Carolina 28658

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

Bid security shall be furnished in accordance with the Instructions to Bidders.

Bidders shall submit proof of qualifications to perform the Work as described in the Instructions to Bidders.

All bidders are hereby notified that they must be properly licensed under the state laws governing their prospective trades. Bidders are also notified that applicable provisions of Chapter 87 of the General Statutes of the State of North Carolina shall be observed in the receiving of bids and awarding of contracts for the Work.

Project shall be Substantially Completed within 180 Calendar Days and meet requirements for Final Completion within an additional 30 Calendar Days.

Catawba County reserves the right to reject any and all bids and to waive informalities as may be permitted by law.

The County reserves the right to postpone bid openings for its own convenience. Please check the designated County website for details.

END OF ADVERTISEMENT FOR BIDS

This page intentionally left blank.

INSTRUCTIONS TO BIDDERS

FOR CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1— Defined Terms	1
Article 2— Bidding Documents	1
Article 3— Qualifications of Bidders.....	3
Article 4— Pre-Bid Conference.....	3
Article 5— Site and Other Areas; Existing Site Conditions; Examination of Site; Owner’s Safety Program; Other Work at the Site.....	4
Article 6— Bidder’s Representations and Certifications	6
Article 7— Interpretations and Addenda	6
Article 8— Bid Security	7
Article 9— Contract Times.....	8
Article 10— Substitute and “Or Equal” Items	8
Article 11— Subcontractors, Suppliers, and Others	8
Article 12— Preparation of Bid	9
Article 13— Basis of Bid	10
Article 14— Submittal of Bid.....	10
Article 15— Modification and Withdrawal of Bid.....	11
Article 16— Opening of Bids.....	12
Article 17— Bids to Remain Subject to Acceptance.....	12
Article 18— Evaluation of Bids and Award of Contract.....	12
Article 19— Bonds and Insurance.....	13
Article 20— Signing of Agreement.....	13
Article 21— Sales and Use Taxes	13
Article 22— Contracts to Be Assigned	13

ARTICLE 1—DEFINED TERMS

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

ARTICLE 2—BIDDING DOCUMENTS

- 2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.
- 2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use, nor does it grant or confer ownership or any property interest in the Bidding Documents and other documents distributed for the Project. Authorization to download documents, or other distribution, includes the right for Bidding Documents holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the Bidding Documents holder pays all costs associated with printing or reproduction. Paper or other types of printed documents may not be re-sold under any circumstances.
- 2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a Bidding Documents holder with the Issuing Office at such website, and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered Bidding Documents holders will receive Addenda issued by Owner or Issuing Office.
- 2.04 Bidder may register as a Bidding Documents holder and obtain complete sets of Bidding Documents, in the format stated in the Advertisement or invitation to bid, from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered Bidding Documents holders will receive Addenda issued by Owner or Issuing Office.
- 2.05 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as Bidding Documents holders from the Bidding Documents Website or Issuing Office. Owner is not responsible for omissions in Bidding

Documents or other documents obtained from plan rooms or other such sources (such as other prospective bidders), or for a Bidder's failure to obtain Addenda from a plan room.

2.06 *Electronic Documents*

- A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to prospective Bidders as Electronic Documents in the manner specified.
 - 1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader Version 6 or later. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor any bidder's or the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.
- B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in paper versions of the documents, and for Bidder's reliance upon such derived information.
- C. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor certain documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats as originally prepared by Engineer.
 - 1. Electronic Documents that are available in native file format include:
 - a. CADD Files for Proposed Grading Plans and Utilities.
 - 2. Release of such documents will be solely for the convenience of the Contractor and subject to additional requirements, if any, for such release as indicated in Specifications Section 01 31 26 – Electronic Communication Protocols. No such document is a Contract Document.
 - 3. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that electronic/digital information provided in Electronic Documents is appropriate and adequate for Contractor's specific purposes.
 - 4. In no case will Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—QUALIFICATIONS OF BIDDERS

- 3.01 Bidder is to submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work:
- A. Written evidence establishing its qualifications such as financial data, previous experience, and present commitments.
 - B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.
 - C. Bidder's state (or other) contractor license number, if applicable.
 - D. Subcontractor and Supplier qualification information.
 - E. Other required information regarding qualifications.
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.04 Bidders shall be experienced in the kind of Work to be performed, shall have the or be able to obtain construction equipment necessary for the Work, and shall possess sufficient capital to properly perform the Work within the time allowed. Bids received from Bidders who have previously failed to complete work within the time required, or who have previously performed similar work in an unsatisfactory manner, may be rejected. A Bid may be rejected if Bidder cannot show and document to Owner's satisfaction that Bidder has the necessary ability, facilities, equipment, and resources to commence the Work at the time prescribed and thereafter to prosecute and complete the Work at the rate or within the times specified. A Bid may be rejected if Bidder is already obligated for the performance of other work which would delay the commencement, prosecution or completion of the Work.

ARTICLE 4—PRE-BID CONFERENCE

- 4.01 A mandatory pre-bid conference will be held at the time and location indicated in the Advertisement or invitation to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bids will not be accepted from Bidders who do not attend the conference. It is each Bidder's responsibility to sign in at the pre-bid conference to verify its participation. Bidders must sign in using the name of the organization that will be submitting a Bid. A list of Bidders that attended the pre-bid conference and are, on that basis alone, eligible to submit a Bid for this Project, will be issued in an Addendum.
- 4.02 Information presented at the pre-bid conference does not alter the Bidding Documents. Owner or Issuing Office will issue Addenda to make any changes to the Bidding Documents that result

from discussions at the pre-bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

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

5.01 *Site and Other Areas*

- A. The Site is identified in the Bidding Documents, including in Specifications Section 01 11 00 – Summary of Work. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. The Supplementary Conditions identify the following regarding existing conditions at or adjacent to the Site:
 - a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.
 - b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.
 - c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
 - d. Technical Data contained in such reports and drawings.
2. Owner will make copies of reports and drawings referenced above available to any prospective Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

- B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-Related Documents*

- A. In addition to the documents regarding existing Site conditions referred to in Paragraph 5.02.A of these Instructions to Bidders, the following other documents relating to conditions at or adjacent to the Site are known to Owner and made available to Bidders for reference:

Refer to list of other Site-related documents in the Supplementary Conditions—Document 00 73 01—Paragraph SC-5.03. Owner will make copies of these other Site-related documents available to any Bidder on request. Such Site-related drawings, reports, and other documents (if any) may be examined at the office of Purchasing Department during normal business hours, Mondays through Fridays, upon 24 hours' notice to Tina Wright – Catawba County Purchasing Manager
Purchasing Department, 25 Government Drive, Newton, North Carolina 28658, (828) 465-8224, tinawright@catawbacountync.gov.

- B. Owner has not verified the contents of these other Site-related documents, and Bidder may not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.
- C. The other Site-related documents are not part of the Contract Documents.
- D. Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.
- E. No other Site-related documents are available.

5.04 *Site Visit and Testing by Bidders*

- A. Bidder is required to visit the Site and conduct a thorough visual examination of the Site and adjacent areas. During the visit the Bidder must not disturb any ongoing operations at the Site.
- B. A Site visit is scheduled for Thursday June 5, 2025, at the Blackburn Landfill Administrative Building, 4017 Rocky Ford Road, Newton, North Carolina 28658.
- C. Bidders visiting the Site are required to: (1) arrange their own transportation to the Site; and (2) each Bidder visiting the Site is responsible for providing and using its own personal protective equipment appropriate for the Site and conditions, and in accordance with posted requirements, if any. Comply with Paragraph 5.05 of these Instructions to Bidders.
- D. All access to the Site, other than during a regularly scheduled Site visit, must be coordinated through the following Owner or Engineer contact for visiting the Site: Rodney Hamby, Landfill Superintendent, Office: 828-462-1348 or Cell: 828-312-1672. Bidder must conduct the required Site visit during normal working hours, Mondays through Fridays.
- E. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- F. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns,

or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

- G. Bidder must comply with Laws and Regulations regarding excavation and location of utilities, obtain necessary permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- H. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. If an Owner safety program exists, it will be indicated in the Supplementary Conditions. Where the Bidding Documents indicate an Owner's safety program, visitors to the Site during the bidding phase and at other times shall comply with Owner's safety programs.

5.06 *Other Work at the Site*

- A. Reference is made to Specifications Section 01 11 00 – Summary of Work, for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other potentially confidential matters), if any.

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

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

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

ARTICLE 7—INTERPRETATIONS AND ADDENDA

- 7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Engineer in writing. Contact information and submittal procedures for such questions are as follows:
 - A. *Michael Plummer, PE, Vice President*
440 South Church Street – Suite 1200

Charlotte, NC 28270-2075

704.338.6843

Michael.Plummer@hdrinc.com

- 7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all Bidding Documents holders registered with the Issuing Office. Questions received less than seven days prior to the date for opening of Bids may not be answered.
- 7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Bidding Documents.
- 7.05 Addenda that engineer judges to have a material or significant effect on Bidders' preparation of pricing and other requirement element of the Bid will be transmitted via Addendum for Bidders' receipt not less than seven days prior to the scheduled date for receipt of the Bids. Clarifications or modifications that Engineer deems will not have a material or substantial effect on the preparation of Bids may be transmitted for Bidders' receipt later, for receipt prior to the deadline for receipt of Bids.

ARTICLE 8—BID SECURITY

8.01 *Required Form and Amount of Bid Security*

- A. A Bid must be accompanied by bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions.
- B. Such bid bond will be issued in the form included in the Bidding Documents.

8.02 *Bid Security of Successful Bidder*

- A. The Bid security of the apparent Successful Bidder will be retained until Owner awards the Contract to such Bidder, and such Bidder has signed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Successful Bidder's bid security will be released.
- B. If the Successful Bidder fails to sign and deliver the Contract and furnish the required Contract security within the number of days, indicated in Paragraph 20.01 of these Instructions to Bidders, after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the bid security of that Bidder will be forfeited.
- C. Upon Successful Bidder's default:
 - 1. When the bid security is a penal sum bid bond, the entire penal sum amount of the bid bond will be forfeit and due Owner.
 - 2. When the bid security is a damages form of bid bond, to the extent of Owner's damages will be forfeit and due Owner.
 - 3. If a type of bid security other than a bid bond is allowed and is furnished, the amount that will be forfeit and due Owner will be the same as for the form of bid bond included

in the Bidding Documents. Owner will so notify the defaulting Bidder in writing of the annulment and the amount of the forfeiture, with documentation of the amount forfeited.

D. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.

8.03 *Bid Security of Bidders other than the Successful Bidder*

- A. The bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 60 days after the Bid opening, whereupon bid security furnished by such Bidders will be released.
- B. Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the bid opening.
- C. Release of Bid Security: Owner may release any Bidder's bid security by returning such bid security to the associated Bidder. When bid security is in the form of a bid bond, Owner may dispose of or destroy the bid bond and so advise the associated Bidder in writing that the bid bond has been released.

ARTICLE 9—CONTRACT TIMES

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

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

- 10.01 The Contract for the Work, as awarded, will be on the basis of materials, equipment, and procedures specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items or procedures. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment or procedure, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.
- 10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, and will perform the Work in accordance with procedures indicated in the Bidding Documents, as supplemented by Addenda, if any. Assumptions regarding the possibility of post-bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 11.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so in the Specifications or elsewhere in the Bidding Documents. If a

prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should not submit a Bid.

- 11.02 Bidders must submit a list of the Subcontractors and Suppliers proposed for the Work in the Bid.
- 11.03 If requested by Owner or Engineer, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and awarding the Contract.
- 11.04 If apparent Successful Bidder declines to make a requested substitution, Owner may award the Contract to another Bidder, consistent with the basis for evaluating the Bids for award as set forth in these Instructions to Bidders, that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to issuance of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 12—PREPARATION OF BID

- 12.01 The Bid Form is included with the Bidding Documents.
 - A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
 - B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."
- 12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8.5inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- 12.03 A Bid by a corporation must be signed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.

- 12.05 A Bid by a limited liability company must be signed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 12.06 A Bid by an individual must show the Bidder's name and official address.
- 12.07 A Bid by a joint venture must be signed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 12.08 All names must be printed in ink below the signatures.
- 12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be indicated on the Bid Form.
- 12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.
- 12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Unit Price*

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

ARTICLE 14—SUBMITTAL OF BID

- 14.01 The Bidding Documents include one separate, unbound copy of the Bid Form, and, where required, the Bid Bond Form and other supplements to the Bid Form. The unbound copy of the

Bid Form and supplements (if any) is to be completed and submitted with the Bid security and the other documents required with the Bid by Article 2 of the Bid Form.

- 14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, and, if applicable, the designated portion of the Project for which the Bid is submitted, and the name and address of Bidder, and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery method, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid must be addressed to the location designated in the Advertisement or invitation to bid.
- 14.03 Bids received after the date and time prescribed for the opening of Bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened. Owner accepts no responsibility for delays in returning Bids submitted or delivered to the incorrect location.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

- 15.01 An unopened Bid may be withdrawn by an appropriate document duly signed in the same manner that a Bid must be signed and delivered to the place where Bids are to be submitted, prior to the date and time established in the Bidding Documents for the receipt of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 of this Article and submit a new Bid prior to the date and time for established in the Bidding Documents the receipt of Bids.
- 15.03 If, within 24 hours after Bids are opened, any Bidder files a duly signed, written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a

material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the bid security will be returned.

ARTICLE 16—OPENING OF BIDS

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

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.
- 18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. Owner may reject the Bid of any Bidder that fails to demonstrate appropriate qualifications, experience, and resources for the Work, in accordance with Article 3 of these Instructions to Bidders.
- 18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.
- 18.04 *Basis for Award of Contract*
- A. If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest-priced, responsive Bid that has not otherwise been disqualified.
- 18.05 *Evaluation of Bids*
- A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or elsewhere in the Bidding Documents, or prior to the Notice of Award.
- B. *Unit Price Work:* For the determination of the apparent low-price Bid when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price bid for that item, together with amount(s) of lump sum items (if any).
- 18.06 In evaluating whether a Bidder is responsible, Owner will consider the qualifications, experience, and resources of the Bidder and may consider the qualifications, experience, and resources of

Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

- 18.07 Owner, with or without Engineer's assistance, may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19—BONDS AND INSURANCE

- 19.01 Paragraph 2.01 and Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, set forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the signed Agreement to Owner (or Owner's representative), it must be accompanied by required bonds and insurance documentation.
- 19.02 Article 8 ("Bid Security") of these Instructions to Bidders addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unsigned counterparts of the Agreement, along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and required bonds and insurance documentation (as required by the Contract Documents) to Owner. Within 10 days thereafter, Owner will deliver one fully signed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21—SALES AND USE TAXES

- 21.01 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.

ARTICLE 22—CONTRACTS TO BE ASSIGNED

BID FORM

FOR CONSTRUCTION CONTRACT

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

ARTICLE 1—OWNER AND BIDDER

- 1.01 This Bid is submitted to: Catawba County 25 Government Drive, Newton, NC 28658.
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
 - E. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - F. Required Bidder Qualification Statement with supporting data; and

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

- 3.01 *Lump Sum Bids*
- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s), together with any unit prices indicated in Paragraph 3.02:
- 3.02 *Unit Price Bids*
- A. Bidder will perform the following Work at the indicated unit prices:

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
General Administration					
1	Bonds, Mobilization and Insurance (5% max. of Total Work Items 2 - 30)	LS	1	\$	\$

2	General Conditions and Construction Quality Control	LS	1	\$	\$
3	Surveying and Control	LS	1	\$	\$
Earthwork					
4	Demolition of Existing Sediment Basin	LS	1	\$	\$
5	Unsuitable Soil Excavation	CY	1000	\$	\$
6	Unsuitable Soil Replacement	CY	250	\$	\$
7	Erosion and Sediment Control	LS	1	\$	\$
8	Sediment Basin Discharge Structures	LS	1	\$	\$
9	Soil Excavation	CY	30,000	\$	\$
10	Structural Fill	CY	70,000	\$	\$
11	Perimeter Gravel Roadway	SY	13,000	\$	\$
12	TRM Channel Lining	SY	12,000	\$	\$
13	Topsoil Placement	AC	3.5	\$	\$
14	Temporary Seeding and Mulching	AC	1.5	\$	\$
15	Permanent Seeding and Mulching	AC	3.5	\$	\$
Utilities					
16	Permanent 18" LFG Header and Valves	LF	2,300	\$	\$
17	Temporary 12" LFG Header and Valves	LF	1,000	\$	\$
18	3' Dia. Condensate Trap Pump Station	EA	1	\$	\$
19	Permanent 4"x8" Leachate Forcemain	LF	2,100	\$	\$
20	Temporary 3"x6" Leachate Forcemain	LF	1,800	\$	\$
21	4"x8" Condensate Forcemain	LF	300	\$	\$
22	6"x10" Leak Detection Pipe	LF	1,400	\$	\$
23	6' Dia. Leak Detection Manhole	EA	1	\$	\$
24	18" CPE Drainage Pipe	LF	510	\$	\$
25	24" CPE Drainage Pipe	LF	120	\$	\$
26	72" CPE Drainage Pipe	LF	160	\$	\$

27	8' Dia. Stormwater Manholes	EA	2	\$	\$
28	French Drain	LF	120	\$	\$
29	Underground Electrical Service	LS	1	\$	\$
30	Temporary Electrical Service	LS	1	\$	\$
31	Construction Contingency Allowance	LS	1	\$200,000	\$200,000
Total of All Lump Sum and Unit Price Bid Items					\$

B. Bidder acknowledges that:

1. each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and
2. the estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 4—TIME OF COMPLETION

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

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

5.01 *Bid Acceptance Period*

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

5.02 *Instructions to Bidders*

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

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder’s Representations*

A. In submitting this Bid, Bidder represents the following:

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

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

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

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(typed or printed)

Bidder's Address for giving notices:

Bidder's Contact Person:

Name:

(typed or printed)

Title:

(typed or printed)

Phone:

Email:

Address:

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

BID BOND (PENAL SUM FORM)

Bidder Name: [Full formal name of Bidder] Address <i>(principal place of business)</i> : [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Bid Project <i>(name and location)</i> : [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
<i>(Full formal name of Bidder)</i> _____	<i>(Full formal name of Surety) (corporate seal)</i> _____
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

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.

BID BOND (DAMAGES FORM)

Bidder Name: [Full formal name of Bidder] Address <i>(principal place of business)</i> : [Address of Bidder's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Bid Project <i>(name and location)</i> : [Owner project/contract name, and location of the project] Bid Due Date: [Enter date bid is due]
Bond Bond Amount: [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
<i>(Full formal name of Bidder)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature) (Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.</i>	

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder that submitted a responsive Bid, as determined by Owner, for the work required by the Contract Documents, provided that:
 - 1.1. If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the bond amount set forth on the face of this Bond, and
 - 1.2. In no event will Bidder's and Surety's obligation hereunder exceed the bond amount set forth on the face of this Bond.
 - 1.3. Recovery 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 will not in the aggregate exceed 120 days from 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 must 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.

QUALIFICATIONS STATEMENT

ARTICLE 1—GENERAL INFORMATION

1.01 Provide contact information for the Business:

Legal Name of Business:			
Corporate Office			
Name:		Phone number:	
Title:		Email address:	
Business address of corporate office:			
Local Office			
Name:		Phone number:	
Title:		Email address:	
Business address of local office:			

1.02 Provide information on the Business's organizational structure:

Form of Business:	☐ Sole Proprietorship ☐ Partnership ☐ Corporation		
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:			
1.			
2.			
3.			
Provide a separate Qualification Statement for each Joint Venture r.			
Date Business was formed:		State in which Business was formed:	
Is this Business authorized to operate in the Project location?		☐ Yes ☐ No ☐ Pending	

1.03 Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:		Affiliation:	
Address:			
Name of business:		Affiliation:	
Address:			

Name of business:		Affiliation:	
Address:			

1.04 Provide information regarding the Business's officers, partners, and limits of authority.

Name:		Title:	
Authorized to sign contracts:	☐ Yes ☐ No	Limit of Authority:	\$
Name:		Title:	
Authorized to sign contracts:	☐ Yes ☐ No	Limit of Authority:	\$
Name:		Title:	
Authorized to sign contracts:	☐ Yes ☐ No	Limit of Authority:	\$
Name:		Title:	

ARTICLE 2—LICENSING

2.01 Provide information regarding licensure for Business:

Name of License:			
Licensing Agency:			
License No:		Expiration Date:	
Name of License:			
Licensing Agency:			
License No:		Expiration Date:	

ARTICLE 3—DIVERSE BUSINESS CERTIFICATIONS

3.01 Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
☐ Disadvantaged Business Enterprise		
☐ Minority Business Enterprise		
☐ Woman-Owned Business Enterprise		
☐ Small Business Enterprise		
☐ Disabled Business Enterprise		
☐ Veteran-Owned Business Enterprise		
☐ Service-Disabled Veteran-Owned Business		
☐ HUBZone Business (Historically Underutilized) Business		

☐ Other			
☐ None			

ARTICLE 4—SAFETY

4.01 Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:			
Safety Certifications			
Certification Name	Issuing Agency	Expiration	

4.02 Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	MH	EMR	TRFR	MH	EMR	TRFR	MH

ARTICLE 5—FINANCIAL

5.01 Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:			
Business address:			
Date of Business's most recent financial statement:		☐ Attached	
Date of Business's most recent audited financial statement:		☐ Attached	
Financial indicators from the most recent financial statement			
Contractor's Current Ratio (Current Assets ÷ Current Liabilities)			
Contractor's QuickRatio ((Cash and Cash Equivalents + Accounts Receivable + Short Term Investments) ÷ Current Liabilities)			

ARTICLE 6—SURETY INFORMATION

- 6.01 Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:			
Surety is a corporation organized and existing under the laws of the state of:			
Is surety authorized to provide surety bonds in the Project location?	☐ Yes ☐ No		
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury?			
☐ Yes ☐ No			
Mailing Address (principal place of business):			
Physical Address (principal place of business):			
Phone (main):		Phone (claims):	

ARTICLE 7—INSURANCE

- 7.01 Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

Name of insurance provider, and type of policy (CLE, auto, etc.):			
Insurance Provider	Type of Policy (Coverage Provided)		
Are providers licensed or authorized to issue policies in the Project location?		☐ Yes ☐ No	
Does provider have an A.M. Best Rating of A-VII or better?		☐ Yes ☐ No	
Mailing Address (principal place of business):			
Physical Address (principal place of business):			

Phone (main):		Phone (claims):	

ARTICLE 8—CONSTRUCTION EXPERIENCE

8.01 Provide information that will identify the overall size and capacity of the Business.

Average number of current full-time employees:	
Estimate of revenue for the current year:	
Estimate of revenue for the previous year:	

8.02 Provide information regarding the Business's previous contracting experience.

Years of experience with projects like the proposed project:				
As a general contractor:		As a joint venturer:		
Has Business, or a predecessor in interest, or an affiliate identified in Paragraph 1.03:				
Been disqualified as a bidder by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been barred from contracting by any local, state, or federal agency within the last 5 years? ☐ Yes ☐ No				
Been released from a bid in the past 5 years? ☐ Yes ☐ No				
Defaulted on a project or failed to complete any contract awarded to it? ☐ Yes ☐ No				
Refused to construct or refused to provide materials defined in the contract documents or in a change order? ☐ Yes ☐ No				
Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No				
Provide full details in a separate attachment if the response to any of these questions is Yes.				

8.03 List all projects currently under contract in Schedule A and provide indicated information.

8.04 List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.

8.05 In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

ARTICLE 9—REQUIRED ATTACHMENTS

9.01 Provide the following information with the Statement of Qualifications:

- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.02.
- B. Diverse Business Certifications if required by Paragraph 3.01.
- C. Certification of Business's safety performance if required by Paragraph 4.02.

- D. Financial statements as required by Paragraph 5.01.
- E. Attachments providing additional information as required by Paragraph 8.02.
- F. Schedule A (Current Projects) as required by Paragraph 8.03.
- G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.04.
- H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.05.
- I. Additional items as pertinent.

This Statement of Qualifications is offered by:

Business:

(typed or printed name of organization)

By:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Date:

(date signed)

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

Attest:

(individual's signature)

Name:

(typed or printed)

Title:

(typed or printed)

Address for giving notices:

Designated Representative:

Name:

(typed or printed)

Title:

(typed or printed)

Address:

Phone:

Email:

Schedule A—Current Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule B—Previous Experience with Similar Projects

Name of Organization					
Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Project Owner			Project Name		
General Description of Project					
Project Cost			Date Project Completed		
Key Project Personnel	Project Manager	Project Superintendent	Safety Manager	Quality Control Manager	
Name					
Reference Contact Information (listing names indicates approval to contacting the names individuals as a reference)					
	Name	Title/Position	Organization	Telephone	Email
Owner					
Designer					
Construction Manager					

Schedule C—Key Individuals

Project Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Project Superintendent			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

Safety Manager			
Name of individual			
Years of experience as project manager			
Years of experience with this organization			
Number of similar projects as project manager			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	
Quality Control Manager			
Name of individual			
Years of experience as project superintendent			
Years of experience with this organization			
Number of similar projects as project superintendent			
Number of similar projects in other positions			
Current Project Assignments			
Name of assignment		Percent of time used for this project	Estimated project completion date
Reference Contact Information (listing names indicates approval to contact named individuals as a reference)			
Name		Name	
Title/Position		Title/Position	
Organization		Organization	
Telephone		Telephone	
Email		Email	
Project		Project	
Candidate's role on project		Candidate's role on project	

AGREEMENT

BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between Catawba County ("Owner") and [name of contracting entity] ("Contractor").

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

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents.

The Work is generally described as follows:

The work includes excavation and placement of structural fill and topsoil from on-site borrow area to prepare subgrade for perimeter landfill berms and roadways, installation of gravel road materials, installation of landfill gas header piping, valves, condensate trap, permanent and temporary leachate forcemain, underground electrical conduits, temporary power to existing leachate pump stations, construction to temporary and permanent stormwater basins, piping and structures, erosion and sediment control and other appurtenant work.

ARTICLE 2—THE PROJECT

ARTICLE 3—2.01 THE PROJECT, OF WHICH THE WORK UNDER THE CONTRACT DOCUMENTS IS A PART, IS GENERALLY DESCRIBED AS FOLLOWS: BLACKBURN MSW LANDFILL UNIT 4 CONSTRUCTION, ADVANCE SITEWORK & UTILITY RELOCATION. ENGINEER

3.01 The Owner has retained HDR Engineering, Inc. of the Carolinas ("Engineer") to act as Owner's representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by HDR Engineering, Inc. of the Carolinas "Engineer".

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

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

4.02 *Contract Times: Days*

A. The Work will be substantially complete within 180 calendar 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 an additional 30 calendar days from the date of Substantial Completion.

4.03 *Liquidated Damages*

- A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
1. *Substantial Completion*: Contractor shall pay Owner \$1,000 for each calendar day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
 2. *Completion of Remaining Work*: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$1,000 for each calendar day that expires after such time until the Work is completed and ready for final payment.
 3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive, and will not be imposed concurrently.

- 4.04 Owner reserves the right to withhold from payments due Contractor under the Contract amounts for liquidated damages (if any), special damages (if any), and performance damages (if any) in accordance with the Contract.

ARTICLE 5—CONTRACT PRICE

- 5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:
- A. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item).

Unit Price Work					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Extended Price
				\$	\$
				\$	\$
				\$	\$
				\$	\$
				\$	\$

Unit Price Work					
Item No.	Description	Unit	Estimated Quantity	Unit Price	Extended Price
Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					\$

ARTICLE 6—THE EXTENDED PRICES FOR UNIT PRICE WORK SET FORTH AS OF THE EFFECTIVE DATE OF THE CONTRACT ARE BASED ON ESTIMATED QUANTITIES. AS PROVIDED IN PARAGRAPH 13.03 OF THE GENERAL CONDITIONS, ESTIMATED QUANTITIES ARE NOT GUARANTEED, AND DETERMINATIONS OF ACTUAL QUANTITIES AND CLASSIFICATIONS ARE TO BE MADE BY ENGINEER. PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

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

6.02 Progress Payments; Retainage

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the second Friday of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.
 - a. 95 percent of the value of the Work completed (with the balance being retainage).
 - 1) If 50 percent or more of the Work has been completed, as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
 - b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 98 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 100% percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

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

6.04 *Consent of Surety*

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

6.05 *Interest*

- A. Amounts not paid within 45 days after acceptance of Application for Payment by Owner or approval by Engineer shall bear interest at the rate of one percent per month in accordance with NCGS 143-134.1.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following:
 - 1. This Agreement.
 - 2. Bonds:
 - a. Performance bond (together with power of attorney).
 - b. Payment bond (together with power of attorney).
 - 3. General Conditions.
 - 4. Supplementary Conditions.
 - 5. Specifications as listed in the table of contents of the project manual (copy of list attached).
 - 6. Drawings (not attached but incorporated by reference) consisting of 23 sheets with each sheet bearing the following general title: Blackburn MSW Landfill Unit 4 Construction Advance Sitework & Utility Relocation.
 - 7. Drawings listed on the sheet index.
 - 8. Addenda (numbers [number] to [number], inclusive).
 - 11. Exhibits to this Agreement (enumerated as follows):
 - a. Completed Bid Form
 - b. Certificate of Insurance
 - c. Performance and Payment Bonds
 - 12. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.

- b. Work Change Directives.
 - c. Change Orders.
 - d. Field Orders.
 - e. Warranty Bond, if any.
- B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 7.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
 - 1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 - 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - 4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 - 5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 - 6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
 - 7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price,

within the Contract Times, and in accordance with the other terms and conditions of the Contract.

8. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

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

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

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

Contractor:

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

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

(typed or printed name of organization)

By: _____
(individual's signature)

Date: _____
(date signed)

Name: _____
(typed or printed)

Title: _____
(typed or printed)

(If [Type of Entity] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)

Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:

Name: _____
(typed or printed)

Title: _____
(typed or printed)

Address:

Phone: _____

Email: _____

License No.: _____
(where applicable)

State: _____

This page intentionally left blank.

PERFORMANCE BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Mailing address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Contract Description <i>(name and location)</i> : [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] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> 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
_____ <i>(Full formal name of Contractor)</i>	_____ <i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

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

- 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
- 6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
- 7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and
 - 7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
- 8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
- 9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
- 10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
- 11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
- 12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
- 13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such

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

14. Definitions

- 14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
 - 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”]

PAYMENT BOND

Contractor Name: [Full formal name of Contractor] Address <i>(principal place of business)</i> : [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address <i>(principal place of business)</i> : [Address of Surety's principal place of business]
Owner Name: [Full formal name of Owner] Mailing address <i>(principal place of business)</i> : [Address of Owner's principal place of business]	Contract Description <i>(name and location)</i> : [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] <i>(Date of Bond cannot be earlier than Effective Date of Contract)</i> 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
<i>(Full formal name of Contractor)</i>	<i>(Full formal name of Surety) (corporate seal)</i>
By: _____ <i>(Signature)</i>	By: _____ <i>(Signature)(Attach Power of Attorney)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
Attest: _____ <i>(Signature)</i>	Attest: _____ <i>(Signature)</i>
Name: _____ <i>(Printed or typed)</i>	Name: _____ <i>(Printed or typed)</i>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.</i>	

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

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
16. Definitions
 - 16.1. *Claim*—A written statement by the Claimant including at a minimum:
 - 16.1.1. The name of the Claimant;
 - 16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
 - 16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 - 16.1.4. A brief description of the labor, materials, or equipment furnished;

- 16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
 - 16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 16.1.7. The total amount of previous payments received by the Claimant; and
 - 16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 16.2. *Claimant*—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the 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"]

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



Endorsed By



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.

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

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

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

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

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

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The document prepared by Contractor, in a form acceptable to Engineer, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*
 - a. A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times; contesting an initial decision by Engineer concerning the

- requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract.
- b. A demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal, or seeking resolution of a contractual issue that Engineer has declined to address.
 - c. A demand or assertion by Owner or Contractor, duly submitted in compliance with the procedural requirements set forth herein, made pursuant to Paragraph 12.01.A.4, concerning disputes arising after Engineer has issued a recommendation of final payment.
 - d. A demand for money or services by a third party is not a Claim.
- 11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 - 12. *Contract*—The entire and integrated written contract between Owner and Contractor concerning the Work.
 - 13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
 - 14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents.
 - 15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
 - 16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
 - 17. *Cost of the Work*—See Paragraph 13.01 for definition.
 - 18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
 - 19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
 - 20. *Electronic Document*—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.
 - 21. *Electronic Means*—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the

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

22. *Engineer*—The individual or entity named as such in the Agreement.
23. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
24. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.
 - a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
 - b. The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.
 - c. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.
25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.
28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
30. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
31. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.
32. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

33. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative (RPR) includes any assistants or field staff of Resident Project Representative.
34. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
35. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals.
36. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
37. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
38. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.
39. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
40. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
41. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Engineer, or that is indicated as a Submittal in the Schedule of Submittals accepted by Engineer. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers’ instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.
42. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion of such Work.

43. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.
44. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
45. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
46. *Technical Data*
- a. Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.
 - b. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then Technical Data is defined, with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06, as the data contained in boring logs, recorded measurements of subsurface water levels, assessments of the condition of subsurface facilities, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical, environmental, or other Site or facilities conditions report prepared for the Project and made available to Contractor.
 - c. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data, and instead Underground Facilities are shown or indicated on the Drawings.
47. *Underground Facilities*—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.
48. *Unit Price Work*—Work to be paid for on the basis of unit prices.
49. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
50. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:* The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:* The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:* The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1. does not conform to the Contract Documents;
 - 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or Paragraph 15.04).
- E. *Furnish, Install, Perform, Provide*
 - 1. The word “furnish,” when used in connection with services, materials, or equipment, means to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word “install,” when used in connection with services, materials, or equipment, means to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

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

- A. *Performance and Payment Bonds*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner the performance bond and payment bond (if the Contract requires Contractor to furnish such bonds).
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6, except to the extent the Supplementary Conditions expressly establish other dates for delivery of specific insurance policies.
- C. *Evidence of Owner’s Insurance*: After receipt of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

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

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work

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

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review the schedules submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.
 - 4. If a schedule is not acceptable, Contractor will have an additional 10 days to revise and resubmit the schedule.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one Contract Document is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.
- G. Nothing in the Contract Documents creates:
 - 1. any contractual relationship between Owner or Engineer and any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
 - 2. any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

- A. *Standards Specifications, Codes, Laws and Regulations*
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner or Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

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

- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly notify Owner and Contractor in writing that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

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

4.02 *Starting the Work*

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

4.03 *Reference Points*

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

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

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Abnormal weather conditions;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.

- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
1. The circumstances that form the basis for the requested adjustment;
 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;
 3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
 4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
 5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.
- Contractor shall also furnish such additional supporting documentation as Owner or Engineer may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.
- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

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

5.01 *Availability of Lands*

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

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.
 - C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment

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

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

5.03 *Subsurface and Physical Conditions*

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

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

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

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

- D. *Limitations of Other Data and Documents:* Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
 3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
 4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
 2. is of such a nature as to require a change in the Drawings or Specifications;
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

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

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the subsurface or physical condition in question may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- E. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in

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

- a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.
 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.
- F. *Underground Facilities; Hazardous Environmental Conditions:* Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* Unless it is otherwise expressly provided in the Supplementary Conditions, the cost of all of the following are included in the Contract Price, and Contractor shall have full responsibility for:
1. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 2. complying with applicable state and local utility damage prevention Laws and Regulations;

3. verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;
 4. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 5. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing regarding such Underground Facility.
- C. *Engineer's Review:* Engineer will:
1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;
 2. identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;
 3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
 4. advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Early Resumption of Work:* If at any time Engineer determines that Work in connection with the Underground Facility may resume prior to completion of Engineer's review or Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Engineer may at its discretion instruct Contractor to resume such Work.
- F. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown

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

- a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.
 4. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 5.05.F.

5.06 *Hazardous Environmental Conditions at Site*

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

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

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

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

- of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- H. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special

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

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I obligates Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or

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

- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner’s termination rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the state or jurisdiction in which the Project is located to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by

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

- E. Owner shall deliver to Contractor, with copies to each additional insured identified in the Contract, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- G. In addition to the liability insurance required to be provided by Contractor, the Owner, at Owner's option, may purchase and maintain Owner's own liability insurance. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.
- H. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker's compensation, commercial general liability, and other insurance that is appropriate for their participation in the Project, and to name as additional insureds Owner and Engineer (and any other individuals or entities identified in the Supplementary Conditions as additional insureds on Contractor's liability policies) on each Subcontractor's commercial general liability insurance policy; and
 - 2. Suppliers to purchase and maintain insurance that is appropriate for their participation in the Project.
- I. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- J. If Contractor has failed to obtain and maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination rights under Article 16.
- K. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.

- L. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- M. The insurance and insurance limits required herein will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- N. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured and Engineer.

6.03 *Contractor's Insurance*

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, and other insurance pursuant to the specific requirements of the Supplementary Conditions.
- B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:
 - 1. include at least the specific coverages required;
 - 2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
 - 3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;
 - 4. apply with respect to the performance of the Work, whether such performance is by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and
 - 5. include all necessary endorsements to support the stated requirements.
- C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:
 - 1. include and list as additional insureds Owner and Engineer, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
 - 2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
 - 3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the Supplementary Conditions.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

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

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

1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.
 2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.
1. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.
- C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.
- D. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

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

7.02 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.03 *Labor; Working Hours*

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

- B. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.04 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.05 *"Or Equals"*

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) has a proven record of performance and availability of responsive service; and
 - 4) is not objectionable to Owner.
- b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Engineer's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract.
- E. *Treatment as a Substitution Request*: If Engineer determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

3. Contractor shall make written application to Engineer for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination*: Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee*: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

- H. On a monthly basis, Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.
- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner and Engineer.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 Patent Fees and Royalties

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.09 *Permits*

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

7.10 *Taxes*

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

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.12 *Record Documents*

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

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.
- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- E. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Engineer has issued a written notice to Owner and Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as material safety data sheets) or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Engineer determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
- 2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

3. With each Shop Drawing or Sample, Contractor shall give Engineer specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall label and submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals.
1. *Shop Drawings*
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide, and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.C.
 2. *Samples*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the Submittal for the limited purposes required by Paragraph 7.16.C.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Engineer's Review of Shop Drawings and Samples*
1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Engineer's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will

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

5. Engineer's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Engineer will record Engineer's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to the Engineer in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Engineer will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Engineer's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

- d. If any such Submittal is not accepted, Contractor shall confer with Engineer regarding the reason for the non-acceptance, and resubmit an acceptable document.
- 2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.
- F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer is entitled to rely on Contractor's warranty and guarantee.
- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
- C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 1. Observations by Engineer;
 - 2. Recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. The issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. Use or occupancy of the Work or any part thereof by Owner;
 - 5. Any review and approval of a Shop Drawing or Sample submittal;
 - 6. The issuance of a notice of acceptability by Engineer;
 - 7. The end of the correction period established in Paragraph 15.08;
 - 8. Any inspection, test, or approval by others; or

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

7.18 Indemnification

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, from losses, damages, costs, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

7.19 Delegation of Professional Design Services

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Engineer with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Engineer, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Engineer.

- D. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.
- E. Pursuant to this Paragraph 7.19, Engineer's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner or Engineer.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. An itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. The extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

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

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
 - 1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 - 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

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

9.02 *Replacement of Engineer*

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

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Evidence of Financial Arrangements*

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

9.12 *Safety Programs*

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

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

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

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe, as an experienced and qualified design professional, the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.07. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Resident Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in the Supplementary Conditions and in Paragraph 10.07.
- B. If Owner designates an individual or entity who is not Engineer's consultant, agent, or employee to represent Owner at the Site, then the responsibilities and authority of such individual or entity will be as provided in the Supplementary Conditions.

10.04 *Engineer's Authority*

- A. Engineer has the authority to reject Work in accordance with Article 14.
- B. Engineer's authority as to Submittals is set forth in Paragraph 7.16.
- C. Engineer's authority as to design drawings, calculations, specifications, certifications and other Submittals from Contractor in response to Owner's delegation (if any) to Contractor of professional design services, is set forth in Paragraph 7.19.
- D. Engineer's authority as to changes in the Work is set forth in Article 11.

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

10.05 *Determinations for Unit Price Work*

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

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

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

10.07 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, will create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

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

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

10.08 *Compliance with Safety Program*

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

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Engineer's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Engineer.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 - 2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 - 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and
 - 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.

11.03 *Work Change Directives*

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

- B. If Owner has issued a Work Change Directive and:
 - 1. Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.
 - 2. Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any Claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

11.04 *Field Orders*

- A. Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Engineer's recommendation.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

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

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

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

- B. *Change Proposal Procedures*

- 1. *Submittal:* Contractor shall submit each Change Proposal to Engineer within 30 days after the start of the event giving rise thereto, or after such initial decision.
- 2. *Supporting Data:* The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

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

- 3. *Engineer's Initial Review:* Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal. If in its discretion Engineer concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Engineer may request that Contractor submit such additional supporting data by a date specified by Engineer, prior to Engineer beginning its full review of the Change Proposal.
- 4. *Engineer's Full Review and Action on the Change Proposal:* Upon receipt of Contractor's supporting data (including any additional data requested by Engineer), Engineer will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change

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

5. *Binding Decision*: Engineer's decision is final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- C. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties in writing that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice will be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.
- D. *Post-Completion*: Contractor shall not submit any Change Proposals after Engineer issues a written recommendation of final payment pursuant to Paragraph 15.06.B.

11.10 *Notification to Surety*

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

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process*: The following disputes between Owner and Contractor are subject to the Claims process set forth in this article:
 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents;
 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters; and
 4. Subject to the waiver provisions of Paragraph 15.07, any dispute arising after Engineer has issued a written recommendation of final payment pursuant to Paragraph 15.06.B.
- B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim rests with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge

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

- C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate will stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process will resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process will resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

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

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 - 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, which will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
 5. Other costs consisting of the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

c. *Construction Equipment Rental*

- 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
 - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 6. Expenses incurred in preparing and advancing Claims.
 - 7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee*
- 1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
 - 2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change

Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. *Documentation and Audit*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances*: Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision

thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.

E. *Adjustments in Unit Price*

1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
3. Adjusted unit prices will apply to all units of that item.

ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs,

losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work,

or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 Owner May Correct Defective Work

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace defective Work as required by Engineer, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15—PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation

establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications

1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work;
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto;
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work;
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid by Owner; or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner*

1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

- b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time

submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have 7 days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without

significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
2. At any time, Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

- d. a list of all duly pending Change Proposals and Claims; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
- 3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. *Engineer's Review of Final Application and Recommendation of Payment:* If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within 10 days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the final Application for Payment to Owner for payment. Such recommendation will account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. *Notice of Acceptability:* In support of its recommendation of payment of the final Application for Payment, Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to stated limitations in the notice and to the provisions of Paragraph 15.07.
- D. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment and issuance of notice of the acceptability of the Work.
- E. *Final Payment Becomes Due:* Upon receipt from Engineer of the final Application for Payment and accompanying documentation, Owner shall set off against the amount recommended by Engineer for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's receipt of the final Application for Payment from Engineer.

15.07 *Waiver of Claims*

- A. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, except as set forth in an outstanding Claim,

appeal under the provisions of Article 17, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a Claim, or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.
- D. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects,

attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon 7 days' written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, 7 days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The

provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF 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.

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.

This page intentionally left blank.

SUPPLEMENTARY CONDITIONS

OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1— Definitions and Terminology	1
Article 2— Preliminary Matters.....	1
Article 3— Contract Documents: Intent, Requirements, Reuse	2
Article 4— Commencement and Progress of the Work	2
Article 5— Site, Subsurface and Physical Conditions, Hazardous Environmental Conditions	2
Article 6— Bonds and Insurance.....	6
Article 7— Contractor’s Responsibilities.....	10
Article 8— Other Work at the Site	12
Article 9— Owner’s Responsibilities.....	13
Article 10— Engineer’s Status During Construction.....	13
Article 11— Changes to the Contract.....	15
Article 12— Claims.....	15
Article 13— Cost of Work; Allowances, Unit Price Work.....	15
Article 14— Tests and Inspections; Correction, Removal, or Acceptance of Defective Work.....	15
Article 15— Payments to Contractor, Set Offs; Completions; Correction Period	15
Article 16— Suspension of Work and Termination	16
Article 17— Final Resolutions of Disputes.....	16
Article 18— Miscellaneous.....	17

SUPPLEMENTARY CONDITIONS

OF THE CONSTRUCTION CONTRACT

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

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

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

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01.A.40 Add the following to Paragraph 1.01.A.40:

Trucking, shipping, delivery firms, consultants, and entities performing testing or inspection retained by Contractor or any Subcontractor are considered to be Subcontractors.

SC-1.01.A.45 Add the following to Paragraph 1.01.A.45:

Entities that rent construction equipment or machinery, but are not incorporated into the Work, are considered to be Suppliers. If such rental entity furnishes both equipment and one or more personnel to operate and maintain the equipment, such entity is a Subcontractor.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

- B. *Evidence of Contractor's Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

2.02 *Copies of Documents*

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

Owner shall furnish to Contractor three paper copies of the Contract Documents (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

SC-2.02 Delete Paragraph 2.02.A in its entirety and insert the following new paragraph in its place:

- A. Owner shall furnish to Contractor three paper copies of conformed Contract Documents incorporating and integrating all Addenda and amendments, if any, negotiated prior to the Effective Date of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional paper copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

2.06 *Electronic Transmittals*

SC-2.06 Delete in its entirety Paragraph 2.06.B and replace with the following new paragraph:

- B. *Electronic Document Protocol*: Comply with Specifications Section 01 31 26 – Electronic Communication Protocols.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

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

SC-3.01 Add the following new paragraphs immediately after Paragraph 3.01.E:

- F. The Specifications and other verbal components of the Contract Documents may vary in form, format, and style. Some Specification sections are written in varying degrees of streamlined or declarative style and some Specifications sections may, in comparison, employ a more-narrative style. Omissions of such words and phrases as "Contractor shall," "in conformity with," "as shown," or "as specified" are intentional in streamlined language in the Contract Documents. Omitted words and phrases are incorporated by inference. Similar types of provisions may appear in various parts of a Specifications section or elsewhere in the Contract Documents. Contractor shall not attempt to take advantage of any variation of form, format or style in Change Proposal(s) and Claim(s).
- G. Cross referencing of Specification sections in a Specifications section's heading "Related Sections includes, but are not necessarily limited to: "and elsewhere within each Specifications section is provided as an aid and convenience to Contractor. Contractor shall not rely on cross referencing indicated and is responsible for coordinating the entire Work and providing a complete Project whether or not cross referencing is provided in each Specifications section or whether or not cross referencing is complete.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.05 *Delays in Contractor's Progress*

SC-4.05.C Amend Paragraph 4.05.C by adding the following subparagraphs:

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 on the critical path at the time of the delay.

- b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:
 - 1) Every workday on which one or more of the following conditions exist will be considered a “bad weather day”:
 - i) Total precipitation (as rain equivalent) occurring between 7:00 p.m. on the preceding day (regardless of whether such preceding day is a workday) through 7:00 p.m. on the workday in question equals or exceeds 0.25 inches of precipitation (as rain equivalent, based on the snow/rain conversion indicated in Table SC-4.05.C-1—Foreseeable Bad Weather Days .
 - ii) Ambient outdoor air temperature at 11:00 a.m. is equal to or less than the following low temperature threshold: thirty degrees Fahrenheit; or, at 3:00 p.m. the ambient outdoor temperature is equal to or greater than the following high temperature threshold: ninety-five degrees Fahrenheit.
 - 2) Determination of actual bad weather days during performance of the Work will be based on the weather records measured and recorded by National Weather Service weather monitoring station at Hickory Regional Airport.
 - 3) Contractor shall anticipate the number of foreseeable bad weather days per month indicated in Table SC-4.05.C-1—Foreseeable Bad Weather Days.
 - 4) In each month, every bad weather day exceeding the number of foreseeable bad weather days established in Table SC-4.05.C-1—Foreseeable Bad Weather Days, will be considered as “abnormal weather conditions.” The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Contractor’s then-current Progress Schedule’s critical path for the Project.

Table SC-4.05.C-1—Foreseeable Bad Weather Days

Month	Number of Foreseeable Bad Weather Days in Month Based on Precipitation as Rain Equivalent (inches) ⁽¹⁾	Ambient Outdoor Air Temperature (degrees F)	
		Number of Foreseeable Bad Weather Days in Month Based on Low Temperature (at 11:00 a.m.)	Number of Foreseeable Bad Weather Days in Month Based on High Temperature (at 3:00 p.m.)
January	5	3	0
February	5	5	0
March	4	2	0
April	3	1	0
May	4	0	0
June	2	0	2

EJCDC® C-800, Supplementary 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.

Month	Number of Foreseeable Bad Weather Days in Month Based on Precipitation as Rain Equivalent (inches) ⁽¹⁾	Ambient Outdoor Air Temperature (degrees F)	
		Number of Foreseeable Bad Weather Days in Month Based on Low Temperature (at 11:00 a.m.)	Number of Foreseeable Bad Weather Days in Month Based on High Temperature (at 3:00 p.m.)
July	5	0	1
August	5	0	1
September	3	0	0
October	4	0	0
November	3	2	0
December	2	3	0
Notes:			
1. Two inches of sleet equal one inch of rain. Five inches of wet, heavy snow equal one inch of rain. Fifteen inches of "dry" powder snow equals one inch of rain.			

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

5.02 Use of Site and Other Areas

SC-5.02.A.2 Delete Paragraph 5.02.A.2 in its entirety and insert the following new paragraph in its place.

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 mediation 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 mediation 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.

5.03 *Subsurface and Physical Conditions*

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

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

Report Title	Date of Report	Technical Data
Unit 4 Boring Logs	6/25/24	Boring Logs
Unit 4 Well Logs	7/23/24	Well Construction Details
Unit 4 Water Elevation Data	04/18/25	Water Level Readings

- F. The following table lists the drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data, and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
Well As-Built Survey	10/24/09	Unit 4 Monitoring Well and Piezometer Location and Elevations

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

SC-5.04.A Add the following new paragraph immediately after Paragraph 5.04.A.4:

5. Contractor encounters human remains, recognizes the existence of burial markers, archaeological sites, historical sites, artifacts of potential archaeological or historical interest, or wetlands not shown or indicated in the Contract Documents, Contractor shall immediately cease operations that may disturb such area(s) and secure the adjacent Work; and Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations (Contractor shall continue to suspend such operations until otherwise instructed by Owner but shall continue with all other operations that do not affect those remains or features);

5.06 *Hazardous Environmental Conditions*

SC-5.06.I Delete Paragraph 5.06.I in its entirety and insert the following new paragraph in its place.

- 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, mediation, 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.

SC-5.06.J Delete Paragraph 5.06.J in its entirety and insert the following new paragraph in its place.

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 mediation 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.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

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

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

6.02 *Insurance—General Provisions*

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.B:

1. Contractor may obtain worker's compensation insurance from an insurance company that has not been rated by A.M. Best, provided that such company (a) is domiciled in the state in which the Project is located, (b) is certified or authorized as a worker's compensation insurance provider by the appropriate state agency, and (c) has been accepted to provide worker's compensation insurance for similar projects by the state within the last 12 months.

6.03 *Contractor's Insurance*

SC-6.03 Supplement Paragraph 6.03 with the following provisions 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
Employer's Liability	
Each accident	\$1,000,000
Each employee	\$1,000,000
Policy limit	\$1,000,000

- 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	\$2,000,000
Products—Completed Operations Aggregate	\$1,000,000
Personal and Advertising Injury	\$1,000,000
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

- I. *Automobile Liability:* Contractor shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	\$1,000,000
Each Accident	\$1,000,000
Property Damage	
Each Accident	\$1,000,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$1,000,000

- J. *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	\$5,000,000
General Aggregate	\$5,000,000

- K. *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 \$[specify amount] after accounting for partial attribution of its limits to underlying policies, as allowed above.
- L. *Contractor's Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

Contractor's Pollution Liability	Policy limits of not less than:
Each Occurrence/Claim	\$5,000,000
General Aggregate	\$5,000,000

- M. *Unmanned Aerial Vehicle Liability Insurance:* If Contractor uses unmanned aerial vehicles (UAV—commonly referred to as drones) at the Site or in support of any aspect of the Work,

Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	\$1,000,000
General Aggregate	\$1,000,000

6.04 *Builder's Risk and Other Property Insurance*

SC-6.04 Delete Paragraph 6.04.A and insert the following in its place:

- A. Owner 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.

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

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

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.02 *Supervision and Superintendence*

SC-7.02 Add the following to Paragraph 7.02, following Paragraph 7.02.B:

- C. Unless Owner otherwise agrees in writing, the superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

7.03 *Labor; Working Hours*

SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:

1. Regular working hours will be 7:00 AM to 5:00 PM Monday – Friday.
2. Owner's legal holidays are New Year's Day, Martin Luther King Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving, Christmas Eve, Christmas Day.

SC-7.03 Add the following new paragraph immediately after Paragraph 7.03.C:

- D. Contractor shall be responsible for the cost of overtime (premium) pay and other expense incurred by Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

7.08 Patent Fees and Royalties

SC-7.08.B Delete Paragraph 7.08.B in its entirety.

SC-7.08.C Delete Paragraph 7.08.C in its entirety and insert the following new 7.08.B in its place.

- B. 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 mediation or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.11 Laws and Regulations

SC-7.11.B Delete Paragraph 7.11.B in its entirety and insert the following new paragraph in its place.

- 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 mediation 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.

SC-7.11 Add the following new paragraph immediately after Paragraph 7.11.C:

- D. Refer to Article SC-19 for Laws and Regulations that, by terms of said Laws and Regulations, are to be included in the Contract Documents. The failure to include in Article SC-19 any Law or Regulation applicable to the performance of the Work does not diminish Contractor's responsibility to comply with all Laws and Regulations applicable to the performance of the Work.

7.14 Hazard Communication Programs

SC-7.14 Add the following new paragraph immediately after Paragraph 7.14.A:

- B *Single Prime Contract*: Contractor shall be responsible for coordinating exchange of 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 and Regulations. Contractor shall provide a centralized location for the maintenance of the safety data sheets or other hazard communication information required to be made available by any employer on the Site. Location of the material safety data sheets or other hazard communication information shall be readily accessible to the employees of employers on the Site.

SC-7.16.E.1 Delete in its entirety Paragraph 7.16.E.1.b, and replace with the following:

- b. Engineer will provide timely review of such Submittals in accordance with the Schedule of Submittals accepted by Engineer. When Engineer deems such Submittals to be not in conformance with the Contract Documents, Engineer will furnish to Contractor written indication of such non-acceptance. When such Submittals are acceptable, Engineer's acceptance will be indicated in accordance with Specifications Section 01 33 00 – Submittal Procedures.

7.17 *Contractor's General Warranty and Guarantee*

SC-7.17.A Delete Paragraph 7.17A in its entirety and insert the following new paragraph in its place.

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective for a period of 12 months, or such longer periods as set forth in the Contract Documents, from the effective date of Final Completion.

7.18 *Indemnification*

SC-7.18.A Delete Paragraph 7.18.A in its entirety and insert the following new paragraph in its place.

- 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 mediation 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.

ARTICLE 8—OTHER WORK AT THE SITE

8.03 *Legal Requirements*

SC-8.03.C Delete Paragraph 8.03.C in its entirety and insert the following new paragraph in its place.

- 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 mediation 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 mediation or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

No Supplementary Conditions in this Article.

ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

10.03 Resident Project Representative

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

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
 2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
 3. *Liaison*
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
 4. *Review of Work; Defective Work*

- a. Conduct on-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
- b. Observe whether any Work in place appears to be defective. This does not impose on either RPR or Engineer any obligation to find all, or any specific element of, defective Work, for which Contractor remains solely responsible.
- c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.

5. *Inspections and Tests*

- a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to (1) code-required tests and special inspections, and (2) those performed by public or other agencies having jurisdiction over the Work.
- b. Observe specific tests, inspections, and other field quality control required by the Contract Documents and performed by Contractor, Subcontractor, Supplier, or by testing or laboratories retained by any of them.
- c. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.

6. *Payment Requests:* Review Applications for Payment with Contractor and advise Contractor regarding quantities or extent of the Work eligible for payment.

7. *Completion*

- a. Participate in Engineer's visits regarding inspection for Substantial Completion.
- b. Assist in the augmenting or amending the punch list of items to be completed or corrected prior to final inspection.
- c. *Final Inspection:* Participate in Engineer's visit to the Site, in the company of Owner and Contractor, regarding completion of the Work, and prepare a final punch list (if any) of items to be completed or corrected by Contractor.
- d. Observe whether items on the final punch list have been completed or corrected.
- e. *Record Documents:* Periodically during the Work, review with Contractor the status of Contractor's record documents required by the Contract Documents and advise Contractor on whether such record documents appear to comply with the Contract's requirements for record documents. Review final record documents submitted by Contractor.

D. The RPR will not:

- 1. Authorize any deviation from the Contract Documents or substitution of materials, equipment (including "or-equal" items), or procedures or sequences indicated in the Contract Documents.
- 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 or responsibility over any aspect of the means, methods, techniques, sequences or procedures of construction.

5. Advise on, issue directions regarding, or assume control over security protection, or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 11—CHANGES TO THE CONTRACT

No Supplementary Conditions in this Article.

ARTICLE 12—CLAIMS

No Supplementary Conditions in this Article.

ARTICLE 13—CLAIMS

No Supplementary Conditions in this Article.

ARTICLE 14—COST OF WORK; ALLOWANCES, UNIT PRICE WORK

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

E. Adjustments in Unit Price

1. Contractor or Owner shall be entitled to an adjustment in the unit price if the quantity on an individual bid item extends or fails to achieve 25 percent of the estimated quantity at the time of Contract formation plus any additions or deletions included in change orders to the contract.
2. The adjusted unit price will apply only to all units installed for that bid item.

ARTICLE 15—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

No Supplementary Conditions in this Article.

ARTICLE 16—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD

15.03 *Substantial Completion*

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

1. If some or all of the Work has been determined by Engineer not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer or other entity retained by Owner, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor

does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

15.08 Correction Period

SC-15.08.C Delete Paragraph 15.08.C in its entirety and insert the following new paragraph in its place.

- 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 mediation 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.

ARTICLE 17—SUSPENSION OF WORK AND TERMINATION

No Supplementary Conditions in this Article.

ARTICLE 18—FINAL RESOLUTIONS OF DISPUTES

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

SC-17.02 Mediation

- A. All matters subject to final resolution under this Article will be decided by mediation in accordance with the "Rules Implementing Mediated Settlement Conferences in North Carolina Public Construction Projects". This agreement to mediate will be specifically governed by and enforceable under the prevailing laws of the State of North Carolina. Venue for any dispute resolution or adversarial process shall be exclusively Catawba County, North Carolina.

17.03 Attorneys' Fees

SC-17.03 Add the following new paragraph immediately after Paragraph 17.02.

SC-17.03 Attorneys' Fees

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

ARTICLE 19—MISCELLANEOUS

18.08 *Delete SC-18.08 In its Entirety.*

SC-18.11 Add a new paragraph after Paragraph 8.10.

SC-18.11 *E-Verify*

Contractor shall comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes. Further, if Contractor uses a subcontractor, Contractor shall require the subcontractor to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes.

SC-18.12 Add a new paragraph immediately after Paragraph 8.11.

SC-18.12 *Non-Appropriation Clause*

Payment to Contractor for services is expressly conditioned upon availability of funds, and upon the actual receipt of funds, from appropriated revenue sources. If funds are insufficient to meet expected performances hereunder due to non-appropriation or reduction of funds by the source, services to be provided hereunder may be adjusted by the parties, in writing, to conform with the funds which are actually available. If such adjustment is impractical or would defeat the intent or purpose of this Agreement, same may be terminated accordingly without penalty.

SC-18.13 Add a new paragraph immediately after Paragraph 8.12.

SC-18.13 *Non-Discrimination*

Neither Party nor its employees will discriminate against any person based on race; religion; creed; color; sex; gender identity and expression; pregnancy; childbirth; breastfeeding; medical conditions related to pregnancy, childbirth, or breastfeeding; sexual orientation; marital status; age; national origin; ancestry; genetic information; disability; veteran status; low income status or any class protected by local, state, or federal law in the performance of this Agreement.

This page intentionally left blank.

RULES IMPLEMENTING MEDIATED
SETTLEMENT CONFERENCES IN
CATAWBA COUNTY
Adopted: February 5, 2024

Table of Rules

RULE

1. Initiating Mediated Settlement Conferences
 - A. Purpose of Mandatory Settlement Conferences
 - B. Initiating the Dispute Resolution Process
 - C. Condition Precedent to Litigation
2. Selection of a Mediator
 - A. Selection of a Certified Mediator by Agreement of the Parties
 - B. Withdrawal or Disqualification of a Mediator
3. The Mediated Settlement Conference
 - A. Where the Conference is to be Held
 - B. When the Conference is to be Held
 - C. Requests to Extend the Deadline for Completion
 - D. Recesses
 - E. Postponements
 - F. Construction Projects
4. Duties of Parties and Other Participants
 - A. Attendance
 - B. Finalizing the Agreement
 - C. Mediation Fee
 - D. Failure to Compensate the Mediator
5. Authority and Duties of Mediators
 - A. Authority of Mediators
 - B. Duties of Mediators
6. Compensation of the Mediator
7. Mediator Certification
8. Rule Amendments
9. Time Limits
10. No Recording

RULE 1. INITIATING MEDIATED SETTLEMENT CONFERENCES

- A. Purpose of Mandatory Settlement Conferences. Pursuant to Catawba County Code Section 8-35 and NCGS §143-128(f1), these Rules are promulgated to implement a system of settlement events which are designated to focus the parties' attention on settlement rather than on claim preparation and to provide a structured opportunity for settlement negotiations to take place. Nothing herein is intended to limit or prevent the parties from engaging in settlement procedures voluntarily at any time prior to or during commencement of the dispute resolution process.
- B. Initiating the Dispute Resolution Process.
1. Any party to a Catawba County contract governed by Catawba County Code Chapter(s) 8 or 30 and who is a party to a dispute arising out of the construction process in which the amount in controversy is at least \$15,000 may submit a written request to Catawba County for mediation of the dispute.
 2. Prior to submission of a written request for mediation to Catawba County, the parties should give notice of any and all claims in accordance with their respective contracts, obtain decisions on the claims as required or allowed by their respective contracts, and attempt to resolve the dispute according to the terms and conditions in their respective contracts. The Mediator may adjourn any mediated settlement conference if the Mediator believes, in his or her sole discretion, that the parties have not satisfied all of the terms and conditions of their respective contracts and that doing so will enhance the prospects for a negotiated settlement.
- C. Condition Precedent to Litigation. Before any party to a Contract may commence a civil action against Catawba County seeking remedies for breach or non-performance of the Contract by the County, said party must first initiate the dispute resolution process under these rules and attend and participate in good faith in the mediated settlement conference.

RULE 2. SELECTION OF A MEDIATOR

- A. Selection of a Certified Mediator by Agreement of the Parties. The parties shall select a Certified Mediator within twenty-one (21) days of receipt by the County of the request for mediation. If the Mediator selected is not available or declines to participate for any reason, the parties shall select another Certified Mediator. If the parties are unable to agree on a mediator within twenty-one (21) days of the request for mediation, the County shall have the right in its absolute discretion to appoint a Certified Mediator.
- B. Withdrawal or Disqualification of a Mediator. Any party may request replacement of a mediator by Catawba County for good cause. If a mediator withdraws or is disqualified, then the parties shall select another Certified Mediator within three (3) days of the notice of withdrawal or disqualification. A mediator who has withdrawn or been disqualified shall not be entitled to receive an administrative fee, unless the mediation has been commenced. If the parties do not select and designate a mediator within three (3) days from the notice of withdrawal or disqualification, the County shall have the right in its absolute discretion to appoint a Certified Mediator.

RULE 3. THE MEDIATED SETTLEMENT CONFERENCE

- A. Where the Conference is to be Held. Unless all parties and the mediator otherwise agree, the mediated settlement conference shall be held in Catawba County. The mediator shall be responsible for reserving a place and making arrangements for the conference and for giving timely notice of the time and location of the conference to all attorneys, unrepresented parties and other persons and entities required to attend.
- B. When the Conference is to be Held. The mediation shall be completed within ninety (90) days after selection of the mediator.
- C. Request to Extend the Deadline for Completion. A party, or the mediator, may request that Catawba County extend the deadline for completion of the mediated settlement conference. Such request shall state the reasons the extension is sought and shall be served by the moving party upon the other parties and the mediator. If any party does not consent to the request, said party shall promptly communicate its objection, and the reasons for its objection, to Catawba County. Catawba County may grant the request by setting a new deadline for completion of the conference, or deny the request to extend the deadline, resulting in an impasse of the mediation.
- D. Recesses. The mediator may recess the mediated settlement conference at any time and may set times for reconvening. If the time for reconvening is set before the conference is recessed, no further notification is required for persons present at the conference.
- E. Postponements. A mediated settlement conference session may be postponed for good cause only after notice by the movant to all parties of the reason for the postponement and a finding of good cause by Catawba County.
- F. Construction Project. The mediated settlement conference or the matter subject of the mediated settlement conference shall not be cause for the delay of the construction project which is the focus of the dispute.

RULE 4. DUTIES OF PARTIES AND OTHER PARTICIPANTS

- A. Attendance.
 - 1. All parties to the dispute must attend the mediated settlement conference. Failure of a party to a construction contract to attend the mediated settlement conference will result in Catawba County's withholding of monthly payment to that party until such party attends the mediated settlement conference.
 - 2. Attendance shall constitute physical attendance, not by telephone or other electronic means. Notwithstanding the foregoing, all parties and persons required to attend a mediated settlement conference may agree to conduct the conference using remote technology, or using a hybrid of in-person attendance and remote technology.
 - 3. Any party that is a nongovernmental entity shall be represented at the mediated settlement conference by an officer, employee, or agent who is not the entity's outside counsel and who has been authorized to decide whether, and on what terms, to settle the action on behalf of the entity, or who has been authorized to negotiate on behalf of the entity and can promptly communicate during the conference with persons who have decision-making authority to settle the action;

provided, however, that if a specific procedure is required by law (e.g., a statutory pre-audit certificate) or the entity's governing documents (e.g., articles of incorporation, bylaws, partnership agreement, articles of organization, or operating agreement) to approve the terms of the settlement, then the representative shall have the authority to negotiate and make recommendations to the applicable approval authority in accordance with that procedure.

4. Any party that is a governmental entity shall be represented at the mediated settlement conference by an employee or agent who is not the entity's outside counsel and who: (i) has authority to decide on behalf of the entity whether and on what terms to settle the action; (ii) has been authorized to negotiate on behalf of the entity and can promptly communicate during the conference with persons who have decision-making authority to settle the action; or (iii) has authority to negotiate on behalf of the entity and to make a recommendation to the entity's governing board, if under applicable law the proposed settlement terms can be approved only by the entity's governing board. Notwithstanding anything in these rules to the contrary, any agreement reached which involves a governmental entity may be subject to the provisions of NCGS §159-28(a).
5. Attorneys on behalf of parties may attend the mediated settlement conference but are not required to do so.
6. Sureties or insurance company representatives are not required to attend the mediated settlement conference unless any monies paid or to be paid as a result of any agreement reached as a result of mediation require their presence or acquiescence. If such agreement or presence is required, then authorized representatives of the surety or insurance company must attend the mediation.

- B. Finalizing the Agreement. If an agreement is reached in the mediated settlement conference, parties to the agreement shall reduce the terms to writing and sign it along with their counsel, if counsel is present, prior to the adjournment of the conference. If additional time is required to formalize an agreement, the mediator may recess the conference and set a time certain for reconvening pursuant to Rule 3(D). The time for reconvening shall be as soon as practicable to allow for formalization of the agreement.
- C. Mediation Fee. The mediation fee and any ancillary fees shall be paid in accordance with Rule 6 Compensation of the Mediator.
- D. Failure to Compensate the Mediator. Any party's failure to compensate the mediators in accordance with Rule 6 shall subject that party to a withholding of said amount of money from the party's monthly payment by Catawba County.

RULE 5. AUTHORITY AND DUTIES OF MEDIATORS

- A. Authority of Mediators.
 1. Control of Conference. The mediator shall at all times be in control of the mediated settlement conference and the procedures to be followed.
 2. Private Consultation. The mediator may communicate privately with any participant or counsel prior to and during the mediated settlement conference. The fact that

private communications have occurred with a participant shall be disclosed to all other participants at the beginning of the conference.

3. Scheduling the Conference. The mediator shall make a good faith effort to schedule the mediated settlement conference at a time that is convenient with the participants, attorneys and mediator. In the absence of agreement, the mediator shall select the date for the mediated settlement conference.

B. Duties of Mediators.

1. The mediator shall define and describe the following at the beginning of the mediated settlement conference:
 - a. The process of mediation;
 - b. The difference between mediation and other forms of conflict resolution;
 - c. The costs of the mediated settlement conference;
 - a. That the mediated settlement conference is not a trial, the mediator is not a judge, and the parties retain their legal rights if they do not reach settlement;
 - b. The circumstances under which the mediator may meet and communicate privately with any of the parties or with any other person;
 - f. Whether and under what conditions communications with the mediator will be held in confidence during the conference;
 - g. The inadmissibility of conduct and statements as provided by NCGS §7A-38.1(l);
 - h. The duties and responsibilities of the mediator and the participants; and
 - i. Any agreement reached will be reached by mutual consent.
2. Disclosure. The mediator has a duty to be impartial and to advise all participants of any circumstance bearing on possible bias, prejudice or partiality.
3. Declaring an Impasse. It is the duty of the mediator to timely determine that an impasse exists and that the mediated settlement conference should end.
4. Reporting the Results of the Conference. The mediator shall report to Catawba County within ten (10) days of the mediated settlement conference whether or not an agreement was reached by the parties. If an agreement was reached, the report shall state the nature of said agreement. The mediator's report shall inform Catawba County of the absence of any party known to the mediator to have been absent from the mediated settlement conference without permission. Catawba County must require the mediator to provide statistical data for evaluation of the mediated settlement conference program.
5. Scheduling and Holding the Conference. It is the duty of the mediator to schedule the mediated settlement conference and conduct it prior to the deadline of completion set by these Rules. Deadlines for completion of the conference shall be strictly observed by the mediator unless said time limit is changed by a written order from Catawba County.

RULE 6. COMPENSATION OF THE MEDIATOR

The parties shall compensate the mediator for mediation services, and any ancillary fees related to the mediation, at the rate in accordance with the rate charged for Superior Court mediation. The parties shall

also pay to the mediator a one-time per case administration rate in accordance with the rate charged for Superior Court mediation, which is due upon appointment.

RULE 7. MEDIATOR CERTIFICATION

All mediators shall be properly certified in accordance with the rules certifying mediators in Superior Court in North Carolina. (Except when otherwise allowed by Catawba County upon the request of the parties to the mediation.) When selecting mediators, the parties may designate a preference for mediators with a background in construction law or public construction contracting. Such requirements, while preferred, are not mandatory under these Rules. All mediators chosen must either demonstrate they are certified in accordance with the Rules for Mediated Settlement Conferences in Superior Court or must gain the consent of Catawba County to mediate any dispute in accordance with these Rules.

RULE 8. RULE AMENDMENTS

These Rules are subject to amendment by Catawba County at any time the County deems appropriate.

RULE 9. TIME LIMITS

Any time limit provided for by these Rules may be waived or extended by the County for good cause shown.

RULE 10. NO RECORDING

There shall be no stenographic, audio, or video recording of the mediation process by any participant. This prohibition includes recording either surreptitiously or with the agreement of the parties.

Blackburn MSW Landfill Unit 4 Construction
Advance Sitework & Utility Relocation

Catawba County
Newton, NC

ADDENDUM NO. [X]
[Month] [Day], [Year]

TO: Prospective Bidders

FROM: HDR (Engineer)
[HDR project office street address]
[HDR project office city, state, postal code]

OWNER: [Owner's organization name]
[Owner's street address]
[Owner's city, state, postal code]

SUBJECT: [Site or facility name]
[Project title—same as on Drawings and project manual cover]
[Owner's contract designation, if any]

This Addendum is part of the Bidding Documents and the Contract Documents and modifies the original Bidding Documents dated [____], as indicated below. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification for award of the associated Contract.

This Addendum consists of [____] pages and the attachments, if any, listed on the last page.

ADDENDUM NO. [1] SEALS AND SIGNATURES

[insert licensee], PE License No. []	The seal and signature to the left applies to the changes made via this Addendum for the Work in the following divisions, sections, and Drawings of the proposed Contract Documents: • []. • [].
[insert licensee], PE License No. []	The seal and signature to the left applies to the changes made via this Addendum for the Work in the following divisions, sections, and Drawings of the proposed Contract Documents: • []. • [].
[insert licensee], PE License No. []	The seal and signature to the left applies to the changes made via this Addendum for the Work in the following divisions, sections, and Drawings of the proposed Contract Documents: • []. • [].

[insert licensee], PE License No. []	The seal and signature to the left applies to the changes made via this Addendum for the Work in the following divisions, sections, and Drawings of the proposed Contract Documents: • []. • [].

Engineer's seal and signature does not apply to the documents, or changes thereto, that comprise Division 00, Bidding and Contracting Requirements, except for revisions to provisions of prior Addenda that modify the Specifications and Drawings.

It is a violation applicable laws and regulations governing professional licensing and registration for any person, unless acting under the direction of the licensed and registered design professional(s) indicated above, to alter in any way the proposed Specifications, Drawings, and Addenda for this Project.

CHANGES TO PRIOR ADDENDA

None

CHANGES TO INTRODUCTORY INFORMATION

None

CHANGES TO BIDDING REQUIREMENTS

None

CHANGES TO CONTRACTING REQUIREMENTS

None

CHANGES TO SPECIFICATIONS

CHANGES TO DRAWINGS

ATTACHMENTS

The items listed below and bound following this document's "End of Addendum" designation, are part of this Addendum.

None

• .

END OF ADDENDUM NO. [X]

SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Location and description of Work and prior uses of the Site.
 2. Construction Contracts for this Project.
 3. Others retained by Owner for the Project.
 4. Work by others under Owner's control on other projects.
 5. Work by others not under Owner's control.
 6. Work by Owner.
 7. Sequence and progress of Work.
 8. Contractor's use of the Site.
 9. Easements and rights-of-way.
 10. Partial utilization by Owner.
 11. Utility owners.
 12. Tree trimming, clearing, and tree removal.
- B. Related Requirements:
1. Include, but are not limited to, the following:
 - a. Section 01 14 19 - Use of Site.
 - b. Section 01 71 33 - Protection of the Work and Property.

1.2 LOCATION AND DESCRIPTION OF WORK

- A. The Work is located at the Blackburn MSW Landfill , 3993 Rocky Ford Road, Newton, North Carolina, 28658
- B. The Project includes constructing the Work broadly described below, in accordance with the Contract Documents, with all related appurtenances. Work shown on the Drawings, or indicated in the Specifications, or indicated elsewhere in the Contract Documents is part of the Work, regardless of whether indicated below. The Work includes, but is not limited to, the following:

The work includes excavation and placement of structural fill and topsoil from on-site borrow area to prepare subgrade for perimeter landfill berms and roadways, installation of gravel road materials, installation of landfill gas header piping, valves, condensate trap, permanent and temporary leachate forcemain, underground electrical conduits, temporary power to existing leachate pump stations, construction to temporary and permanent stormwater basins, piping and structures, erosion and sediment control and other appurtenant work.

- C. Contracting Method: The Project will be constructed under a single prime construction Contract.

1.3 CONSTRUCTION CONTRACTS FOR THIS PROJECT

- A. Single Prime Construction Contract: The Contract requires all the Work for the Project not expressly allocated to Owner or others in the Contract Documents.

1.4 OTHERS RETAINED BY OWNER FOR THE PROJECT

- A. Engineer:
1. Engineer is identified in the Agreement.

2. Engineer's responsibilities for the Project, relative to Contractor, are indicated throughout the Contract Documents.
 3. Whether the Engineer will furnish the services of a Resident Project Representative (RPR) for the Project is indicated in the Supplementary Conditions.
- B. Non-Professional Services Contracted by Owner: Owner will retain services of the following entities to perform the services indicated relative to the Project. Contractor shall coordinate and schedule the Work with, and cooperate with, the entities performing the following services for Owner.
1. Code-Required Special Inspections and Testing:
 - a. Owner has, or will, retain the services of a qualified testing laboratory to perform code-required testing and special inspections for the Work, in accordance with selected provisions of the Contract Documents related to field testing.

1.5 WORK BY OTHERS UNDER OWNER'S CONTROL - OTHER PROJECTS

1.6 NONWORK BY OTHERS NOT UNDER OWNER'S CONTROL

- A. None.

1.7 WORK BY OWNER

- A. Owner will perform the following in connection with the Work:
1. Operate all existing valves, flow-control gates, pumps, equipment, and appurtenances that will affect Owner's operations or facility processes, unless otherwise specified or indicated.

1.8 SEQUENCE AND PROGRESS OF WORK

- A. Requirements for sequencing and coordinating with Owner's operations, including maintenance of facility operations during construction, and requirements for tie-ins and shutdowns, are in Section 01 14 16 - Coordination with Owner's Operations.

1.9 CONTRACTOR'S USE OF SITE

- A. Use of Site - General:
1. Limits on Contractor's use of the Site are indicated in Section 01 14 19 - Use of Site, and as may be shown on the Drawings.
 2. Contractors shall share use of the Site with other contractors and others specified in Articles 1.3 through 1.6 (inclusive) of this Section.
 3. Relocate stored materials and equipment that interfere with operations of Owner, other contractors, and others performing work for Owner.
 4. Comply with restrictions set forth in Section 01 14 19 - Use of Site.
- B. Owner will occupy the Site jointly with Contractor during construction for performance of Owner's typical operations. Coordinate with Owner in all construction operations to minimize conflicts between Contractor and Owner's employees and others under Owner's control. If the Site is a treatment facility or other production facility, Owner will have Owner's suppliers for deliveries of chemicals and other items accessing the Site from time to time, possibly on a daily basis.

1.10 EASEMENTS AND RIGHTS-OF-WAY

- A. Easements and Rights-of-Way - General:
1. Easements and rights-of-way required for the permanent improvements included in the Work will be provided by Owner in accordance with the General Conditions and Supplementary Conditions.
 2. Confine construction operations within Owner's property, public rights-of-way, easements obtained by Owner, and limits shown, and property for which Contractor has made arrangements directly with property owner(s).

3. Use care in placing construction tools, machinery and equipment, excavated materials, and materials and equipment to be incorporated into the Work to avoid damaging property and interfering with traffic.
4. Do not enter private property outside the construction limits without permission from the owner of the property.

1.11 UTILITY OWNERS

- A. Utilities known to Engineer and that may have Underground Facilities or other facilities in the vicinity of the Work are:
 1. Terreva Renewables, LLC:
 - a. Renewable Natural Gas Main and Easement.
 - b. 889 Howell Mill Road NW, Suite 4300, Atlanta, GA 30318.
 - c. Telephone: 925.719.0921.
- B. Utilities and their owners indicated in the Contract Documents are for Contractor's convenience. Neither Owner nor Engineer will be liable to Contractor or any utility owner for failure to indicate utility, its owner, or complete and correct contact information in the Contract Documents where Contractor's reasonable and ordinarily-exercised diligence would reveal the presence of the utility and its owner. Nothing in the Contract mitigates Contractor's responsibilities under the General Conditions, Section 01 71 33 - Protection of the Work and Property, and Laws and Regulations, including "call before you dig" regulations.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

This page intentionally left blank.

SECTION 01 14 16
COORDINATION WITH OWNER'S OPERATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for coordinating with Owner's operations during the Project.
 2. Requirements for tie-ins and shutdowns necessary to complete the Work without impact on Owner's operations except as allowed in this Specifications section.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to coordinate with Owner's operations during the Work in accordance with this Specifications section.
 2. Except for shutdowns specified in this Specifications section, perform the Work such that Owner's facilities remain in continuous, satisfactory operation during the Project. Schedule and perform the Work such that the Work does not: impede Owner's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, cause odors or other nuisances, does not affect the public health, safety, welfare, and convenience, and does not adversely affect the environment resulting in violation of Laws or Regulations.
 3. Work not specifically addressed in this Specifications section or in referenced sections may, in general, be performed, to be completed within the Contract Times, at any time during regular working hours in accordance with the Contract Documents, subject to the requirements in this section.
- C. Related Requirements: Include but are not necessarily limited to:
1. Section 01 11 00 - Summary of Work.
 2. .
 3. Section 02 41 00 - Demolition.

1.2 REFERENCES

- A. Terminology:
1. Terminology indicated below are not defined terms and are not indicated with initial capital letters, but when used in this Specifications section have the meaning indicated below:
 - a. The term "Owner" is used throughout this section. When the facility is operated or managed by an entity other than Owner, references in this section to "Owner" as the operator or manager of the facility will be interpreted as referring to the facility manager.
 - b. A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, conduit (including piping and ducting), has to be temporarily suspended or taken out of service to perform the Work.
 - c. A "tie-in" is a connection of new Work to existing facilities, including connecting to existing conduits (including piping and ducting), electrical systems, structural elements, process/mechanical elements, and other physical connections.

Some tie-ins may require that the tie-in be made without an associated shutdown.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review construction procedures under other Specifications sections and coordinate Work that will be performed with or before the Work indicated in this Section.

B. Sequencing and Scheduling:

1. Refer to this Specifications sections articles on sequencing, tie-ins, and shutdowns.

1.4 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Shutdown Planning Submittal:

- a. For each shutdown, submit an inventory of labor, materials, and equipment required to perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for Owner to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
- b. Furnish submittal to Engineer not less than 30 days prior to proposed shutdown start date. Do not start shutdown until obtaining Engineer's acceptance of shutdown planning Submittal.

2. Shutdown Notification:

- a. After Engineer's acceptance of shutdown planning Submittal and prior to starting the shutdown, submit written notification to Owner and Engineer of date and time each shutdown is to start. Submit notification not less than 72 hours in advance of each shutdown.

1.5 GENERAL CONSTRAINTS

A. Indicated in the Contract Documents are the sequence and shutdown durations, where applicable, for Owner's equipment, systems, and conduits (including piping and ducting) that are to be taken out of service temporarily for the Work. New materials and equipment may be used by Owner after the specified field quality control activities are successfully completed and the materials or equipment are substantially complete in accordance with the Contract Documents.

B. The following constraints apply to coordination with Owner's operations:

1. **Operational Access:** Owner's personnel shall have access to equipment and areas of the facility that remain in operation.
2. **Temporary Partitions and Enclosures:** Provide temporary partitions and enclosures necessary to maintain dust-free, heated, and ventilated spaces in areas of the facility that are adjacent to the Work and that must be kept operational. Comply with Section 01 51 05 -Temporary Utilities.
3. **Schedule and perform equipment and system start-ups in accordance with project requirements.** Equipment and systems shall not be placed into operation on Friday, Saturday, Sunday, or holidays without prior approval of Owner, unless specifically indicated otherwise in the Contract Documents.
4. **Dead End Valves or Conduits:**
 - a. Provide blind flanges, watertight bulkheads, or valve at temporary and permanent terminuses of conduits, including piping and ducting.

- b. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required, or otherwise restrained as necessary or as required by Engineer.
 - c. Temporary valves shall be suitable for their associated service. Where valve is provided at permanent terminus of conduit, including piping or ducting, also provide on downstream side of valve a blind flange with drain/flushing connection.
- 5. Owner will assist Contractor in dewatering process tanks, basins, conduits, and other work areas to be dewatered for shutdowns. Maintain clean, dry work area by pumping and properly disposing of fluid and other material that accumulates in work areas.
- 6. Draining and Cleaning of Conduits, Tanks, and Basins:
 - a. Unless otherwise shown or indicated in the Contract Documents, Contractor shall dewater process tanks, basins, conduits (including piping) at beginning of each shutdown. Flush, wash down, and clean tanks, basins, conduits (including piping), and other work areas.
 - b. Contractor shall remove liquids and solids and dispose of them at appropriate location at the Site as directed by Engineer. Unless otherwise specified or indicated, contents of tanks, basins, and conduits (including piping) undergoing modifications shall be transferred to existing process tanks or conduits at the Site with capacity sufficient to accept such discharges, using hoses, temporary piping, temporary pumps, and other means provided by Contractor. Discharge of fluids across floors is not allowed.
 - c. If drainage point is not available on the conduit (including piping) to be drained, provide a wet tap using tapping saddle and valve or other method approved by Engineer. Uncontrolled spillage of contents of conduits (including piping) is not allowed.
 - d. Spillage shall be brought to Engineer's attention immediately, both orally and in writing, and reported in accordance with Laws and Regulations. Contractor shall wash down spillage to floor drains or sumps or other appropriate location and flush the system to prevent clogging and odors. If spillage is not suitable for discharge to the drainage system, such as chemical spills, as determined by Engineer, Contractor shall remove spillage by other means, such as vactor truck, sorbents, or other method acceptable to Engineer.

1.6 TIE-INS

- A. Table 01 14 16-A in this Specifications section lists connections by Contractor to existing facilities. Table 01 14 16-A may not indicate all tie-ins required for the Work; Contractor shall perform tie-ins necessary and required to complete the Work as shown or indicated in the Contract Documents, regardless of whether tie-in is indicated in Table 01 14 16-A. For tie-ins not indicated in Table 01 14 16-A, obtain requirements for tie-ins from Engineer by requesting an interpretation or clarification.

1.7 SHUTDOWNS

- A. Shutdowns shall be in accordance with Table 01 14 16-B of this Specifications section. Work requiring service interruptions for tie-ins shall be performed during scheduled shutdowns.
- B. Work that may interrupt normal operations shall be accomplished at times convenient to Owner unless otherwise indicated in the Contract Documents.

- C. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.
- D. Fines and Penalties Imposed by Authorities Having Jurisdiction:
 - 1. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor if, in Engineer's opinion, Contractor did not comply with requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in performing the Work and complying with applicable permits, Laws, and Regulations.
 - 2. Owner or Engineer may deduct as set-offs such amounts from payments due Contractor.
- E. Temporary, short-term shutdowns of smaller conduits (including piping and ducting), equipment, and systems may not be included in Table 01 14 16-B. Coordinate requirements for such shutdowns with Engineer and Owner. Where necessary, obtain Engineer's interpretation or clarification before proceeding.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 SUBSTITUTE PROCEDURES

- A. Proposal of Substitute Sequencing, Shutdowns, and Tie-Ins:
 - 1. As a substitute to the procedures indicated in this Specifications section, Contractor may propose providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to Owner, provided such additional temporary facilities: do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect Owner's ability to comply with Laws and Regulations, permits, and operating requirements; that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.
 - 2. Engineer will consider proposals for substitute procedures after the Effective Date of the Contract. All Bids shall be based on the requirements of the Contract Documents, including this section.
 - 3. Substitution Requests:
 - a. When proposing a substitute procedure for a tie-in or shutdown or other requirements of this section, comply with the requirements of the General Conditions and Supplementary Conditions (regarding substitutes) and Section 01 25 00 - Substitution Procedures.
 - b. When deviation from specified sequence or procedures is proposed, Contractor's proposal shall explain in detail the proposed sequence and procedures and associated effects, including evidence that Owner's operations will not be adversely affected, to an extent greater than originally contemplated in the Contract Documents, by proposed substitution. List benefits of proposed substitution, including benefits to Progress Schedule.

3.2 GENERAL PROVISIONS FOR COORDINATING WITH OWNER'S OPERATIONS

- A. When possible, combine multiple tie-ins into a single shutdown to reduce impacts on Owner's operations and processes.
- B. Operation of Existing Systems and Equipment during the Work:

1. Do not shut off or disconnect existing operating systems or equipment, unless accepted by Engineer in writing.
 2. Operation of existing systems and equipment will be by Owner unless otherwise specified or indicated.
 3. Where necessary for the Work, Contractor shall seal or bulkhead Owner-operated gates and valves to prevent leakage that may affect the Work, Owner's operations, or both.
 4. Provide temporary watertight plugs, bulkheads, and line stops as necessary and as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of Engineer.
- C. Bypassing:
1. Diversion of flows around treatment processes is not allowed.
- D. Performing the Work of this section constitutes Contractor's approval of underlying work and field conditions prevailing at the time of the Work.

3.3 PREPARATION

- A. Coordinate preparations for removals with requirements of Section 02 41 00 - Demolition, as applicable.
- B. Shutdowns - General Preparation:
1. Coordinate shutdowns with Owner and Engineer.
 2. Submit shutdown planning Submittals and shutdown notification Submittals in accordance with this Specifications section's "Submittals" Article.
 3. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, materials, equipment, spare parts, both temporary and permanent, necessary to successfully perform the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to commencing the associated shutdown. Demonstrate to Engineer's satisfaction that Contractor has complied with such requirements before commencing the shutdown.
 4. Engineer shall have no duty to Contractor to advise Contractor of inadequate preparations by Contractor; Contractor is solely responsible for the means, methods, procedures, techniques, and sequences of construction.
- C. Shutdowns of Electrical Systems:
1. Comply with Laws and Regulations, including the National Electric Code.
 2. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before starting other Work associated with the shutdown.
 3. Upon completion of shutdown Work, remove the locks and tags and advise Engineer or Resident Project Representative (RPR) that facilities are available for use.
 4. Following Shutdown:
 - a. Verify functionality of equipment and systems.
 - b. Verify operation of new equipment and systems, and verify that joints in conduits (including piping and ducting) are watertight or gastight as applicable.
 - c. Repair joints that are not watertight or gastight, as applicable.
 - d. Remove temporary pumping system and appurtenances.

3.4 ATTACHMENTS

A. The following, bound after this Specifications Section's "End of Section" designation, are part of this Specifications Section:

1. Tables:

a. Table 01 14 16-A, Schedule of Tie-ins.

Type	Location
Temporary Electric	Existing Panel P-2 and Unit 3 Phase 1 and 2 Leachate Pump Stations
Temporary Leachate	Unit 3 Phase 1 and 2 Leachate Forcemains
Leak Detection	Unit 2 Leak Detection Manhole
Gas Condensate	Unit 3 Gas Condensate Manhole
Gas Header	18" Perimeter Header and 12" Southern Header

b. Table 01 14 16-B, Schedule of Shutdowns.

Type	Location
Leachate Pump Station Electric	Existing Panel P-2 and Unit 3 Phase 1 and 2 Leachate Pump Stations
Gas Header	18" Perimeter Header and 12" Southern Header. Contractor shall coordinate with Owner for short term shutdown of active gas collection vacuum to segments of header pipes requiring extension and installation of isolation valves.

END OF SECTION

Table 01 14 16-A

Schedule of Tie-Ins

Tie-In No.	New Line Size and Service	Existing (Connecting) Line Size & Service	Tie-In Building/Location	Construction Stage	Remarks
1					
2					
3					
4					
5					
6					

Table 01 14 16-B
Schedule of Shutdowns

Shut- down No.	Process Equipment and Service Lines Out-of-Service During Shutdown	Process Equipment In Operation During Shutdown	Tie-In Nos.	Maximum Duration
A				
B				
C				
D				

SECTION 01 14 17
MITIGATION OF CONSTRUCTION ON THE PUBLIC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for:
 - a. Coordination of the Work with the public, including community events.
 - b. Public informational meetings during construction.
 - c. Community relations during construction.
 - d. Maintenance and use of construction equipment and machinery.

B. Scope:

1. Allowable days and hours of work at the Site, and Owner's holidays, are addressed in the General Conditions and the Supplementary Conditions.
2. Unless otherwise required by the Contract Documents, Contractor shall provide reasonable mitigation of effects of construction on the public, in addition to the general requirements set forth in the Specifications indicated in Paragraph 1.1.C of this Section. Provide effective measures to reduce and mitigate the effects on the public (including property owners and occupants of property at and adjacent to the Site) of constructing the Work.

C. Related Requirements:

1. Include but are not necessarily limited to:
 - a. Section 01 11 00 - Summary of Work.
 - b. Section 01 55 13 - Vehicular Access and Parking.
 - c. Section 01 57 05 - Temporary Controls.
 - d. Section 01 74 00 - Cleaning.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Give written notice to owners and occupants of properties directly affected by traffic controls.
 - a. Comply with requests of Owner and authorities having jurisdiction relative to coordinating the Work and construction traffic with community events.
 - b. When such events are held on a recurring basis or are otherwise reasonably foreseeable at the Effective Date of the Contract, Contractor is not eligible for increases in Contract Price or Contract Times for delays, costs incurred by Contractor, or other inconvenience to the Work arising from community events.

1.3 FIELD CONDITIONS

A. Existing Conditions:

1. The following are located at or adjacent to the Site, or within such proximity to the Site as to have potential to be affected by performance of the Project's construction:
 - a. Public and private roadways.
 - b. Residential areas.
 - c. Commercial areas.
 - d. Industrial areas, including: Terreva RNG Processing Facility.
 - e.

2. Existing Services: Owner or Engineer are aware of the following essential services that have potential to be affected by the Project's construction activities:
 - a. Utilities by utility owners indicated in Section 01 11 00 - Summary of Work.
 - b. Solid waste and recycles collection in the vicinity of the Site including operation of the solid waste Convenience Center.
 - 1) Contractor shall make reasonable efforts to mitigate effect of the Project's construction activities on service providers' ability to carry out their functions relative to the public.
3. The foregoing is not intended to be comprehensive and does not reduce or mitigate Contractor's responsibility for Contractor's own visual observations of the Site and adjacent areas, as required by the Instructions to Bidders and as affirmed by Bidder's representations in the Bid Form and Contractor's representations in the Agreement. Neither Owner nor Engineer, nor any of their respective consultants or subcontractors, have any responsibility to Bidders, sub-bidders, Contractor, Subcontractors, Suppliers, or any other entity for which Contractor is responsible, for indicating or inventorying the types and nature of properties and services at, adjacent to, or that may be affected by operations at the Site.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 MAINTENANCE AND USE OF CONSTRUCTION EQUIPMENT AND MACHINERY

- A. Regularly perform routine and preventative maintenance on construction equipment and machinery to reduce noise and engine exhaust emissions. Such maintenance includes, but is not limited to:
 1. Regular greasing of construction equipment tracks and treads, chassis, and pivot points
 2. Replacement of worn parts.
 3. Brake checks and maintenance.
 4. Mechanical overhauls.
 5. Maintenance of properly-functioning exhaust emissions controls.
 6. Regular checks and maintenance of noise-attenuating devices and equipment such as mufflers and silencers.
- B. Construction equipment and machinery used at the Site shall have, and be operated with, all applicable covers, hoods, shields, and guards in place and latched closed, and exhaust emissions controls in place and fully operating as intended by their manufacturer. Air-powered (pneumatic) construction equipment and machinery, such as rock drills and jackhammers, shall have effective mufflers on air exhausts. Comply with equipment and machinery manufacturer's recommendations regarding use and maintenance of the associated equipment and machinery.
- C. Construction equipment and machinery not in use shall be shut down, and not left idling for periods longer than three minutes to reduce noise and air pollution.
- D. Brakes on trucks and other construction equipment and machinery shall be adjusted and maintained to avoid emitting objectionable braking noise. Engine brakes shall not be used at the Site or on access roads or haul routes, except in an emergency.
- E. Operators of excavating equipment shall use minimum power consistent with reasonable operation of such construction equipment and avoid banging of buckets on truck beds and other solid objects.

END OF SECTION

SECTION 01 14 19

USE OF SITE

PART 1 - GENERAL

1.1 SUMMARY

1. Section Includes: Restrictions on Contractor's use of the Site and premises.
 2. Restrictions on use of existing buildings and structures, including:
 - a. Permanent utilities and sanitary facilities.
 - b. Existing elevators.
 - c. Existing hoisting equipment.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to comply with restrictions on Contractor's use of the Site and other areas.
 2. Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions, regarding the Contractor's use of the Site and other areas.

1.2 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Site plan showing proposed location of field offices, storage trailers, staging and laydown areas, temporary sanitary facilities, fuel and oil storage, fueling location, bottle gas storage facilities, and other areas Contractor proposes to occupy.
- B. Informational Submittals: Submit the following:
1. Notices of Condition:
 - a. Notice of condition of Owner's existing hoisting equipment that Contractor proposes to use, together with written evaluation of condition of equipment including condition of equipment's safety devices. If corrective work is necessary or advisable, transmit concurrently with the Submittal Contractor's Change Proposal for remedial work, in accordance with Section 01 26 00 - Contract Modification Procedures.
 2. Hoist Manufacturer's Reports: Submit written report of results of each visit to Site by equipment manufacturer's service technician, including purpose and time of visit, tasks performed, and results obtained.
 3. Qualifications Statements:
 - a. Identification by name, and qualifications and experience of, person Contractor proposes as Contractor's operator of Owner's hoisting equipment.

1.3 USE OF PREMISES

- A. Limit use of premises at the Site to work areas shown or indicated on the Drawings and as specified in this Section. Do not disturb portions of the Site beyond areas of the Work.
1. Limits:
 - a. Confine construction operations to the following areas:
 - 1) Limits of Disturbance
 - 2) Designated Borrow Area.
 - b. Confine storage of materials and equipment, and locations of temporary facilities to the following areas:
 - 1) Identified Staging Area.

- 2) Contractor's gang boxes and storage containers for tools in active use in the Work may be kept in reasonable quantity in the work areas as long as such items do not obstruct access to the facilities by Owner or occupants.
- 3) Do not store items of any sort, whether temporarily or otherwise, in stairways and ramps, whether existing or under construction.
- c. Do not enter the following areas:
 - 1) Areas outside of the work areas indicated in Paragraph A.1.a of the "Use of Premises" Article in this Specifications section, and outside of work areas indicated on the Drawings.
2. Prohibitions:
 - a. Do not use the Site for the following:
 - 1) Conducting Contractor's business not related to the Project or other work for Owner.
 - 2) Overnight lodging or other, non-work use of the Site by workers or others for whom Contractor is responsible, whether housed in recreational vehicles, other vehicles, tents, quarters in field offices or Contractor-furnished temporary structures, or in work areas, is unacceptable.
 - 3) Refer to Section 01 57 33 - Temporary Security, for other prohibited activities.
3. Access to Site, Access Roads, Parking Areas, and Haul Routes:
 - a. As designated on Construction Drawings.
- B. Use of Existing Buildings and Structures: Maintain existing buildings and structures in weather-tight condition throughout construction unless otherwise indicated in the Contract Documents. Protect buildings, structures, and occupants during construction.
 1. Use of Existing Utilities, Sanitary Facilities, and First-aid Facilities:
 - a. Refer to Section 01 51 05 - Temporary Utilities.
 - b. Do not use permanent sanitary facilities, whether provided under the Project or existing prior to the Project, at the Site.
 - c. Do not use permanent telephone, Internet, or other communications utilities and facilities at the Site, regardless of whether such services and facilities were provided under the Project or existed prior to the Project, except in cases of emergency.
 - d. Do not use Owner's or occupants' first-aid facilities, except in cases of medical emergency. Promptly replenish used items and supplies with items identical to those used.
 - e. Contractor may use the hoisting equipment and access ways indicated above for moving materials and equipment during construction. Hoisting equipment shall be available to Owner and occupants at all times unless otherwise arranged with Owner and Engineer. Do not load hoisting equipment beyond posted capacity.
- C. Promptly repair damage to premises, including existing structures, finishes, equipment, and other features, caused by construction operations. Upon completion of the Work, restore premises to specified condition; if condition is not specified, restore to pre-construction condition.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 14 33
WORK IN RIGHTS-OF-WAY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for:
 - a. Work in RNG Natural Gas easement.
- B. Scope:
 - 1. Contractor shall coordinate with Terreva Renewables for work within their natural gas line easement and obtain necessary permits, arrange and pay for inspections required by Terreva, and pay all charges for the Work in each right-of-way where the Work will be performed.
 - 2. Comply with applicable rules, regulations, permits, and standards of right-of-way owner.

1.2 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Permits:
 - a. Copy of work permit obtain from owner of each right-of-way in which Work will be performed.
 - b. Submit prior to starting work in or adjacent to the associated right-of-way.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials used shall be in accordance with requirements of associated right-of-way owner and the Contract Documents.

PART 3 - EXECUTION

3.1 PREPARATION AND PROTECTION

- A. Contractor shall implement means necessary to prevent accidents caused or influenced by the Work. Provide flaggers, temporary barriers, barricades, lights, signs, and other temporary measures to provide safe conditions during the Work.

3.2 INSTALLATION

- A. Utility Crossings of Rights-of-Way:
 - 1. Work shall be located as shown on the Drawings.
 - 2. Provide materials, equipment, piping, and appurtenances required for crossings of existing Underground Facilities and aboveground facilities, utilities, and structures.
 - 3. Furnish and maintain at the Site sufficient additional pipe fittings, adapters, and short lengths of required utility carrier pipe (quantities to be determined by Contractor) to expedite providing complete installation of utility carrier piping without unduly long period for open excavations in or adjacent to rights-of-way. Such pipe fittings, adapters, and short pieces are eligible for payment when properly installed and are in accordance with the Contract Documents.
- B. Pavement:
 - 1. When fill is stabilized in accordance with requirements of owner of the street or highway right-of-way and the Contract Documents, replace roadway subbase material and pavement with materials as required by the Contract Documents and, if not expressly required,

replace with pavement of similar type and equal thickness to the pavement in place prior to start of the Work.

2. Paving shall comply with requirements of owner of the street or highway right-of-way and the Contract Documents.

C. Restoration for Other than Paved Areas:

1. Restore disturbed areas of rights-of-way in accordance with associated permits and the Contract Documents. Where permits and the Contract Documents do not expressly address the type or extent of such restoration, restore all areas disturbed during the Work to condition equal to or better than preconstruction conditions.
2. If owner of the right-of-way requires restorations beyond that required by the Contract Documents and applicable permits, promptly advise Engineer and submit Change Proposal in accordance with the Contract Documents. Obtain authorization in accordance with the Contract prior to performing any Work not in accordance with or beyond the scope of the Contract Documents.

END OF SECTION

SECTION 01 22 00
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. General requirements applicable to all bid/pay items.
 2. General provisions on unit prices and quantities.
 3. General provisions on lump sums.
 4. Listing of the various bid/pay items in the Project, together with criteria for measuring Unit Price Work for payment.
- B. Related Requirements: Include, but are not necessarily limited to:
1. Section 01 26 00 - Contract Modification Procedures.
 2. Section 01 29 76 - Progress Payment Procedures.
 3. Section 01 71 23 - Field Engineering.

1.2 REQUIREMENTS APPLICABLE TO ALL BID/PAY ITEMS

- A. In this Section and elsewhere in the Contract Documents, the terms "bid item", "pay item", "bid/pay item", "Item" followed by a number designation, "this item", and the like all have the same meaning, and refer to one or more specific elements of the Contract, established for pricing and payment, as indicated in the Bid Form and in the Agreement (or exhibit to the Agreement) at the time the Contract was signed by the parties.
- B. This Article applies to all bid/pay items in the Contract.
- C. Prices – General:
1. The bid/pay items listed starting with Article 1.5 of this Section refer to and are the same bid items listed in the Bid Form and included in the Contract, and constitute all bid/pay items for the Work at the time the Contract was signed by the parties.
 2. No direct or separate payment will be made, outside of the bid/pay items in the Contract, for the following: providing miscellaneous temporary or accessory materials or equipment, temporary works, temporary construction facilities, Contractor's project management, superintendence, and similar costs for Subcontractors or Suppliers; bonds and insurance; schedules and schedule updates; coordination (with: Owner's operations (including, but not limited to, lockout/tag-out procedures), other contractors, utility owners, owners of transportation facilities, adjacent property owners and occupants, authorities having jurisdiction, Subcontractors and Suppliers, and others with whom Contractor is to coordinate the Work); information technology systems required by the Contract Documents; Submittals; photographic documentation; Project meetings; Contractor's hazard communication program; Contractor's compliance with environmental procedures for Constituents of Concern (including spill control and countermeasures plans and implementation); professional services (required for Contractor's means and methods of construction, and for delegated designs required by the Contract Documents); obtaining and complying with permits and licenses; temporary utilities (including electric power, water supply and disposal, fuel, and communications); temporary lighting; temporary fire protection; temporary enclosures and HVAC; temporary sanitary facilities; temporary first-aid facilities and services; Contractor's field offices and sheds, Engineer's field offices (when required elsewhere in the Contract Documents); temporary vehicular access and parking (including access to the Site, temporary access roads and parking, onsite traffic controls for construction traffic, and offsite haul routes); traffic control of non-construction vehicular and pedestrian traffic; temporary controls (including temporary erosion and sediment controls, noise control, control of storm water, surface water, and groundwater, pollution controls (including solid waste control, water pollution control, and control of

atmospheric pollution), dust control, pest and rodent controls, odor controls, and other temporary controls required by the Contract Documents); temporary security for the Work; temporary barriers; Project signage (when required elsewhere in the Contract Documents); delivering, handling, and storing materials and equipment to be incorporated into the Work; layouts and surveys for the Work; construction equipment, machinery, tools, and vehicles; safety and protection; Site maintenance during construction; cleaning and removal and disposal of waste and debris; checkout and startup; testing and other quality control activities required by the Contract Documents; record documents, operation and maintenance data; warranties; spare parts and extra materials required by the Contract Documents; instruction of facility personnel as required by the Contract Documents; commissioning (when required elsewhere in the Contract Documents); Contractor's correction period, Contractor's general warranty and guarantee; Contractor's indemnification obligations; other labor, cost, or effort required by the General Conditions and Supplementary Conditions, Division 01 Specifications, and other requirements of the Contract Documents.

3. Price Escalation:

- a. Unless expressly indicated otherwise in the Contract Documents, Owner is not obligated to change the stipulated prices (including lump sums, unit prices, and allowances) that are all or part of the Contract Price because of escalation of costs when there is no corresponding change in the Contract Times.
 - b. Changes in the Contract Times do not necessarily entitle Contractor to a change in Contract Price due to escalation.
 - c. Should Contractor claim a change in Contract Price for one or more stipulated price pay items without a corresponding change in scope, extent, or quality in the associated Work, prior to receiving any such change in Contract Price, Contractor shall submit with Contractor's associated Change Proposal, documentation satisfactory to Engineer supporting and documenting that Contractor's costs have increased because of delays beyond Contractor's control within the associated change in Contract Times included in such Change Proposal.
4. Compensation for all services, labor, materials, and equipment shall be included in prices stipulated for the lump sum and unit price bid/pay items in the Contract.
 5. Each lump sum and unit price in the Contract shall include an amount considered by Contractor as sufficient for all overhead and profit for each separately identified bid/pay item.

D. Contract Price, Payment Procedures, and Related Matters:

1. Contract Price: The Contract Price, as apportioned among bid/pay items in the Contract, is indicated in the Agreement and may be modified by Change Order.
2. Payments to Contractor: Refer to the General Conditions (as may be modified by the Supplementary Conditions), the Agreement (including provisions on retainage, if any), and Section 01 29 76 - Progress Payment Procedures, among other applicable Contract Documents.
3. Schedule of Values: Refer to the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 29 73 - Schedule of Values.
4. Procedures for Changes in Contract Price: Refer to the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 26 00 - Contract Modification Procedures.
5. Defective Work is not eligible for payment.

1.3 GENERAL PROVISIONS ON UNIT PRICES AND QUANTITIES

A. Quantities:

1. Quantities of Unit Price Work indicated in the Bid Form and in the Contract (at the time the Agreement was signed by the parties) are estimates for purposes of pricing and comparison of Bids.

2. Owner does not represent, either expressly or by implication, or agree that the nature of materials encountered below ground surface or in concealed areas, or actual quantities of Unit Price Work required, will correspond with the quantities in the Contract at the time the Agreement was signed by the parties. Owner reserves the right to increase or decrease quantities, and to eliminate quantities, as Owner may deem necessary or as may be necessary due to Site conditions encountered.
 3. Adjustment of Unit Prices Due to Variation in Quantities:
 - a. Provisions, if any, regarding adjustment of unit prices due to variations in actual quantities (eligible for payment) from the estimated quantities in the Contract (including quantities at the time the Agreement was signed by the parties and as subsequently modified by Change Order) are in the General Conditions, as may be modified by the Supplementary Conditions.
 - 1) Engineer's review for possible unit price adjustment, when provision for such adjustment is expressly indicated in the Contract, will be at a time Engineer deems reasonable and proper.
 - 2) When the Supplementary Conditions establish that, to be eligible for an adjustment in the unit price, a pay item of Unit Price Work must have a total computed, extended price (at the time the Agreement was signed by the parties) equal to or greater than a specified percentage (stipulated in the Supplementary Conditions) of the total Contract Price (at the time the Agreement was signed by the parties), and the total extended price of such pay item does not exceed the stipulated percentage of the Contract Price, then the associated pay item will be paid at the unit price in the Contract without adjustment for variations in actual quantity.
 4. Quantities eligible for payment will be actual quantities furnished and installed (as applicable) in accordance with the Contract Documents, within the pay limits shown or indicated, as measured by Engineer (or other entity so empowered in the Contract Documents) and recommended for payment by Engineer.
 5. At Contractor's expense, Contractor may independently verify quantities measured by Engineer for payment. Should Contractor disagree with quantities measured and recommended for payment by Engineer, submit appropriate Change Proposal (appealing Engineer's measurements) indicating the specific reasons for Contractor's appeal, with detailed reasons therefor and associated calculations and estimates, in accordance with the Contract Documents.
 6. Quantity Overruns:
 - a. When the quantity of a pay item of Unit Price Work eligible for payment exceeds the pay item's quantity included in the Contract, Owner will pay for quantities that exceed those in the Contract only while the estimated total payments to Contractor under the Contract will not exceed the Contract Price. Otherwise, a Change Order is required to modify the associated quantity in the Contract, thus changing the Contract Price.
 7. Except as may be established elsewhere in the Contract Documents, make no claim for anticipated profit, loss of profit, damages, or additional compensation arising from difference between quantities of Unit Price Work eligible for payment and the estimated quantities in the Contract.
- B. Measuring for Payment:
1. At Engineer's option, Engineer may delegate to Resident Project Representative (RPR) (if any), some or all of Engineer's responsibilities for measuring Unit Price Work eligible for payment.
 2. Unless expressly indicated otherwise in the Contract Documents, measurements will be in United States standard measurements.
 3. Unless indicated otherwise elsewhere in the Contract Documents, quantities of Unit Price Work eligible for payment will be rounded to the nearest whole number.
 4. Assistance with Measurements:
 - a. Comply with Section 01 71 23 - Field Engineering.

- b. Assist Engineer and Resident Project Representative (RPR) (if any), by providing measuring equipment, labor, and survey personnel necessary to measure quantities eligible for payment.
- 5. Quantities eligible for payment can be adjusted by Engineer to correct quantities included in Contractor's prior payment requests, and for incomplete or defective Unit Price Work. Such corrections are at Engineer's sole discretion.

1.4 GENERAL PROVISIONS ON LUMP SUM ITEMS

- A. Progress payments for Work paid on a lump sum basis will be based on Engineer's estimate of the Work (in accordance with the Contract Documents) performed through the end of the associated pay period, based on the Schedule of Values accepted by Engineer in accordance with the Contract Documents.
- B. At its sole discretion, Engineer may correct amounts of lump sum Work included in prior payment requests based on improved data or information available to Engineer, or Engineer's knowledge or reasonable belief that Work is incomplete or defective.

1.5 BID/PAY ITEMS - GENERAL CONTRACT

- A. Item 1 – Bonds, Mobilization, and Insurance:

This Work shall consist of securing the appropriate bonds and insurance policies for the Project, and performance of preparatory construction operations, including the movement of personnel and equipment to the Project site, safety equipment and other facilities to begin work on a substantial phase of the Contract. Payment for this item will be made on a Lump Sum basis, wherein no measurement will be made. The Lump Sum price bid shall be full compensation for performing the specified work and the furnishing of all materials, labor, tools, equipment, and incidentals necessary to mobilize and subsequently demobilize. The amount of this item shall be limited to a maximum of five percent of the Line Items 2-30.

- B. Item 2 – General Conditions and Construction Quality Control:

This Work shall consist of all administrative, project management, supervision and quality control material testing and inspection work required by the Contract Documents. This includes borrow source characterization, identification and testing of structural fill, riprap, crushed stone, pipe, and other testing as defined in the Specifications. This lump sum bid item shall be full compensation for performing the testing work required. Payment for this bid item shall be made on a lump sum basis wherein no measurement will be made.

- C. Item 3 – Surveying and Control:

This Work shall consist of all surveying and control work required by the Contract Documents. This includes establishment of appropriate local site benchmarks, baseline surveys, location of utilities, stakeout of elevation and positional information required to complete the construction and obtaining all survey information required to compile Record (As-Built) Drawings sealed by a surveyor licensed in North Carolina. The As-Built Drawings shall include all information identified in Section 01 71 23 Field Engineering. This lump sum bid item shall be full compensation for performing the surveying work required. Payment for this bid item shall be made on a lump sum basis wherein no measurement will be made.

- D. Item 4 – Demolition of Existing Sediment Basin:

This Work shall consist of furnishing all equipment, materials, labor and appurtenances necessary to demolish components of the existing temporary sediment basin within the southeast corner of future Unit 4 as shown on the Drawings and as specified in the Contract Documents. Work to include dewatering, removal and disposal of the existing CMP riser, and grouting and abandonment in-place of the existing sediment basin discharge pipe. Payment for this bid item shall be made on a lump sum basis wherein no measurement will be made.

- E. Item 5 – Unsuitable Soil Excavation:

This Work shall consist of furnishing all equipment, materials, labor and appurtenances necessary to excavate muck in the bottom of the existing temporary sediment basin and other unsuitable soils encountered to establish suitable subgrade for placement of structural fill materials, in accordance with the Drawings and Specifications. Work includes excavation of unsuitable muck and soil to the limits specified by the Engineer, hauling and stockpiling on-site at location south of Unit 3 as identified by Owner. Payment for this bid item shall be made on a cubic yard excavated basis wherein measurement will be made by survey of in-place material removed.

F. Item 6 – Unsuitable Soil Replacement:

This Work shall consist of furnishing all equipment, materials, labor and appurtenances necessary to replace excavated unsuitable soils with 10 oz non-woven geotextile filter fabric and NCDOT ABC Aggregate Base from bottom of excavation to within 24-inches of proposed subgrade elevation. The remaining backfill shall be completed with structural fill to proposed subgrade shall be measured and paid under Item 10. Non-woven geotextile shall be placed below ABC aggregate materials and the aggregate shall be placed and compacted in accordance with the specifications. Payment for this bid item shall be made on a cubic yard installed in-place basis wherein measurement will be made by survey.

G. Item 7 – Erosion and Sediment Control:

This Work shall consist of furnishing all necessary materials and appurtenances in compliance with the Drawings and Specifications regarding erosion and sediment as shown on the Drawings and as specified in the Contract Documents, unless specifically described under other Bid Items. Work to include construction of diversion berms; diversion channel on berm slope, silt fence; silt fence outlets; installation and maintenance of sediment tubes; installation of pipe outlet protections and erosion control matting on slopes; clean out all sediment basins and sediment traps affected by Work; monitoring and maintenance of erosion control measures during construction; removal of temporary erosion and sediment control measures upon site stabilization; and other necessary erosion control measures. Payment shall include all materials, labor, maintenance, tools, equipment, and incidentals necessary to complete the work. All earthmoving associated with construction of the erosion control measures, including excavation, and placement of structural fill, shall be included in the lump sum bid price unless otherwise specifically described under other Bid Items. Erosion control measures which are not specifically detailed in the Work, but which are necessary to protect the work and comply with local and state ordinances, shall be included herein at no additional charge to the Owner. Payment for this bid item shall be made on a lump sum basis wherein no measurement will be made.

H. Item 8 – Sediment Basin Discharge Structures:

This Work shall consist of furnishing all necessary materials and appurtenances in compliance with the Drawings and Specifications regarding installation of the discharge structures for the proposed temporary sediment basin and permanent Sediment Basin #16 as shown on the Drawings and as specified in the Contract Documents. Work to include construction of discharge risers and barrels; barrel outlet protection; trash racks and anti-vortex devices; anti-seep collars; emergency spillways; skimmers; porous baffles; and other necessary components. Payment shall include all materials, labor, maintenance, tools, equipment, and incidentals necessary to complete the work. Payment for this bid item shall be made on a lump sum basis wherein no measurement will be made.

I. Item 9 – Soil Excavation:

This Work shall consist of furnishing all necessary materials, labor, equipment, and appurtenances necessary to excavate soil to achieve the subgrade elevations for perimeter berms and roadways, sediment basins and as shown on the Drawings and specified in the Contract Documents. Suitable excavated soil may be reused by Contractor as structural fill or shall be stockpiled at location designated by Owner. Payment for this bid item shall be made on a per cubic yard excavated basis, wherein measurement will be made by survey.

J. Item 10 – Structural Fill:

This Work shall consist of furnishing all necessary materials, equipment, labor, and appurtenances necessary to complete all structural fill required to achieve final grades as shown on the Drawings and as specified in the Contract Documents. Cost shall include excavation and hauling of material from on-site sources, placement of excavated material within the Work as structural fill and to achieve berm and roadway subgrades and swale subgrade elevations, and compaction. Structural fill material shall be obtained primarily from within the proposed borrow areas shown on the Drawings. This item shall include the costs to demolish existing abandoned underground utilities that are encountered in the borrow area at the northwest corner of future Unit 4. Payment for this bid item shall be made on a compacted per cubic yard installed in-place basis, wherein measurement will be made by survey.

K. Item 11 – Perimeter Gravel Roadway:

This Work shall consist of furnishing all necessary materials, equipment, labor, and appurtenance necessary to complete the perimeter gravel roadway to be constructed along the north and east berms of future Unit 4 and for maintenance access to the temporary sediment basin as shown on the Drawings and as specified in the Contract Documents. Cost shall include subgrade preparation, placement of surge stone layer, and placement and compaction of ABC stone. Payment for this bid item shall be made on a square yard installed in-place basis, wherein measurement will be made by survey.

L. Item 12 – TRM Channel Lining:

This Work shall consist of furnishing all equipment, materials, labor, and appurtenances necessary to install the Turf Reinforcement Matting (TRM) within the proposed drainage channel along the north and east berms of future Unit 4 as shown on the Drawings and as specified in the Contract Documents. This Work shall include all material delivery, stockpiling, protection, placement, connections, and testing involving the TRM. Placement of underlying topsoil and permanent seeding and mulching will be paid under separate Bid Items. Payment for this bid item shall be made on a square yard installed in-place basis, wherein measurement will be made by survey.

M. Item 13 – Topsoil Placement:

This Work consists of furnishing all equipment, materials, labor, and appurtenances to provide topsoil within those areas which are indicated to be permanently seeded or have been otherwise disturbed by the Contractor and require repair, as shown on the drawings and as specified in the Contract Documents. Topsoil materials shall be furnished from on-site stockpile and processed as required to meet project requirements. Areas must be approved by the Engineer. Payment for this bid item shall be made on a per acre installed basis, wherein measurement will be made by survey.

N. Item 14 – Temporary Seeding and Mulching:

This Work consists of furnishing all equipment, materials, labor, and appurtenances to provide temporary seeding to those areas which are indicated to be temporarily seeded or have been otherwise disturbed by the Contractor and require repair, as shown on the drawings and as specified in the Contract Documents. Work includes soil preparation, soil amendments, seeding, mulching, watering, maintenance and repair until the temporary vegetative cover is no longer required. Areas must be approved by the Engineer. Payment for this bid item shall be made on a per acre installed basis, wherein measurement will be made by survey.

O. Item 15 – Permanent Seeding and Mulching:

This Work consists of furnishing all equipment, materials, labor, and appurtenances to provide permanent seeding to those areas which are indicated to be permanently seeded or have been otherwise disturbed by the Contractor and require repair, as shown on the drawings and as specified in the Contract Documents. Work includes soil preparation, soil amendments, seeding, mulching, watering, maintenance and repair until the end of the maintenance period stipulated within the Contract Documents. Areas must be approved by

the Engineer. Payment for this bid item shall be made on a per acre installed basis, wherein measurement will be made by survey.

P. Item 16 – Permanent 18" LFG Header and Valves:

This work shall consist of furnishing and installing all necessary materials, equipment, and labor and services to construct the permanent 18" diameter HDPE SDR 17 landfill gas transmission header as shown on the Drawings and as specified in the Contract Documents. This item includes piping, excavation, pipe bedding, backfilling, soil compaction, fittings, access points, bollards, connections to existing LFG header and proposed temporary LFG header, pipe location markings, isolation valves and valve pits, blind flanges, testing, incidentals and all other work required for a complete and acceptable system. Payment for this item shall be made on a installed in-place linear foot basis, wherein measurement will be made by survey.

Q. Item 17 – Temporary 12" LFG Header:

This work shall consist of furnishing and installing all necessary materials, equipment, and labor and services to construct the temporary 12" diameter HDPE SDR 17 landfill gas transmission header as shown on the Drawings and as specified in the Contract Documents. This item includes piping, excavation, pipe bedding, backfilling, soil compaction, fittings, access points, bollards, connections to existing temporary LFG header and proposed permanent LFG header, pipe location markings, isolation valves and valve pits, CMP road crossing casing, testing, incidentals and all other work required for a complete and acceptable system. Payment for this item shall be made on a installed in-place linear foot basis, wherein measurement will be made by survey

R. Item 18 – 3' Dia. Condensate Trap Pump Station:

This work shall consist of furnishing and installing all necessary materials, equipment, and labor and services to construct the dual-contained condensate trap pump station as shown on the Drawings and as specified in the Contract Documents. This item includes 3' diameter dual-contained HDPE condensate sump, excavation, gravel bedding, backfill, soil compaction, connections to 18" LFG transmission header and 12" LFG temporary header, valves, miscellaneous fittings, bollards, testing, incidentals and all other work required. Electric submersible pump, controls, and connections to condensate forcemain will be under separate contract. Payment for this item shall be made on a lump sum basis, wherein no measurement will be made.

S. Item 19 – Permanent 4"x8" Leachate Forcemain:

This Work shall consist of furnishing all equipment, materials, labor and appurtenances necessary to completely construct the new permanent 4"x8" dual contained leachate forcemain in accordance with the Drawings and as specified in the Contract Documents. This item includes trench excavation, pipe bedding, trench backfilling, tracer wire, furnishing and installing dual-contained HDPE forcemain pipe and fittings, isolation valves, testing, blind flange, and connection to existing leachate forcemain. Payment for this bid item shall be made on an installed in-place linear foot basis, wherein measurement will be made by survey.

T. Item 20 – Temporary 3"x6" Leachate Forcemain:

This Work shall consist of furnishing all equipment, materials, labor and appurtenances necessary to completely construct the new temporary 3"x6" dual contained leachate forcemain in accordance with the Drawings and as specified in the Contract Documents. This item includes trench excavation, pipe bedding, trench backfilling, tracer wire, furnishing and installing dual-contained HDPE forcemain pipe and fittings, isolation valves, testing, and connection to existing permanent and existing leachate forcemains. Payment for this bid item shall be made on an installed in-place linear foot basis, wherein measurement will be made by survey.

U. Item 21 – 4"x8" Condensate Forcemain:

This Work shall consist of furnishing all equipment, materials, labor and appurtenances necessary to completely construct the new 4"x8" dual contained condensate forcemain in accordance with the Drawings and as specified in the Contract Documents. This item includes trench excavation, pipe bedding, trench backfilling, tracer wire, furnishing and installing dual-contained HDPE forcemain pipe and fittings, testing, Stub-up with ball valve at condensate sump, and blind flanges. Payment for this bid item shall be made on an installed in-place linear foot basis, wherein measurement will be made by survey.

V. Item 22 – 6"x10" Leak Detection Pipe:

This Work shall consist of furnishing all equipment, materials, labor and appurtenances necessary to completely construct the extension of the existing 6"x10" dual contained leak detection pipe in accordance with the Drawings and as specified in the Contract Documents. This item includes trench excavation, pipe bedding, trench backfilling, tracer wire, furnishing and installing dual-contained HDPE leak detection pipe and fittings, testing, and connections to existing and proposed leak detection structures. Payment for this bid item shall be made on an installed in-place linear foot basis, wherein measurement will be made by survey.

W. Item 23 – 6' Dia. Leak Detection Manhole:

This work shall include furnishing all necessary materials, equipment, and labor to furnish and install the pre-cast reinforced concrete leak detection manhole as shown on the Drawings and as specified in the Contract Documents. This item includes excavation, aggregate base, pre-cast concrete manhole segments, rubber boot with clamps, backfill with compaction, gaskets, grout, watertight sealant, and manhole frame and cover. Payment for this bid item shall be made on a lump sum basis, wherein no measurement will be made.

X. Item 24 – 18" CPE Drainage Pipe:

This work shall include furnishing all necessary materials, equipment, and labor to furnish and install the 18" diameter dual-wall (ADS N-12 or equal) Corrugated Polyethylene (CPE) drainage pipe beneath the proposed reconstructed gravel haul road near the northwest corner of future Unit 4 as shown on the Drawings and as specified in the Contract Documents. This item includes excavation, pipe bedding, pipe segments, water-tight gaskets, fittings, backfill and compaction. Payment for this bid item shall be made on an installed in-place linear foot basis, wherein measurement will be made by survey..

Y. Item 25 – 24" CPE Drainage Pipe:

This work shall include furnishing all necessary materials, equipment, and labor to furnish and install the 24" diameter dual-wall (ADS N-12 or equal) Corrugated Polyethylene (CPE) drainage pipe within the proposed interphase berm on the south side of future Unit 4 as shown on the Drawings and as specified in the Contract Documents. This item includes excavation, pipe bedding, pipe segments, water-tight gaskets, fittings, outlet protection, backfill and compaction. Payment for this bid item shall be made on an installed in-place linear foot basis, wherein measurement will be made by survey..

Z. Item 26 – 72" CPE Drainage Pipe:

This work shall include furnishing all necessary materials, equipment, and labor to furnish and install the 72" diameter dual-wall (ADS N-12 or equal) Corrugated Polyethylene (CPE) drainage pipe from the proposed drop inlet within the future Unit 5 perimeter berm to the discharge point at proposed Sediment Basin #16 as shown on the Drawings and as specified in the Contract Documents. This item includes excavation, pipe bedding, pipe segments, water-tight gaskets, fittings, connections to proposed drop inlet and drainage manhole, outlet protection, backfill and compaction. Payment for this bid item shall be made on an installed in-place linear foot basis, wherein measurement will be made by survey.

AA. Item 27 – 8' Dia. Stormwater Manholes:

This work shall include furnishing all necessary materials, equipment, and labor to furnish and install the 8' diameter pre-cast reinforced concrete stormwater manholes as shown on the Drawings and as specified in the Contract Documents. This item includes excavation, aggregate base, pre-cast concrete manhole segments, rubber boots with clamps, backfill with compaction, gaskets, grout, watertight sealant, manhole frame and cover, and trash rack. Payment for this bid item shall be made on a lump sum basis, wherein no measurement will be made.

BB. Item 28 – French Drain:

This Work shall consist of furnishing all equipment, materials, labor and appurtenances necessary to completely construct the French drain located near the temporary sediment basin near the southeast corner of future Unit 4 in accordance with the Drawings and as specified in the Contract Documents. This item includes trench excavation, nonwoven geotextile, NCDOT No. 57 stone, perforated 6" HDPE pipe, and end cap. Payment for this bid item shall be made on an installed in-place linear foot basis, wherein measurement will be made by survey.

CC. Item 29 – Underground Electrical Service:

This work consists of furnishing all equipment, materials, labor, and appurtenances necessary to furnish and install all underground electrical conduits and hand holes as shown on the Drawings and as specified in the Contract Documents. This item includes stub ups at existing and proposed panels, conduit, pull strings, direct burial and backfill, handholes, concrete encasement beneath roads, and appurtenant supplies and equipment. Payment for this item shall be made on a lump sum basis, wherein no measurement will be made.

DD. Item 30 – Temporary Electrical Service:

This work consists of furnishing all equipment, materials, labor, and appurtenances necessary to furnish and install all temporary aboveground electrical service to existing Phase 3 leachate pump station panels as shown on the Drawings and as specified in the Contract Documents. This item includes connections to existing panels, breakers, wiring, conduit, hand holes, disconnects, excavation, backfill and concrete duct bank for roadway and swale crossings, and appurtenant supplies and equipment. Payment for this item shall be made on a lump sum basis, wherein no measurement will be made.

EE. Item 31 – Construction Contingency Allowance:

This item includes a stipulated amount available as reserve allowance for sole use by Owner for costs authorized by Owner during construction for Work not included under other bid/pay items. Payment for work authorized and performed under this item will be full compensation for providing all work, complete as shown, indicated, or directed by Engineer in accordance with the associated authorization(s). The negotiated allowance value includes the direct cost of labor, materials, equipment, transportation, taxes, and insurance associated with each applicable allowance work. Whenever the actual costs for all construction contingency allowance work is more than or less than the stated allowance value, the Contract Price shall be adjusted accordingly by Change Order, the amount of the Change Order shall reflect the difference between actual costs incurred by Contractor for the contingency allowance items and the construction contingency allowance value.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

This page intentionally left blank.

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements applicable to all substitution requests.
 2. Provisions specific to Contractor's substitution requests for:
 - a. Materials and equipment to be incorporated into the Work.
 - b. Methods, procedures, and sequences indicated in the Contract Documents.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals, and pay all costs associated with requests for approval of substitutes.
 2. Where the Contract Documents expressly indicate that substitutes are not allowed, are unacceptable, or time-barred, do not submit substitution requests for such items or procedures.
 3. Requirements for Contractor's proposal of "or-equals", where allowed by the Contract, , are in the General Conditions, as may be modified by the Supplementary Conditions.
- C. Related Requirements:
1. Include, but are not necessarily limited to:
 - a. Section 01 26 00 - Contract Modification Procedures.

1.2 REFERENCES

- A. Terminology:
1. The following terminology, although not indicated with initial capital letters, has the following meaning in this Section:
 - a. "Or-equal" and "or equal" each means material or equipment items to be incorporated into the completed Work as a functioning whole, or method, procedure, or sequence that, in Engineer's sole opinion, are equivalent to that shown or indicated in the Contract Documents.
 - b. "Substitute" means a proposed materials or equipment to be incorporated into the completed Work as a functioning whole, or a proposed construction method, procedure, or sequence that is not, in Engineer's sole opinion, equivalent to the associated, similar material or equipment item or method, procedure, or sequence shown or indicated in the Contract Documents, but accomplishes the same or similar purpose. Unless expressly indicated otherwise in the Contract Documents, Contractor's proposals for "value engineering" (and similar terms) are substitutes.
 - c. "Substitution request" means Contractor's written request for Engineer's approval of a proposed substitute, in accordance with this Section. Substitution requests are separate from Shop drawings and other Submittals required by the Contract Documents.

1.3 SUBSTITUTES - GENERAL

- A. This Article applies to all substitutes and substitution requests, whether for substitute materials or equipment, or for substitute methods, procedures, or sequences.
- B. This Section expands on the provisions on substitutes in the General Conditions, as may be modified by the Supplementary Conditions.
- C. Time Limits for Submitting Substitution Requests:
 - 1. Where the Contract allows Contractor's substitution requests, such proposals will be considered by Engineer only during a period of 30 days after the date the Contract Times start to run, unless otherwise indicated.
 - 2. Substitution requests will be accepted for consideration by Engineer after the time limit indicated in the paragraph above this, when materials or equipment shown or indicated, and all associated "or-equals", are either:
 - a. Unavailable; or
 - b. Despite Contractor's due diligence, are unavailable in time for the Work to be completed within the Contract Times.
 - 3. The foregoing notwithstanding, substitutes will not be approved when received by Engineer after Contractor has commenced the associated Work at the Site, where approval of the substitute would require rework or removing Work already installed.
- D. Design Professional:
 - 1. Engineer is responsible for design of the completed Project as a functioning whole and has responsible charge of the Project except for Work for which design responsibility is expressly delegated by the Contract Documents.
 - 2. Do not retain services of any third-party design professional to prepare modifications of Engineer's design of the completed Project as a functioning whole without Engineer's express, written consent via an appropriate Contract modification setting forth appropriate performance and design criteria for delegating the design of the substitute.
- E. Contractor's Representations:
 - 1. In submitting each substitution request, Contractor represents that:
 - a. Contractor has read and understands the Contract's provisions on substitutes, as indicated in the General Conditions, as may be modified by the Supplementary Conditions, this Section, and elsewhere in the Contract Documents.
 - b. Substitution request is complete and includes all documents and information required by the Contract Documents.
 - c. Contractor certifications required by the General Conditions, as may be modified by the Supplementary Conditions, and this Section are valid and made with Contractor's full knowledge, information, and belief.
 - d. Contractor will provide the same or better guarantees and warranties for substitute as for the specified materials, equipment, methods, procedures, and sequences (as applicable).
 - e. Contractor waives all rights for increasing the Contract Price or extending the Contract Times, related to the substitute, that subsequently may become apparent to Contractor after issuance of the associated Contract modification instrument approving such substitute, except for those associated with differing subsurface or physical conditions or discovery of a previously unforeseen

Hazardous Environmental Condition associated with the Work involving the approved substitute.

F. Submittal of Substitution Requests - General:

1. Substitution requests must be submitted by Contractor. Engineer will not accept or review substitution requests from prospective or bona-fide Subcontractors or Suppliers.
2. Submit separate substitution request for each proposed substitute.
3. Submit substitution requests in accordance with requirements for Shop Drawings and other Submittals, as indicated in the General Conditions, as may be modified by the Supplementary Conditions, Section 01 33 00 - Submittal Procedures, and Section 01 31 26 - Electronic Communication Protocols.
4. Do not submit substitution requests as any of the following (such substitution requests will be returned by Engineer without review):
 - a. Shop Drawing, Sample, or other Submittal.
 - b. Request for approval of an "or-equal".
 - c. Request for interpretation (RFI) or clarification.
 - d. Change Proposal without all other, required substitution request elements indicated below.
 - e. Other oral or written communication not in accordance with this Section.
5. Each substitution request shall include:
 - a. Transmittal letter (one per substitution request) expressly indicating the communication is a substitution request.
 - b. Completed substitution request form, on the form attached to this Section.
 - c. Change Proposal, submitted in accordance with the Contract Documents, including Section 01 26 00 - Contract Modification Procedures. Clearly indicate the proposed changes in Contract Price and Contract Times if substitute is approved; if none, clearly so indicate on the Change Proposal.
 - d. Certifications and written representations required by the Contract Documents to accompany substitution requests.
 - e. Other information: (1) required elsewhere in this Section and in other elements of the Contract Documents, and (2) deemed appropriate by Contractor to support Contractor's substitution request.
6. When Engineer requires additional information to evaluate a substitution request, furnish such information within five days of receipt of Engineer's request, unless additional time is granted by Engineer, in writing.
7. Engineer and Owner have the right to rely upon the completeness and accuracy of information, documents, certifications, and representations in Contractor's substitution request. Contractor accepts full responsibility for completeness and accuracy of substitution requests (except for Engineer's professional liability).

G. Engineer's Review of Substitution Requests:

1. Engineer has no obligation to approve any substitute.
2. Substitutes will not be approved unless all of the following are satisfied for the associated substitute:
 - a. The Contract supports submittal of such substitution request; and
 - b. Substitute is reasonably consistent with Engineer's design intent for the Project as a completed, functioning whole; and
 - c. As indicated in Paragraph 1.3.A.3 of this Section.

- d. Substitute will not have an adverse effect on the work of other contractors, or existing or proposed construction; and
 - e. Substitution request is complete in accordance with the Contract Documents and Engineer's requests, and
 - f. Owner agrees to the substitute; and
 - g. Associated changes in Contract Price and Contract Times, if any, are acceptable to Owner.
3. Engineer is not obligated to approve any substitute where such approval is conditioned on an increase in the Contract Price, the Contract Times, or both.
4. Timeliness of Engineer's Review:
- a. Allow not less than 14 days for Engineer's review of each substitute. Allow longer for larger, more-complex substitutes.
 - b. Engineer will endeavor to perform timely review of substitution requests. However, Contractor is responsible for complying with the Contract Times, regardless of whether the substitute is approved.
 - c. Where approval of a substitute would necessitate other changes to the Project's design, additional time, beyond that indicated above, will be necessary for Engineer's preparation of revisions to the design.
5. When Design Changes are Required with Approval of Substitute:
- a. Engineer will advise Contractor promptly following Engineer's review (and Owner's comment, if any) on substitution request to indicate whether the substitute will be acceptable. Engineer's advisory to Contractor will indicate whether changes in Engineer's design are necessary and include a preliminary estimate of Engineer's fee and time required for modifying the design and preparing an associated Proposal Request to Contractor.
 - b. Engineer's preliminary estimates of fee and time for design modifications will be prepared in good faith, but are not binding on Owner or Engineer.
 - c. Contractor shall reimburse Owner for costs incurred by Owner for design modifications necessitated by approval of substitute. Owner may deduct such amounts, as one or more set-offs, from payments due Contractor under the Contract.
 - d. Upon Contractor's receipt of Engineer's estimate of fee and time for design modifications, contractor shall advise Engineer, in writing, within three days whether Contractor will continue pursuing approval of the substitute.
 - e. Request to Contractor.
 - f. Engineer may reject a substitute that would require substantial changes in the Project's design.
- H. Approval of Substitutes:
- 1. Substitutes are approved only via issuance of an appropriate Field Order or Change Order in accordance with Section 01 26 00 - Contract Modification procedures, and the General Conditions, as may be modified by the Supplementary Conditions.
 - 2. Approval of a substitute does not relieve Contractor from obligation to comply with the Contract Documents, including submitting Shop Drawings, Samples, and other Submittals in accordance with the Contract Documents.

1.4 SUBSTITUTE MATERIALS AND EQUIPMENT

- A. In addition to other requirements of this Section and elsewhere in the Contract Documents, substitution requests for substitute materials or equipment shall include:

1. Manufacturer and Location:
 - a. Name and address of manufacturer of the proposed substitute. Indicate country where manufacturer is incorporated and owned.
 - b. Companies and brands owned by or affiliated with manufacturer.
 - c. Name of manufacturers of principal component items, such as motors, bearings, and similar items.
 - d. Location where the items would be manufactured, including country and address. Indicate the total percentage of the items' value that will be manufactured outside of the United States and its territories.
 - e. Name, address, and driving distance from the Site of:
 - 1) Manufacturer's sales representative.
 - 2) Nearest service center offering full array of service capabilities.
 - 3) Warehouse or other location where spare parts for the proposed substitute are available.
 - f. Number of years that manufacturer has actively participated the North American market.
2. Proposed Materials and Equipment:
 - a. Model designation and quantity of each proposed for the Work.
 - b. Manufacturer's literature for proposed substitute, with description of the materials and equipment.
 - c. Performance information and representative test data.
 - d. Indication of reference standards with which materials and equipment comply.
 - e. Preliminary process and instrumentation diagrams (P&ID), where applicable.
 - f. Identification of hazardous materials, including Constituents of Concern, used in the materials and equipment, and associated permitting or licensing required.
 - g. Manufacturer's standard warranty and applicable, proposed special or extended warranties, including indication of specific entities that will be beneficiary of such warranties.
 - h. Complete list of proposed deviations from requirements of the Contract Documents.
 - i. Itemized comparison of specified materials and equipment and proposed substitute, indicating:
 - 1) Size (physical dimensions) when: item is in use, when not in use, and space required for routine and major maintenance.
 - 2) Weight and loading at supports, when item is full and empty.Materials of construction.
3. Operation requirements, including:
 - a. Anticipated consumption of each item of: Electricity, other energy sources, water, chemicals (indicate each), and other needs for operation at the Site.
 - b. Typical labor required for operation and associated skill level.
 - c. Description of remote monitoring and control capabilities, as applicable.
4. Maintenance requirements, including:
 - a. Anticipated life in the service and environment required.
 - b. Frequency and general scope of routine and major maintenance typically necessary.

- c. Typical labor requirements and general qualifications of personnel performing routine maintenance.
 - d. Major, associated equipment necessary for routing and major maintenance, including hoisting equipment type and capacity (when applicable).
 - e. Availability, scope, cost, and general conditions of service and maintenance contracts, if any.
- 5. References for similar projects on which the materials and equipment were used. Indicate for each:
 - a. Project owner name, name of facility where installed, and name of project.
 - b. City, state, and country of installation.
 - c. Model number/size and quantity furnished and installed.
 - d. Year of installation.
 - e. Contact information for owner and design professional, including telephone numbers.
 - 6. Other information required by the Contract Documents.
 - 7. Other information reasonably requested by Engineer.

1.5 SUBSTITUTE CONSTRUCTION METHODS, PROCEDURES, OR SEQUENCES

- A. Provisions of the General Conditions, as may be modified by the Supplementary Conditions, regarding substitutes of materials and equipment are hereby extended to apply to substitute methods, procedures, and sequences as shown or indicated in the Contract Documents.
- B. In addition to other requirements of this Section and elsewhere in the Contract Documents, substitution requests for substitute methods, procedures, or sequences shall include:
 - 1. Clear identification of the method, procedure, or sequence shown or indicated in the Contract Documents for which substitute is requested.
 - 2. Detailed description of proposed substitute method, procedure, sequence, or combination thereof.
 - 3. Reasons why substitute is proposed and benefits to the Project should the substitute be approved.
 - 4. Detailed list of how the proposed substitute deviates from associated method, procedure, or sequence shown or indicated in the Contract Documents.
 - 5. Impact of the substitute, if approved, on Owner's or facility manager's operations, when the Work is at an existing facility.
 - 6. Effect on other contractors working at the Site, if substitute is approved.
 - 7. Description of temporary equipment and temporary facilities needed, should the substitute be approved, including quantity of items, capacities, performance characteristics, permitting and approvals required by authorities having jurisdiction, and proposed location at the Site.
 - 8. Written evaluation of how substitute method, procedure, or sequence complies with Laws and Regulations.
 - 9. Drawings illustrating method, procedure, or sequence.
 - 10. Materials to be used that contain Constituents of Concern or that have potential to cause or exacerbate a Hazardous Environmental Condition.
 - 11. Other information and data required by the Contract Documents.
 - 12. Other information reasonably required by Engineer.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The following, bound after this Section's "End of Section" designation, are part of this Specifications Section:
1. Exhibit A - Substitution Request Form (one page).

END OF SECTION

EXHIBIT A **Substitution Request Form**

(One Item per each Form)

Project:		Date:	
Substitution Requestor:			
Contractor:			
Specification Section No:	Paragraph No. (i.e. 2.1 A.1.c):	Specified Item:	
Proposed Substitution:			
Provide Product Data Sheets, Manufacturer's written installation instructions, drawings, diagrams, or any other information as an attached to this Form that will demonstrate the proposed substitution is an Approved Equal.			
State differences between proposed substitutions and specified item. Differences include but are not limited to interrelationship with other items; materials, equipment, function, utility, life cycle costs, applied finished, appearances, and quality.			
Document how the proposed substitution is compatible with or modifies other systems, parts, equipment or components of the Project and Work under the Contract			
Describe what effect the proposed substitution has on dimensions indicated on the Drawings and previously reviewed Shop Drawings?			
Describe what effect the proposed substitution has on the Construction Schedule and Contract Time.			
Describe what effect the proposed substitution has on the Contract Price. This includes all direct, indirect, impact and delay costs.			
Manufacturer's guarantees of the proposed and specified items are:			
☐ Same ☐ Different (explain on attachment)			
The undersigned state that the function, utility, life cycle costs, applied finishes, appearance and quality of the proposed substitution are equal or superior to those of the specified item.			
For use by Engineer: ☐ Accepted – eligible for approval via Change Order ☐ Accepted as Noted – approval via Change Order ☐ Not Accepted _____ Date _____ (Telephone): _____ Signature of PE, RA, or PG in Responsible Charge		_____ (Contractor's Signature) _____ (Contractor's Firm) _____ (Firms Address) _____ (Telephone)	

Comments:

Copyright 2020 HDR Engineering, Inc.

This page intentionally left blank.

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

1.1 SUMMARY

A. Section Includes:

1. This Specifications section expands upon provisions of the General Conditions, as may be modified by the Supplementary Conditions, and includes:
 - a. Requests for interpretation.
 - b. Written clarifications.
 - c. Minor changes in the Work and Field Orders.
 - d. Work Change Directives.
 - e. Proposal Requests.
 - f. Change Proposals.
 - g. Change Orders.

1.2 GENERAL – APPLICABLE TO ALL PROVISIONS OF THIS SECTION

- A. Submit Contract modification documents to Engineer, addressed to the contact person and contact information indicated in Section 01 33 00 - Submittal Procedures, and in accordance with Section 01 31 26 - Electronic Communication Protocols.
- B. Retain at Contractor's office and at the Site complete copy of each Contract modification document, all interpretations and clarifications, related documents, and Engineer's response.

1.3 REQUESTS FOR INTERPRETATION

A. General.

1. Transmit written requests for interpretation to Engineer. Contractor and Owner may prepare and transmit requests for interpretation.
2. Prepare and transmit request for interpretation to obtain clarifications or interpretations of the Contract Documents. Report conflicts, errors, ambiguities, and discrepancies in the Contract Documents by requesting an interpretation.
3. Do not transmit request for interpretation when other form of communication is appropriate, such as Submittals, requests for approvals of substitutes, notices, ordinary correspondence, or other form of communication. Improperly prepared or inappropriate requests for interpretation will be returned without response or action by Engineer.
4. Do not submit request for interpretation or clarification when:
 - a. answer may be obtained by observations at the Site; or.
 - b. required information is clearly indicated in the Contract Documents; or.
 - c. required information is included in industry standards referenced in the Contract Documents or Supplier's instructions that are consistent with the Contract Documents; or.
 - d. are reasonably inferable from any of foregoing.
5. Engineer will return requests for interpretation without response for any of the following reasons:
 - a. Request is regarding one of the items addressed in Paragraphs 1.3.A.3 and 4 of this Specifications section.
 - b. Request is unclear or incomplete.
 - c. Request was answered in Engineer's response to a prior request for interpretation.
 - d. Request is related to construction means, methods, techniques, procedures, or sequences of construction that are not required by the Contract Documents.
 - e. Request is related to safety and protection matters that are solely Contractor's responsibility.

- f. Request resulted in whole or in part to lack of adequate coordination by Contractor, including coordination of Subcontractors and Suppliers.
 - g. Requests that are otherwise frivolous or unnecessary.
6. Should requests be categorized by Engineer as within the limits of Paragraphs 1.3.A.3, 4, or 5 of this Specifications Section, Engineer may recommend and Owner may withhold from payments due Contractor under the Contract set-off(s) sufficient to cover Owner's costs of Contractor's submittal of invalid, frivolous, unnecessary, or inappropriate requests for interpretation or clarification..
 7. Contractor shall have sole financial responsibility for Contractor's costs for requests for interpretation or clarification that are submitted late, out of sequence, or that are unnecessary.

B. Procedure.

1. Transmit requests for interpretation in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Include with each request for interpretation a separate letter of transmittal.
2. If Engineer requests additional information to make an interpretation, entity requesting the interpretation shall transmit the information requested within 10 days, unless Engineer allows additional time, via correspondence referring to request for interpretation number.
3. Engineer will review and respond to requests for interpretation with reasonable promptness. Allow sufficient time for review and response.
4. Engineer will maintain log of requests for interpretation. Upon request, copy of log will be transmitted to requestor.
5. Engineer's response to requests for interpretation will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Each response to a request for interpretation will include a separate letter of transmittal.
6. Engineer's response to each request for interpretation will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
7. If Contractor desires to appeal Engineer's interpretation or clarification, comply with the appeals procedure set forth in the General Conditions, as may be modified by the Supplementary Conditions.
8. Interpretations that One or Both Parties Believes Entails a Change to the Contract:
 - a. If Contractor or Owner believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of Engineer's interpretation, so advise Engineer in writing before proceeding with the Work associated with the request for interpretation.
 - b. If, after this initial communication, either Owner or Contractor believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.

C. Preparation of Requests for Interpretation:

1. Prepare each request for interpretation on the "Request for Interpretation" form included with this Specifications section, or other form acceptable to Engineer.
2. Number each request for interpretation as follows: Numbering system shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First request for interpretation on the general contract for project titled, "Contract WWTP09" would be, "RFI No. WWTP09-GC-001".

3. In space provided on form, describe the interpretation requested. Provide additional sheets as necessary. Include text and sketches as required in sufficient detail to describe the need for interpretation.
4. When applicable, request for interpretation shall include Contractor's recommended resolution.

1.4 WRITTEN CLARIFICATIONS

A. General:

1. Written clarifications, when required, will be initiated and issued by Engineer.
2. Written clarifications do not change the Contract Price or Contract Times, and do not alter the Contract Documents.
3. Written clarifications will be issued as correspondence or using clarification notice form acceptable to Engineer, with additional information as required.

B. Procedure.

1. Engineer's written clarifications will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section.
2. Each written clarification will be distributed to:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
3. If Contractor desires to appeal Engineer's interpretation or clarification, comply with the appeals procedure set forth in the General Conditions, as may be modified by the Supplementary Conditions.
4. Written Clarifications that One or Both Parties Believes Entails a Change to the Contract:
 - a. If Contractor or Owner believe that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of Engineer's written clarification, so advise Engineer in writing before proceeding with the Work associated with the written clarification.
 - b. If, after this initial communication, either Owner or Contractor believes that change in the Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
5. If Engineer's written clarification is unclear, prepare and transmit a request for interpretation in accordance with the Contract Documents.

1.5 MINOR CHANGES IN THE WORK AND FIELD ORDERS

A. General:

1. Field Orders, when required, will be initiated and issued by Engineer.
2. Field Orders authorize minor changes in the Work but do not change the Contract Price or Contract Times.
3. Field Orders will be in the form of Engineers Joint Contract Documents Committee document EJCDC C-942, "Field Order".
4. Engineer will maintain a log of Field Orders issued. Copy of Engineer's log of Field Orders will be transmitted to Contractor or Owner upon request.

B. Procedure:

1. Field Orders will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Each Field Order will include a separate letter of transmittal.
2. Each Field Order will be distributed to the following:
 - a. Contractor.

- b. Owner.
- c. Resident Project Representative (RPR).
- d. Engineer.
- 3. Field Orders that One or Both Parties Believes Entails a Change to the Contract Price or Contract Times:
 - a. If Contractor or Owner believes that a change in the Contract Price or Contract Times or other change to the Contract is required as a result of a Field Order, so advise Engineer in writing before proceeding with the Work associated with the Field Order.
 - b. If, after this initial communication, Contractor believes that change in Contract Price, Contract Times, both, or other relief with respect to the terms of the Contract is necessary, recourse shall be in accordance with the Contract Documents.
- 4. If the Field Order is unclear, submit request for interpretation.
- 5. If Owner disagrees with the Field Order, Engineer may issue a revised or amended Field Order, or a Change Order or Work Change Directive may be issued.

1.6 WORK CHANGE DIRECTIVES

A. General:

- 1. Work Change Directives, when issued, order additions, deletions, or revisions to the Work. When issued, Contractor shall promptly implement the changes ordered in the associated work Change Directive.
- 2. Work Change Directives do not change the Contract Price or Contract Times but are evidence that the parties to the Contract expect that the change ordered or documented by the Work Change Directive will be incorporated in subsequently issued Change Order following agreement by the parties as to the Work Change Directive's effect, if any, on the Contract Price, Contract Times, or both.
- 3. Work Change Directives will be in the form of EJCDC C-940, "Work Change Directive".

B. Procedure.

- 1. Work Change Directives signed by Owner and Engineer will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Each Work Change Directive will include a separate letter of transmittal. Signed Work Change Directives will be transmitted to:
 - a. Contractor.
 - b. Owner.
 - c. Engineer.
 - d. Resident Project Representative.
 - e. Contractor: One original.
 - f. Owner: One original.
 - g. Engineer: One original.
 - h. Resident Project Representative (RPR): One copy.
- 2. Documentation of Costs:
 - a. Promptly following receipt of the Work Change Directive:
 - 1) Advise Engineer and Owner in writing of the anticipated quantity and types of construction equipment and machinery required or anticipated for the associated Work.
 - 2) Advise Engineer and Owner in writing of which construction equipment and machinery is owned by the Contractor or Subcontractor and which is, or will be, rented from an equipment rental firm.
 - 3) When construction equipment and machinery is rented from a rental firm, transmit to Engineer and Owner copy of the associated rental agreements(s) pertinent to the Work ordered by the Work Change Directive.

- 4) For all construction equipment and machinery, indicate to Engineer and Owner whether each item is required only for the Work ordered by the Work Change Directive and whether each item is being, or will be, used for other Work on the Project or other projects for Owner.
 - 5) Advise Engineer and Owner in writing of information on anticipated temporary materials (including items such as temporary support of excavations, scaffolding, temporary barriers, temporary plates covering excavations, and other temporary materials) to the same extent as that required for construction equipment and machinery.
- b. When basis of payment for Work ordered under a Work Change Directive will be paid as Cost of the Work plus a fee, or when otherwise required by Engineer, document for the Work performed under each separate Work Change Directive, for each day, the following:
- 1) Number and labor classifications of workers employed and hours worked each day on the Work ordered via the Work Change Directive.
 - 2) Construction equipment used, including manufacturer, model, and year of manufacture, and number of hours such equipment was onsite and used each day for the Work under the Work Change Directive. Indicate where the equipment was used for other Work under the Contract and idle time.
 - 3) Temporary materials; furnish the same information as required for construction equipment and machinery. Where rental costs of such items approaches the purchase cost of such item, or when otherwise requested by Engineer, furnish evidence, satisfactory to Engineer, of the purchase price of such temporary materials.
 - 4) Consumables and similar materials used.
 - 5) Suppliers' receipts, bills, or invoices for and descriptions of materials and equipment incorporated into the Work.
 - 6) Invoices and labor and equipment breakdowns for Subcontractors.
 - 7) Other information required by Owner or Engineer.
 - 8) Transmit such documentation as a Change Proposal promptly after such documentation is available to Contractor. Actively pursue Subcontractors and Suppliers for required documentation to promptly furnish required documentation to Engineer.
- c. Separately track and document Work performed in accordance with each Work Change Directive and Work performed under stipulated price methods of compensation (including lump sums and Unit Price Work).
- d. Submit such information in a format acceptable to Engineer.
3. Documentation of Time:
- a. General:
 - 1) Contractor will be entitled to change of Contract Times Work ordered by a Work Change Directive in accordance with the requirements of the General Conditions, as may be modified by the Supplementary Conditions.
 - 2) Contractor will be entitled to a change in Contract Times only when the Work ordered by the Work Change Directive is implemented promptly and affects the Contractor's ability to comply with the Contract Times.
 - b. Requirement Documentation: Submit the following as part of the Change Proposal documenting price-related impact of the Work ordered by the Work Change Directive:
 - 1) Statement on whether the subject Work affected Contractor's ability to comply with the Contract Times.
 - 2) If Contractor's ability to comply with the Contract Times was so affected, indicate the effect on each of the relevant Contract Times.
 - 3) Document that Contractor acted promptly and properly upon receipt of the Work Change Directive to promptly implement the Work ordered thereby.

- 4) Time impact analysis for the affected Work, in accordance with Section 01 32 16 - Construction Progress Schedule.
- 5) Other time-related documentation required by Engineer.

1.7 PROPOSAL REQUESTS

A. General:

1. Proposal Requests may be initiated by Engineer or Owner.
2. Proposal Requests are for requesting the effect on the Contract Price and the Contract Times and other information relative to contemplated changes in the Work. Proposal Requests do not authorize changes or variations in the Work, and do not change the Contract Price or Contract Times or terms of the Contract.
3. Proposal Requests will be furnished using the "Proposal Request" form included with this Specifications section.

B. Procedure:

1. Proposal Requests will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Section. Each Proposal Requests will include a separate letter of transmittal.
2. Each signed Proposal Request will be transmitted to the following:
 - a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
3. Transmit request for interpretation to obtain clarification of conflicts, errors, ambiguities, and discrepancies in Proposal Request.
4. Upon receipt of Proposal Request, Contractor shall prepare and transmit to Engineer a Change Proposal, in accordance with the Contract Documents, for the proposed Work described in the Proposal Request.

1.8 CHANGE PROPOSALS

A. General:

1. Prepare and transmit written Change Proposal to Engineer in response to each Proposal Request; or when Contractor believes a change in the Contract Price, Contract Times, both, or other change to the terms of the Contract is required; or to appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract.

B. Procedure:

1. Prepare and transmit Change Proposals within time limits indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Submit only one Change Proposal for each change issue, unless Engineer requires additional information or clarification. Do not submit repeated Change Proposals for the same change issue. Rather, when Contractor is dissatisfied with Engineer's decision on a Change Proposal, recourse is set forth in the General Conditions, as may be modified by the Supplementary Conditions, and elsewhere in this Article.
3. Transmit Change Proposals in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Include with each Change Proposal all required supporting documentation and a separate letter of transmittal.
4. Engineer's Review and Requests for Additional Information:

- a. Engineer will review and act on each Change Proposal in accordance with, and within the time limits indicated in, the General Conditions, as may be modified by the Supplementary Conditions.
 - b. When, Engineer requests additional information to render a decision, submit required information within five days of receipt of Engineer's request, unless Engineer allows more time. Submit the required information via correspondence that refers to the specific Change Proposal number.
 - c. Owner shall transmit to Engineer such comments, if any, that Owner has on the Change Proposal, within 10 days of Owner's receipt of the Change Proposal.
 - d. Engineer will render a written decision on the Change Proposal or take other action in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 - e. Engineer's response to Change Proposals will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section, the General Conditions, and the Supplementary Conditions.
5. Engineer's response to each Change Proposal will be distributed to:
- a. Contractor.
 - b. Owner.
 - c. Resident Project Representative (RPR).
 - d. Engineer.
6. If Change Proposal is recommended for approval by Engineer and is approved by Owner, a Change Order will be issued or, when applicable, an appropriate use of an allowance (already included in the Contract Price) will be authorized by Owner.
7. If parties do not agree on terms for the change, Owner or Contractor may file a Claim against the other, in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
- C. Preparation of Change Proposals:
1. Each Change Proposal shall be submitted on the "Change Proposal" form included with this Specifications section, or other form acceptable to Engineer.
 2. Number each Change Proposal as follows: Numbering system shall be the Contract number and designation followed by a hyphen and three-digit sequential number. Example: First Change Proposal for the general contract for project named "Contract No. 8" would be, "Change Proposal No. 8-GC-001".
 3. In space provided on Change Proposal form:
 - a. Describe scope of each proposed change. Include text and sketches on additional sheets as required to provide detail sufficient for Engineer's review and response. If a change item is submitted in response to Proposal Request, write in as scope, "In accordance with Proposal Request No." followed by the Proposal Request number. Submit written clarifications, if any, to scope of change.
 - b. Submit justification for each proposed change. If change is in response to proposal request, write in as justification, "In accordance with Proposal Request No." followed by the Proposal Request number.
 - c. Indicate the total change in the Contract Price and Contract Times for each separate change item included in the Change Proposal.
 4. Proposed Effect on Contract Price: Unless otherwise directed by Engineer, attach to the Change Proposal detailed breakdowns of pricing (Contractor's cost and Contractor's fee) including:
 - a. List of Work tasks to accomplish the change.
 - b. For each task, labor cost breakdown including labor classification, total hours per labor classification, and hourly cost rate for each labor classification. Where overtime is included, indicate the overtime hours, labor classifications, and associated overhead rates.

- c. Construction equipment and machinery to be used, including manufacturer, model, and year of manufacture, and number of hours for each. Indicate whether the construction equipment or machinery is owned by Contractor, Subcontractor, or leased from a rental firm; if leased, include with the Change Proposal a copy of the rental agreement. Indicate whether the construction equipment and machinery is already onsite and used for other activities, or whether it is required solely for the Work in the contemplated change. Indicate overtime hours budgeted, if any, and the associated cost rate for overtime compared with the straight-time rate.
 - d. Indicate temporary materials required, including description of extent, scope, and quality, and associated cost. Temporary materials include items such as temporary sheeting for support of excavations, scaffolding, temporary plates to cover open excavations, temporary barriers, and other temporary items. Indicate ownership or source of such items. Include copy of rental agreement if rented from a third-party rental firm in which neither Contractor nor any Subcontractor has a financial interest. Indicate intended duration of use for such items and purchase cost of such items.
 - e. Detailed breakdown of cost of materials and equipment to be incorporated into the Work, including quantities, unit costs, and total cost, with Supplier's written quotations. When requested by Engineer, submit quotes by multiple prospective Suppliers.
 - f. Breakdowns of each Subcontractors' pricing, including labor, construction equipment and machinery, temporary materials, and materials and equipment incorporated into the Work, other costs, and Subcontractor fees (e.g., overhead and profit). Breakdown of Subcontractors' pricing shall be the same level of detail as that for Contractor.
 - g. Breakdown of other costs eligible, in accordance with the General Conditions and the Supplementary Conditions under "Cost of the Work" provisions.
 - h. Other information required by Engineer.
 - i. Contractor's fees (overhead and profit) applied to eligible Contractor costs and eligible Subcontractor costs.
5. Proposed Effect on Contract Times: Unless otherwise directed by Engineer, attach to the Change Proposal detailed information substantiating the proposed change in Contract Times, including:
- a. Time impact analysis required by Section 01 32 16 - Construction Progress Schedule.
 - b. Indication of whether the Work associated with the contemplated change will affect Contractor's ability to comply with the Contract Times.
 - c. Other time-related information requested by Engineer.

1.9 CHANGE ORDERS

A. General:

- 1. Change Orders will be recommended by Engineer (when required by the General Conditions) and will be signed by Owner and Contractor (subject to the General Conditions related to a party withholding its signature from a contractually-required Change Order)), to authorize additions, deletions, or revisions to the Work, changes to the Contract Price, changes in the or Contract Times, changes to the terms of the Contract, or a combination thereof.
- 2. Change Orders will be in the form of EJCDC C-941, "Change Order".

B. Procedure.

- 1. Change Orders for signature by Contractor will be transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols, and requirements of this Specifications section. Each Change Order will include a separate letter of transmittal. Contractor shall print three originals of Change Order for Contractor's signature.
- 2. Contractor shall promptly sign each original Change Order and, within five days of receipt, deliver all originals to Engineer.
- 3. Engineer will sign each original Change Order and forward them to Owner.

4. After approval and signature by Owner, original Change Orders will be distributed as indicated below.
5. Original, signed Change Orders will be distributed as follows:
 - a. Contractor: One original.
 - b. Owner: One original.
 - c. Engineer: One original.
 - d. Resident Project Representative (RPR): One copy.
6. Upon Contractor's receipt of the fully-signed Change Order, promptly perform the Work ordered thereby in accordance with the Contract Documents and the Progress Schedule accepted by Engineer.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The forms listed below and bound following this Specifications section's "End of Section" designation, are part of this Specifications section:
 1. Request for Interpretation form (one page).
 2. Proposal Request form (one page).
 3. Change Proposal form (one page).

END OF SECTION

REQUEST FOR INTERPRETATION

Owner: _____

Project Name: _____

Contractor: _____ RFI No. [_____]

Date Transmitted: _____ Date Received: [_____]

Date Response Requested: _____ Date Response Transmitted: [_____]

Subject: _____ [_____]

Specification Section and Paragraph: _____

Drawing References: _____

INTERPRETATION REQUESTED:

Signature: _____ Date: [_____]

ENGINEER'S RESPONSE:

Signature: _____ Date: [_____]

PROPOSAL REQUEST

Owner: _____

Project Name: _____

Proposal Request No.: _____ Date: [_____]

Contract Name and No.: _____

Contractor: _____

Other Contracts Involved in Proposed Change: _____

TO CONTRACTOR: Please submit a complete Change Proposal for the proposed modifications described below. If the associated Change Proposal is approved, a Change Order or allowance authorization will be issued to authorize adjustment so the Contract. This Proposal Request is not a Change Order, Work Change Directive, Field Order, or an authorization to proceed with the proposed Work described below.

SCOPE OF PROPOSED CHANGE(S) IN THE WORK:

1. *[Title 1]:*
2. *[Title 2]:*
3. *[Title 3]:*

Attachments to this Proposal Request:

1. [None].

Proposal requested by: _____
HDR (Engineer)

Signature of Requestor: _____

CHANGE PROPOSAL

Owner: _____

Project Name: _____

Change Proposal No.: _____ Date: [____]

Submitted in Response to Proposal No.: _____

Contractor Name and No.: _____

Contractor: _____

Subject: _____

The following changes to the Contract are proposed:

SCOPE OF PROPOSED CHANGE TO CONTRACT: *(attach supporting information as required)*

1. [Title 1]:

2. [Title 2]:

JUSTIFICATION:

1. [Title 1]:

2. [Title 2]:

PROPOSED CHANGES IN CONTRACT PRICE AND CONTRACT TIMES:

We propose that the Contract Price and Contract Times be changed as follows:

For Contract Price, attach detailed cost breakdowns for Contractor and Subcontractors, Supplier quotations, and other information required.

For the Contract Times, state increase, decrease, or no change to Contract Times for Substantial Completion, readiness for final payment, and Milestones, if any. If increase or decrease, state specific number of days for changes to the Contract Times. Submit supporting data, including time impact analysis for the Progress Schedule.

Description	Amount	Contract Times (days)	
		Substantial	Final
1. [Title 1]	\$0.00	0	0
2. [Title 2]	\$0.00	0	0
Total This Change Proposal	\$0.00	0	0

Changes to Milestones, if any: [____][____]

Contractor represents that supporting data attached to this Change Proposal are accurate and complete. The requested time or price adjustment indicated in this Change Proposal is the entire adjustment to which Contractor believes it is entitled as a result of the proposed change(s) indicated herein.

Change Proposal by: _____

Signature of Proposer: _____

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for the Schedule of values, including:
 - a. Applicability.
 - b. General provisions for Schedules of Values.
 - c. Format, organization, and content of Schedule of Values.
- B. Related Requirements: Include but are not necessarily limited to:
 - 1. Section 01 22 00 - Measurement and Payment.
 - 2. Section 01 29 76 - Progress Payment Procedures.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Schedule of Values and Payment – General:
 - 1. Contractor shall prepare and submit to Engineer for acceptance Schedule of Values that presents (as applicable): (a) an appropriate, detailed breakdown of the price of lump sum bid/pay items, and lists bid/pay items of Unit Price Work. The total of all Work among the various bid/pay items shall equal the Contract Price.
 - 2. For each item of lump sum Work, the Schedule of Values shall, establish in detail the portion of the Contract Price allocated to each component of such Work.
 - 3. Upon request of Engineer, promptly furnish data and information that substantiates and supports the amounts indicated in the Schedule of Values.
 - 4. Submit preliminary Schedule of Values to Engineer for initial review. Contractor shall incorporate Engineer's comments into the Schedule of Values and resubmit to Engineer. Engineer may require corrections and re-submittals until Schedule of Values is acceptable.
 - 5. Schedule of Values may be used, where appropriate, as a basis for negotiating price of changes, if any, in the Work.
- B. Applicability:
 - 1. Lump Sum Work:
 - a. For Work paid on a lump sum basis, progress payments will be on the basis of Work performed in accordance with the Contract Documents, for each line item in the Schedule of Values, as recommended to Owner by Engineer..
 - 2. Unit Price Work:
 - a. Breakdown of unit prices (whether in a Schedule of Values or elsewhere) into detailed cost or price components is not required.
 - b. Unit Price Work will be measured for payment in accordance with the Contract Documents, including Section 01 22 00 - Measurement and Payment.

1.3 ADMINISTRATIVE PROCEDURES

- A. General Provisions for Schedules of Values:
 - 1. This Section augments requirements for the Schedule of Values, indicated in the General Conditions, as may be augmented by the Supplementary Conditions.

1.4 SUBMITTALS

- A. Informational Submittals: Submit the following:

1. Submit to Engineer the Schedule of Values in the form and quantity required in Section 01 33 00 - Submittals, and in accordance with Section 01 31 26 - Electronic Communication Protocols.
2. Content of Schedule of Values Submittals shall be in accordance with this Section.
3. Timing of Submittals:
 - a. Preliminary Schedule of Values:
 - 1) Submit preliminary Schedule of Values within time limit indicated in the General Conditions.
 - 2) Submit preliminary Schedule of Values within 10 days following the date that the Contract Times commence running in accordance with the Notice to Proceed.
 - b. Initial Acceptable Schedule of Values:
 - 1) Revise the preliminary Schedule of Values in accordance with Engineer's comments.
 - 2) Contractor will not be eligible for progress payment until acceptable Schedule of Values is submitted in accordance with the Contract Documents.
 - 3) Submit the Schedule of Values acceptable to Engineer in accordance with the General Conditions.
 - c. Updates: Submit updated Schedule of Values when:
 - 1) The Contract Price has changed.
 - 2) Requested by Engineer

1.5 FORMAT, ORGANIZATION, AND CONTENT OF SCHEDULE OF VALUES

- A. Organization and Major Elements of Schedule of Values.
 1. Prepare Schedule of Values on the "progress estimate" or "continuation sheets", as applicable, of the Application for Payment form indicated in Section 01 29 76 - Progress Payment Procedures.
 2. In addition, list in the Schedule of Values included with Applications for Payment all Unit Price Work bid/pay items in the Contract. The balance of this Article applies to lump sum Work.
 3. Organization in Accordance with Specification Sections:
 - a. Within each work area, organize the Schedule of Values by the various Specifications section numbers and titles included in the Contract Documents.
 - b. Label each row in the Schedule of Values with the appropriate Specifications section number. Include an amount for each row in the Schedule of Values.
 - c. List sub-items of major materials, equipment, or systems, as appropriate or when requested by Engineer.
- B. Requirements for both the preliminary Schedule of Values Submittal and the Schedule of Values Submittal for Engineer's acceptance are:
 1. Subcontracted Work:
 - a. Schedule of Values shall indicate division of Work between Contractor and each Subcontractor.
 - b. Line items for Work to be performed by each Subcontractor shall include the word, "(SUBCONTRACTED)" and the name of the Subcontractor once the associated subcontract is signed and effective.
 2. Apportionment between Materials and Equipment, and Installation: Schedule of Values shall include separate apportionment of costs for:
 - a. Cost of materials and equipment to be incorporated into the completed construction.
 - b. Cost of delivery, handling, and storage of materials and equipment to be incorporated into the completed construction.

- c. Cost of temporary materials (such as excavation supports, scaffolding, and other temporary materials), and their associated delivery, handling, and storage costs, if any.
- d. Cost of rentals of construction equipment and machinery, whether owned by Contractor or Subcontractor or leased from a third-party equipment rental entity.
- e. Cost of installing materials and equipment.
- f. Travel and subsistence costs, if any.
- g. Other costs used in preparing the Bid by Contractor and each Subcontractor.
- 3. Sum of individual line item amounts indicated on the Schedule of Values shall equal the total of associated bid/pay item. Sum of bid/pay item totals in the Schedule of Values, plus the sum of any separate listing of Unit Price Work items, shall equal the total Contract Price.
- 4. Overhead and Profit:
 - a.
 - b. Do not include overhead and profit as separate line item(s).
- 5. Allowances: Include separate line item for each allowance.
- 6. Unit Price Work: Separately indicate items of Unit Price Work in the overall Schedule of Values. Where the required form (in accordance with Section 01 29 76 - Progress Payment Procedures) includes a separate worksheet or page for Unit Price Work, indicate all items of Unit Price Work on such worksheet or page of the form.
- 7. Bonds and Insurance Costs:
 - a. Include line item for bonds and insurance in bid/pay item for General Conditions.
 - b. When Contractor has furnished performance and payment bonds and evidence of insurance acceptable to Owner and in accordance with the Contract Documents, entire amount for bonds and insurance may be applied for in the first Application for Payment.
- 8. Construction Support, Project Management, and Administrative Cost Elements:
 - a. Costs under this category are sometimes informally referred to as General Conditions or "field overhead", but are Project costs rather than costs related to Contractor's general business operations.
 - b. Include in the Schedule of Values relevant line items and amounts for work and services required by the General Conditions and specific Division 01 Specifications sections, such as:
 - 1) Project management costs.
 - 2) Onsite superintendence and supervision costs.
 - 3) Itemized list of Work by work area, as applicable, for costs associated with coordination with the Owner's operations, including required sequencing, as set forth in the Contract Documents.
 - 4) Updating the construction Progress Schedule, preparing time impact analyses, and preparing recovery schedules. Preparation of preliminary Progress Schedule and the initial ("baseline") Progress Schedule acceptable to Engineer are part of mobilization.
 - 5) Construction progress photographic documentation. Preconstruction photographic documentation and final photographic documentation are, respectively, part of mobilization and demobilization.
 - 6) Updates of the Schedule of Submittals.
 - 7) Contractor's safety representative and ongoing implementation of Contractor's Site-specific health and safety plan (SSHASP). Establishing the SSHASP is part of mobilization.
 - 8) Ongoing compliance with permits (when applicable). Contractor's securing of required work permits is part of mobilization.
 - 9) Ongoing cost for temporary utilities and temporary facilities. Establishing such services and facilities is part of mobilization.
 - 10) Ongoing costs for temporary security .

- 11) Field offices (monthly rental and maintenance) and storage facilities (excluding costs of establishment and removal, which are part of mobilization and demobilization).
- 12) Ongoing site maintenance, such as temporary controls (dust, air pollution, water pollution, solid waste control, pest and rodent control, temporary erosion and sediment controls, and others), snow and ice removal, and similar activities.
- 13) Field engineering and surveying.
- 14) Progress cleaning and cleaning for Substantial Completion.
- 15) Record documents (preparation, maintenance, and submittal).
 - a) If adequate record documents are maintained, up to 50 percent of the value of the record documents line item will be eligible for payment, spread evenly over those progress payments in which construction at the Site is performed.
 - b) Remainder of Project record documents line item will be eligible for payment when complete record documents are submitted in accordance with the Contract Documents.
 - c) If record documents submitted are unsatisfactory to Engineer, amount may be reduced via set-offs in accordance with the Contract Documents.
- 16) Other items required by Engineer.
- c. Include such items in Applications for Payment on payment schedule acceptable to Engineer.
- d. Such line items in the Schedule of Values shall exclude any and all costs associated with Contractor's permanent place(s) of business, personnel stationed at permanent office(s), salaries and bonuses of executive and administrative personnel not directly performing work on the Project, and general business expenses, all of which are part of Contractor's overhead costs.
9. Mobilization and Demobilization: Include all associated costs in the separate bid/pay item for mobilization and demobilization. The scope of such bid/pay item is indicated in Section 01 22 00 – Measurement and Payment.
10. Mobilization and Demobilization:
 - a. Include separate line items under each appropriate lump sum bid/pay item for mobilization and demobilization.
 - b. Document for Engineer the activities included in mobilization and demobilization line items.
 - c. Mobilization includes:
 - 1) Obtaining Owner's acceptance of proposed Subcontractors and Suppliers and entering into subcontracts and purchase orders needed to start the Work.
 - 2) Preparing and obtaining Engineer's approval of Shop Drawings required in Section 01 14 19 - Use of Site.
 - 3) Preparing and obtaining Engineer's acceptance of schedules, including Progress Schedule, Schedule of Submittals, and Schedule of Values.
 - 4) Preconstruction conference(s) required by the Contract Documents.
 - 5) Preconstruction photographic documentation.
 - 6) Establishing Contractor's Site-specific health and safety plan, preconstruction activities needed to start implementing Contractor's safety programs, and verifying status of training of construction workers and personnel and condition of construction equipment, machinery, and tools.
 - 7) Submitting acceptable emergency contact information
 - 8) Obtaining required permits needed to start the Work.
 - 9) Initial establishment of temporary utilities and temporary facilities.

- 10) Establishing Contractor's field office and sheds, Engineer's field office, Contractor's storage areas, staging and laydown areas, and other areas necessary to perform the Work.
- 11) Initial establishment of construction vehicular access to the Site, parking needed for construction, and offsite haul routes.
- 12) Establishing construction equipment, machinery, and tools at the Site.
- 13) Providing initial temporary controls.
- 14) Establishing temporary security needed to start Work at the Site.
- 15) Other mobilization acceptable to Engineer.
- d. Mobilization will be limited to 10 percent of the Contract Price, and will be paid in two monthly payments, each of 50 percent of total amount for mobilization. Should Contractor propose mobilization in an amount greater than the limit indicated in this paragraph or on an alternative schedule from that indicated in this paragraph, submit to Engineer for acceptance information and documentation sufficient to support and substantiate the proposed amount and payment schedule for mobilization.
- a. Demobilization includes:
 - 1) Removal from the Site and adjacent areas of excess materials and equipment.
 - 2) Removal of temporary controls, temporary facilities, temporary barriers, and similar materials and equipment.
 - 3) Removal of temporary access roads and parking areas not part of permanent pavement or otherwise allowed to remain by Owner, including temporary traffic controls established for construction vehicles and equipment.
 - 4) Removal of all field office and sheds, storage areas, staging and laydown areas, and other areas needed to perform the Work and restoration of such areas.
 - 5) Removal from the Site of all construction equipment, machinery, tools, Contractor's containers, temporary fuel storage tanks, and similar items.
 - 6) Closeout of permits on which Contractor is a permittee or co-permittee.
 - 7) Final cleaning.
 - 8) Furnishing required closeout documents.
 - 9) Other costs and effort by Contractor for demobilization.
- b. Demobilization shall be not less than 3 percent of the Contract Price and shall be included with the Application for Payment following Substantial Completion, or other schedule acceptable to Engineer.
11. Costs for Submittals, field quality control activities, and training of operations and maintenance personnel shall be as follows, unless otherwise accepted by Engineer:
 - a. Submittals: Up to 8.0 percent of cost (including all associated overhead and profit) of each equipment item, exclusive of transportation and installation costs associated therewith, may be allocated to preparation of Shop Drawings, Samples, and other Submittals required for release for purchase, fabrication, or delivery (as applicable) and may be included in the Application for Payment following Engineer's approval of Shop Drawings (and acceptance of other Submittals, as applicable) required for fabricating or purchasing for that item for the Work.
 - b. Field Quality Control: Up to 3.0 percent of total cost of each item (including all associated overhead and profit), including materials and equipment, and installation, may be apportioned to specified or required field quality control activities (including required testing and inspections) and included in the Application for Payment following Engineer's acceptance of the associated written field quality control report Submittal(s).
 - c. O&M Manual Submittals and Training: Up to a total of 4.0 percent of equipment cost (including all associated overhead and profit), exclusive of transportation and installation costs, may be apportioned to operations and maintenance manuals and training of operations and maintenance personnel, which may be included in the Application for Payment following completion of training for the associated item.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for Contractor's progress payments.

B. Scope:

1. Contractor's requests for payment shall be in accordance with the Agreement, General Conditions and Supplementary Conditions, and the Specifications.
2. Form: Applications for Payment shall be the Engineers Joint Contract Documents Committee (EJCDC) document EJCDC C-620, "Contractor's Application for Payment" (2018 edition or later) or other form acceptable to the Owner and Engineer.

1.2 CONTENT AND PROCEDURE FOR REQUESTING PROGRESS PAYMENTS

A. Procedure:

1. Review with Resident Project Representative (RPR) quantities and the Work proposed for inclusion in each progress payment request. Application for Payment shall cover only the Work and quantities recommended by the RPR.
2. Contractor will review with Engineer or RPR the status of Project record documents, in connection with Engineer's review of each Application for Payment. Failure to maintain record document current will be cause for Engineer to recommend a reduction in payment for record documents in accordance with Section 01 29 73 - Schedule of Values, and will entitle Owner to set-offs in accordance with the Contract Documents.
3. Submit to Engineer electronic copy and 3 printed originals, each with Contractor's signature, of each complete Application for Payment and other documents to accompany the Application for Payment.
4. Engineer will act on request for payment in accordance with the General Conditions and Supplementary Conditions.

B. Content: Each request for payment shall include:

1. Completed Application for Payment form, including summary/signature page, progress estimate sheets, and stored materials summary. Progress estimate sheets shall have the same level of detail as the Schedule of Values.
2. Documentation for Stored Materials and Equipment:
 - a. For materials and equipment not incorporated in the Work but suitably stored, submit documentation in accordance with the General Conditions and Supplementary Conditions.
 - b. UCC-1 Financial Statement:
 - 1) For each lot or delivery of stored materials and equipment for which payment is requested prior to installation of the item(s) at the Site, complete UCC-1, "Financial Statement" form. On UCC-1 form, indicate Owner as "security party"; indicate Supplier as "debtor" when stored item(s) are in Supplier's custody, and indicate Contractor as "debtor" when stored item(s) are in Contractor's custody; and clearly indicate in detail all stored item(s)

included in the filing as “collateral” on the form. Include attachments to the form when necessary to clearly and fully indicate in detail the associated “collateral”.

- 2) File completed UCC-1 form with the secretary of state in the state where the subject item(s) are stored.
- 3) Include with Application for Payment the completed UCC-1 form together with evidence of filing with the required state(s). Submit UCC-1 form and related documentation once for each lot or delivery of stored items.
- c. Photographs of the stored items at the storage location, in accordance with requirements for progress photographs in Section 01 42 00 - References. Submit photographs sufficient to clearly indicate each stored item, clearly showing marking of Owner's property in accordance with Paragraph 1.3.C of this section. Such photographs do not count as photographs required under Section 01 42 00 - References. For each month that such item(s) are stored, take and submit monthly new photographs of each stored item, with date-stamp on each photograph.
- d. Legibly indicate on invoice or bill of sale the specific stored materials or equipment included in the payment request and corresponding bid/payment item number for each and the Supplier price for each item.
3. Listing of Subcontractors and Suppliers:
 - a. In accordance with the General Conditions, submit not less than monthly updated listing of all Subcontractors and Suppliers known to Contractor, whether or not such entities have a contract directly with Contractor.
 - b. Submit complete information using the form attached to this Specifications section.
4. Partial Release or Reduction of Retainage:
 - a. For each Application for Payment where Contractor requests partial release or reduction of retainage in any amount (other than request for final payment), submit with associated progress payment request consent of surety to partial release or reduction of retainage, duly completed by Contractor and surety.
 - b. Acceptable form includes AIA G707A, “Consent of Surety to Reduction in or Partial Release of Retainage” (1994 or later edition), or other form acceptable to Owner.
 - c. For payment requests that include reduction in or payment of retainage in an amount greater than that required by the Contract Documents, obtain Owner's concurrence for partial release or reduction in retainage prior to submitting such Application for Payment.

C. Final Payment:

1. Requirements for request for final payment are in the General Conditions, as may be modified by the Supplementary Conditions, and Section 01 77 19 - Closeout Requirements.

1.3 ADDITIONAL PROCEDURES FOR PAYMENT FOR STORED MATERIALS AND EQUIPMENT

A. Restrictions:

1. Provisions of the General Conditions, as may be modified by the Supplementary Conditions, notwithstanding, only the following items of materials or equipment will be eligible for payment when suitably stored, prior to incorporation into the Work:
 - a. HDPE and CMP Piping

- b. HDPE Manholes
 - c. RCP Manholes
 - d. PVC Conduit
- B. Observation of Stored Materials and Equipment as Condition Precedent to Eligibility for Payment:
 - 1. General:
 - a. Prior to materials or equipment suitably stored but not yet incorporated into the Work can be eligible for payment, Engineer or Resident Project Representative (RPR) shall visit the storage location and verify the extent, condition, and storage environment of the stored items.
 - b. When the same material or equipment item is stored for more than two months, such visits to storage location shall be not less than once every two months.
 - 2. Cost Responsibility for Observations:
 - a. When storage location is less than 20 miles from the Site or less than 20 miles from Engineer's office, Contractor is not responsible for reimbursing Owner for cost of Engineer's time and expenses for observing stored materials and equipment.
 - b. When storage location is more than 20 miles from the Site and more than 20 miles from Engineer's office, Contractor shall reimburse Owner, via a set-off under the Contract Documents, for reasonable cost of Engineer's time and expenses, including travel time, to visit the storage location and observe the stored materials and equipment.
- C. Other Requirements for Stored Items: Regardless of storage location, perform the following for stored materials and equipment for which payment is sought:
 - 1. Clearly mark each stored container, crate, or item as follows: "Property of Catawba County" using permanent marking. Such marking shall not blemish or deface the finish of items that will be exposed to view after installation at the Site.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The forms listed below, following this Specifications section's "End of Section" designation, are part of this Specifications section:
 - 1. List of Subcontractors and Suppliers form (two pages).

END OF SECTION

LIST OF SUBCONTRACTORS AND SUPPLIERS

Owner: [][]
Project Name: [][]

Contractor: _____ Date: []
Contract Designation: _____

Indicate below complete information for each Subcontractor and Supplier known to Contractor, regardless of whether the firm has a direct contract with Contractor. Include all lower-tier Subcontractors and associated Suppliers. Copy and paste the paragraphs below as required to indicate all Subcontractors and Suppliers.

SUBCONTRACTORS

1. Subcontractor Name:

- Address:
- Contact Person:
- Telephone No.:
- E-mail Address:
- Work Under Specifications Section Nos.:
- Brief Description of Work:
- Current Subcontract Price:
- Approximate Subcontract Start Date:
- Approximate Subcontract End Date:

2. Subcontractor Name:

- Address:
- Contact Person:
- Telephone No.:
- E-mail Address:
- Work Under Specifications Section Nos.:
- Brief Description of Work:
- Current Subcontract Price:
- Approximate Subcontract Start Date:
- Approximate Subcontract End Date:

3. Subcontractor Name:

- Address:
- Contact Person:
- Telephone No.:
- E-mail Address:
- Work Under Specifications Section Nos.:
- Brief Description of Work:
- Current Subcontract Price:
- Approximate Subcontract Start Date:
- Approximate Subcontract End Date:

Total of Subcontract Prices for all subcontracts equals approximately [] percent of the Contract Price (Contractor to fill in blank monthly)

SUPPLIERS

1. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

2. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

3. Supplier Name:

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

This page intentionally left blank.

SECTION 01 31 13
PROJECT COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for:
 - a. Project coordination when the Project is implemented using a single prime construction Contract.
 - b. Coordination meetings.
 - c. Coordination drawings and layout drawings.

B. Scope:

1. Contractor shall coordinate the Work, whether performed by Contractor's employees or by Subcontractors, Suppliers, or others for whom Contractor is responsible, to provide Work in accordance with the Contract Documents.
2. Coordinate the Work with testing entities and inspectors (whether hired by Contractor, Owner, or others) employed on the Project, forces of Owner and facility manager (if other than Owner), and other contractors retained by Owner or facility manager, and other entities with which the Work needs to be coordinated.
3. Requirements for preconstruction meetings are in the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 31 19 - Project Meetings.
4. Requirements for construction progress meetings are in Section 01 31 19 - Project Meetings.

C. Related Requirements:

1. Include, but are not necessarily limited to, the following:
 - a. Section 01 11 00 - Summary of Work.
 - b. Section 01 31 19 - Project Meetings.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordination – General:
 - a. In accordance with the General Conditions as may be modified by the Supplementary Conditions, and Section 01 11 00 - Summary of Work, Contractor shall coordinate the Work with, and cooperate with, other contractors, utility owners and their contractors, owners of transportation facilities and their contractors, Owner's and facility manager's workers at the Site, and other entities working at or adjacent to the Site.
2. Advise other contractors (if any) of schedule for the Work to allow other contractors sufficient time to perform their work that must be performed prior to the Work. Coordinate and communicate with other contractors and other entities when the Work must be performed prior to the work of others and make good-faith efforts to avoid delaying work of others.
3. Coordination, Inspection, and Observation to Ensure Quality:
 - a. Contractor shall continuously inspect the Work throughout the Project to ensure that the Work complies with the Contract Documents.
 - b. Inspect (including testing, where required or necessary) substrates and surfaces on which the Work will be constructed, applied, adhered, or attached, to ensure substrate and surface conditions are appropriate for providing Work in accordance with the Contract Documents.

4. Contractor is not responsible for, or liable for, damage or loss unless damage or loss resulted from action, inaction, or negligence of Contractor, or Subcontractor(s), Supplier(s), or other entity for whom Contractor is responsible. This provision does not mitigate or reduce Contractor's responsibility for security for the Work, in accordance with the Contract.
- B. Coordination Meetings:
1. Contractor's Coordination Meetings:
 - a. Schedule, attend, chair, and actively participate in coordination meetings deemed appropriate by Contractor for purposes of coordinating the Work of Contractor's employees, Subcontractors, Suppliers, and others for whom Contractor is responsible.
 - b. Frequency, location, date, time, and duration of Contractor's coordination meetings are at Contractor's discretion. Record and distribute to attendees and other members of Contractor's team a record of topics discussed, decisions made, and other relevant matters at Contractor's coordination meetings.
 - c. Engineer, Resident Project Representative (if any), Owner, and Owner's Site Representative (if any) will not attend Contractor's coordination meetings.
 2. Coordination Meetings with Other Contractors:
 - a. When Section 01 11 00 - Summary of Work, indicates that others, whether or not under Owner's control, will be performing work at or adjacent to the Site, coordination meetings between the separate contractors may be necessary. When such meetings are deemed necessary by Owner, either Owner or Engineer will advise Contractor in writing of the location, date, time, duration, and frequency of such coordination meetings.
 - b. Such coordination meetings, when held, are anticipated to be [once per month] or less-often, and held either at the Site or in reasonable proximity to the Site. During periods when increased coordination among the separate projects is necessary, such as when adjacent contractors are in close proximity to each other, the potential exists that more-frequent coordination meetings may be necessary, although such increased frequency is not anticipated to be for extended periods.
 - c. Contractor's project manager and site superintendent shall attend such coordination meetings required by Owner.
 - d. Purpose of such coordination meetings will be to discuss scheduling and coordination of work by separate contractors and others as appropriate, sharing of space at the Site, and other coordination matters.
 - e. Owner and others deemed appropriate by Owner will attend such coordination meetings.
 - f. Owner or others for whom Owner is responsible will chair the meetings and prepare and distribute to participants a record of the topics discussed and decisions made at such meetings.
- C. Coordination Drawings and Layout Drawings:
1. Maintain sufficient, competent personnel; drafting implements; computer-aided drafting/design (CAD) or building information modeling (BIM) equipment, software, systems; and supplies at Contractor's office and at the Site (as deemed appropriate by Contractor) for preparing layout drawings and coordination drawings.
 2. With the Contract Documents and Shop Drawings, use coordination drawings and layout drawings for coordinating the Work of various trades.
 3. Where such coordination drawings or layout drawings are to be prepared by Subcontractors such as structural-architectural, fire suppression, plumbing, HVAC, civil-site, process-mechanical, or other Subcontractors, ensure that each such Subcontractor maintains required personnel, implements, equipment, and systems at Subcontractor's office and at the Site (as deemed appropriate by Contractor).

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

This page intentionally left blank.

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for the following types of conferences and meetings required during the Work:
 - a. Requirements applicable to all conferences.
 - b. Preconstruction conference(s).
 - c. Construction progress conferences.
 - d. Closeout conference(s).
 - e. Other construction conferences.
- B. Scope:
 - 1. This Section addresses the types of conferences indicated in Paragraph 1.1.A of this Section.
 - 2. Requirements for monthly schedule meetings are in Section 01 32 16 - Construction Progress Schedule.
 - 3. Requirements for pre-installation conferences, if any, are in the Specifications of Divisions 02-49.
- C. Related Requirements: Include, but are not necessarily limited to:
 - 1. Section 01 29 76 - Progress Payment Procedures.
 - 2. Section 01 31 13 - Project Coordination.
 - 3. Section 01 32 16 - Construction Progress Schedule.

1.2 REQUIREMENTS APPLICABLE TO ALL CONSTRUCTION CONFERENCES

- A. Requirements of this Article apply to all conferences required under this Section.
- B. Participants:
 - 1. Lead participant for each participating entity of each conference shall be authorized to represent their employer and its interests on the Project, and shall be sufficiently familiar with the status of their employer's work, services, and activities related to the Project for purposes of the associated conference.
 - 2. Required participants for each type of conference are indicated elsewhere in this Section.
 - 3. Failure to participate by required participants:
 - a. Should a required participant be unavailable for a required conference, inform the designated conference chair not less than one day prior to start of the subject conference. Furnish both oral (either in person or via telephone) and written communication regarding planned non-attendance. Expressly indicate the authorized substitute person who will be empowered to represent that entity at the conference.
 - b. Failure to properly inform the conference chair as required, or repeated or habitual non-participation by mandatory participants, will be grounds for Owner to withhold (as "set-offs") amounts for mandatory meeting attendance from payments due Contractor under the Contract.
 - c. Sending as a substitute lead participant an authorized representative who is ill-informed of their organization's work status and administrative matters related to the Project, or who is not properly authorized to represent their employer for all required matters indicated on the agenda, will be grounds for Owner to withhold payment, as set-offs, of amounts associated with such unpreparedness.

- d. Should Contractor fail to attend without proper, advance notice to conference chair or furnish ill-prepared or unauthorized substitute lead participant, Contractor shall bear full responsibility, including cost- and time-related impacts, for lack of coordination, progress, and other, potentially adverse effects.
4. Conduct:
 - a. Conference participants shall, at all times, exhibit appropriate, professional conduct and demeanor.
 - b. Inappropriate conduct, including shouting, unprofessional language, threatening attitudes, or other types of insult or intimidation are unacceptable.
 - c. Conference chair has the authority to eject from a conference, participants exhibiting inappropriate conduct.
 - d. Person's exhibiting repeated or habitual inappropriate conduct will not be allowed to participate in conferences. Such person's employer and the contracting party they represent shall bear full responsibility for consequences of actions by its employees and representatives.

C. Agenda:

1. Each conference required by this Section shall have an established, written agenda available to required attendees not less than one day prior to the subject conference, unless extenuating circumstances dictate a shorter time period.
2. Unless written agenda specific to a given conference is issued in writing, the default agenda shall be in accordance with this Section.
3. If a person or entity intending to participate in a required conference desires that such conference should address a given topic not already part of the typical agenda indicated in this Section, a written request for such topic to be added to the agenda must be received by the conference chair not later than [two] days prior to the scheduled start of such conference.
4. The agenda may be amended at the outset of the conference, by consent of a majority of conference participants. Thereafter, the conference will be conducted, and topics discussed will be in accordance with the established agenda, as may be modified in accordance with this paragraph.

D. Conference Date, Time, and Location:

1. Date, start time, anticipated duration, and location of each required conference will be established by conference chair, unless otherwise indicated in the Contract Documents.
2. Conference chair will advise, in writing, required participants of conference date, start time, anticipated duration, and location. Such information may be transmitted as part of an agenda. Upon mutual agreement of required participants, date, start time, anticipated duration, and location of recurring conferences, such as construction progress conferences, may be initially established at the outset of the series and, therefore, do not require written advisory for each individual conference.
3. Change of Conference Date, Time, or Location:
 - a. In general, required conferences will be held on the date, at the time, and at the location required.
 - b. Designated conference chair may, at their sole discretion, elect to change the conference date, start time, duration, location, or any combination thereof. Such change, if any, shall be communicated in writing to all required conference participants, and others as appropriate. Contractor is responsible for communicating changes to its Subcontractors and Suppliers.
 - c. Notice of such change shall be communicated in accordance with Section 01 31 26 – Electronic Communication Protocols, not later than one day prior to scheduled start of the subject conference. Such changes may be communicated by distributing a written agenda for the subject conference, expressly indicating changes from previous arrangements.

- d. When changes in date, time, or location are necessary less than the period indicated in the paragraph immediately above, such changes shall be communicated orally, whether in-person or via telephone. When communicated via telephone, calls shall be made to all of the participant's designated telephone numbers on file with the conference chair. Persons intending to participate in such conference are encouraged to check their voicemail and written communications prior to departing for the conference.

E. Minutes:

1. For each conference required in this Section, the conference chair will be responsible for preparing and distributing a written record ("minutes") of the conference proceedings, unless expressly indicated otherwise for a specified type of conference.
2. Purpose of minutes is to furnish a written record of the following for the associated conference: participants (indicating whether each individual participated in-person, virtually, arrived late, or departed early), topics discussed, questions asked and answered, and decisions made, and other pertinent matters as indicated on the established agenda for the associated conference. Minutes are not intended as a transcript or as complete record of minutia discussed at the associated conference.
3. Distribution of Minutes:
 - a. Minutes will be distributed promptly after the associated conference.
 - b. Minutes will be distributed, in accordance with Section 01 31 26 - Electronic Communication Protocols.
 - c. Minutes will be distributed to all conference participants, personnel invited to or required to attend the conference but who did not attend or participate, and others as appropriate.
 - d. Unless indicated otherwise in this Section or elsewhere in the Contract Documents, minutes of conferences required by this Section will be distributed to Owner, Contractor, and Engineer.
4. Amendment of Minutes:
 - a. Minutes distributed by, or on behalf of, the conference chair are subject to comments and potential amendments by other attendees of the subject conference. The period for commenting on, or requesting amendments to, minutes is limited to [30] days following initial distribution of the minutes, unless indicated otherwise elsewhere in the Contract Documents.
 - b. Comments or requests for amendments may be furnished at the next, subsequent meeting in the same series of conferences. For example, comments on minutes of a construction progress conference may be presented at the next, subsequent construction progress conference. Comments on the minutes of the preconstruction conference may be presented at the first construction progress conference unless the designated time limit for requesting amendments has elapsed prior to the first progress conference.
 - c. Minutes may be amended either by issuing revised minutes for the subject conference or by appropriate indication in the minutes of the next, subsequent conference in the same series, at the sole discretion of the conference chair.
 - d. Conference chair has sole authority to accept or reject comments or requests for amendments on previously issued minutes.
 - e. In general, requests, by persons who participated in the subject conference, for amendments to minutes will be given greater consideration by conference chair than request for amendments received from persons who did not participate in the subject conference.
 - f. Should a person or entity believe the final minutes do not accurately reflect their opinion of how events transpired at the subject conference, such person or entity may prepare and submit appropriate correspondence presenting their viewpoint.

1.3 PRECONSTRUCTION CONFERENCES

A. The requirements of Article 1.2 of this Section also apply to this Article.

B. Preconstruction Conferences - General:

1. Purpose of preconstruction conference is reviewing administrative and procedural requirements, site mobilization matters, coordination with utility owners, coordination with authorities having jurisdiction, and related matters. Required agenda, unless otherwise amended by conference chair, is indicated in this Article.
2. Conference Chair: Engineer's project manager.
3. Location, Date, and Time:
 - a. Preconstruction conference will be held in [indicate building and room designation, as appropriate] at [the Site] [indicate other location, including address].
 - b. Preconstruction conference will be held following the Effective Date of the Contract on a day and at a time to be established by Engineer, following consultation with principal representatives of Owner,] Contractor, and other required participants. Preconstruction conference will be held prior to commencement of the Work at the Site.
 - c. Anticipated duration of preconstruction conference is three hours, followed by time necessary for visiting the Site.
 - d. Location, date, and time will be established in accordance with requirements of Article 1.2 of this Section.
4. Required Participants:
 - a. Owner: Project manager.
 - b. Contractor: Project manager and site superintendent.
 - c. Engineer: Project manager or delegate.
5. Required participants may invite to the preconstruction conference others they deem necessary or appropriate.
6. Designation of Authorized Representatives:
 - a. Either prior to or at the preconstruction 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.

C. Agenda:

1. Procedural and Administrative:
 - a. Personnel and Teams:
 - 1) Designation of roles and personnel.
 - 2) Limitations of authority of personnel, including personnel who will sign Contract modifications and make binding decisions.
 - 3) Subcontractors and Suppliers in attendance.
 - 4) Authorities having jurisdiction.
 - b. Procedures for communications and correspondence, including electronic communication protocols.
 - c. Copies of the Contract Documents and availability.
 - d. The Work and Scheduling:
 - 1) General scope of the Work.
 - 2) Contract Times, including Milestones (if any).
 - 3) Phasing and sequencing.
 - 4) Preliminary Progress Schedule.
 - 5) Critical path activities.

- e. Safety and Protection:
 - 1) Responsibility for safety.
 - 2) Contractor's safety representative.
 - 3) Emergency procedures and accident reporting.
 - 4) Emergency contact information.
 - 5) Confined space entry permits.
 - 6) Hazardous materials communication program.
 - 7) Impact of the construction on public safety.
 - 8) Responsibilities for protection of property.
- f. Review of insurance requirements and insurance claim procedures.
- g. Coordination:
 - 1) Coordination of Subcontractors and Suppliers.
 - 2) Construction coordinator (for projects with multiple prime construction contracts and locations where multiple projects may be underway simultaneously in reasonable proximity to each other).
 - 3) Coordination with Owner's operations.
 - 4) Construction progress conferences – schedule and frequency.
 - 5) Coordination conferences with other, separate projects.
- h. Submittals:
 - 1) Current Critical Submittals:
 - a) Preliminary schedules – Progress Schedule, Schedule of Submittals, Schedule of Values.
 - b) Preconstruction photographic documentation.
 - c) List of proposed Subcontractors and Suppliers using the form included in Section 01 29 76 - Progress Payment Procedures.
 - d) List of emergency contact information.
 - e) Notice of elements of Contractor's safety program with which Owner and Engineer are to comply.
 - f) Action Submittals required under Section 01 14 19 - Use of Site.
 - g) Evaluation of need for SPCC plan required under Section 01 35 44 – Spill Prevention Control and Countermeasures Plan.
 - h) Form of Contractor's site superintendent's daily reports, in accordance with Section 01 71 23 - Field Engineering.
 - 2) Work is ineligible for payment without approved or accepted Submittals (as applicable).
 - 3) Submittal procedures.
 - a) Compliance with accepted Schedule of Submittals.
 - b) Actions required of Contractor prior to furnishing Shop Drawings and other Submittals.
 - c) Contractor's Submittal approval stamp required; Contractor's coordination of Submittals.
 - d) Furnishing of Submittals.
 - e) Submittal types and meaning of Engineer's action on each.
 - f) Resubmittals—responsibility for, limitations on quantity.
 - 4) Identification of initial, critical Shop Drawings and product data.
 - 5) Construction photographic documentation.
- i. Substitutes and "Or-Equals":
 - 1) Product options.

- 2) Procedures for proposing "or-equals".
- 3) Procedures for proposing substitutes.
- j. Contract Modification Procedures:
 - 1) Requests for interpretation.
 - 2) Written clarifications.
 - 3) Field Orders.
 - 4) Proposal Requests.
 - 5) Change Proposals.
 - 6) Work Change Directives.
 - 7) Change Orders.
 - 8) Differing site conditions or discovery of unanticipated Hazardous Environmental Condition.
 - 9) Substantiating and documenting Change Proposals and Claims.
 - 10) Claims.
- k. Progress Payment:
 - 1) Owner's Project financing and funding, as applicable.
 - 2) Owner's tax-exempt status.
 - 3) Preliminary Schedule of Values
 - 4) Procedures for measuring for payment (Unit Price Work).
 - 5) Retainage.
 - 6) Progress payment procedures; documents to accompany Applications for Payment.
 - 7) Payment for stored items not yet installed.
 - 8) Date of Owner's payments; payment is due.
- l. Subcontractors and Suppliers:
 - 1) List of proposed Subcontractors and Suppliers; monthly updates.
 - 2) Coordination and management.
 - 3) Subcontracts and purchase orders.
- m. Testing and inspections:
 - 1) Owner-hired and contractor-hired.
 - 2) Identification of Owner-hired testing entity and special inspectors.
 - 3) Responsibility for advising testing entity and special inspectors of need for services.
 - 4) Results of code-required special inspections and tests.
 - 5) Prompt remedy of apparent defects.
 - 6) Notices of defective Work.
 - 7) Remedy of defective Work.
 - 8) Defective Work is ineligible for payment.
 - 9) Covering up defective Work.
 - 10) Cost responsibility for defective Work and retesting/re-inspection.
- n. Disposal of demolition and spoil materials.
- o. Record documents.
- p. Preliminary discussion of Contract closeout:
 - 1) Procedures for Substantial Completion.
 - 2) Partial utilization procedures; property insurance.
 - 3) Contract closeout requirements.
 - 4) Correction period; duration of Contractor's general warranty and guarantee.
 - 5) Duration of bonds and insurance.

2. Authorities Having Jurisdiction (if not covered in a separate conference):
 - a. Municipal licenses.
 - b. Municipal permits required.
 - 1) Permits required and status.
 - 2) Inspections for building code official.
 - 3) Code-required special inspections and tests (if not covered in Administrative and Procedures part of conference).
 - c. Right-of-way work permits; status of occupancy permit(s).
 - d. Environmental permits:
 - 1) Spill prevention control and countermeasures plan (40 CFR 112).
3. Site Mobilization (if not covered in a separate conference):
 - a. Working days, working hours, and overtime.
 - b. Use of Site and other areas; use of existing facilities.
 - c. Field offices, storage trailers, and staging areas.
 - d. Temporary facilities.
 - e. Temporary utilities and limitations on utility use (where applicable).
 - f. Utility company coordination (if not done as a separate conference).
 - g. Access to Site, access roads, and parking for construction vehicles.
 - h. Traffic controls.
 - i. Temporary controls:
 - 1) Erosion and sediment control; storm water pollution prevention plans.
 - 2) Dust control and air pollution control (including emissions control).
 - 3) Water control (storm water, surface water, groundwater).
 - 4) Water pollution control; spill prevention control and countermeasures plan.
 - 5) Solid waste control.
 - 6) Pest control.
 - 7) Other temporary controls.
 - j. Temporary security; temporary security fencing (where required).
 - k. Storage of materials and equipment to be incorporated into the Work.
 - l. Protection of the Work and property; protective barriers.
 - m. Field engineering:
 - 1) Reference points and benchmarks.
 - 2) Surveys and layouts.
 - 3) Professional services for Contractor's means and methods (not delegated design).
 - 4) Contractor's site superintendent's daily records and submittal requirements.
 - n. Site maintenance during the Project:
 - 1) Progress cleaning; removal of trash and debris.
 - 2) Maintenance and cleaning of existing access roads and parking areas.
 - o. Restoration.
4. Next conference.
5. Site visit, as necessary.

1.4 CONSTRUCTION PROGRESS CONFERENCES

- A. The requirements of Article 1.2 of this Section also apply to this Article.
- B. Construction Progress Conferences - General:
 1. Purpose of construction progress conferences is to review and summarize Work performed since the previous construction progress conference; review and summarize planned

progress through the next, subsequent construction progress conference; review and summarize compliance with the Progress Schedule; review progress and necessary actions on pending and critical administrative items; discuss matters pertinent to the Site and construction quality; and other matters.

2. Conference Chair: Engineer's project manager or delegate
3. Location, Date, and Time:
 - a. Construction progress conferences will be held in [Contractor's field office at the Site.
 - b. Frequency: construction progress conferences will be held every other week. Such conferences are in addition to other recurring conferences that may be required elsewhere in the Contract Documents.
 - c. Construction progress conferences will be held following preconstruction conference on a day and at a time to be established by Engineer, following consultation with principal representatives of Owner, [Contractor, and other required participants. Timing on which construction progress conferences will commence will be at the discretion of the designated chair of construction progress conferences.
 - d. Construction progress conferences required by this Section are separate from monthly schedule meetings required in Section 01 32 16 - Construction Progress Schedule.
 - e. Anticipated duration of each construction progress conference is two hours, plus time necessary for visiting the Site.
 - f. Location, date, and time will be established in accordance with requirements of Article 1.2 of this Section.
4. Required Participants:
 - a. Owner: Project manager.
 - b. Contractor: Project manager, site superintendent, and safety representative.
 - c. Principal Subcontractors: Project manager or site superintendent, for Subcontractors performing significant Work since the previous conference and that will perform significant Work prior to the next, subsequent construction progress conference. When Subcontractor's site superintendent represents Subcontractor at construction progress conferences, site superintendent shall be authorized and informed of administrative matters relating to Subcontractor's Work in accordance with Article 1.2 of this Section.
 - d. Major Suppliers: Field representative of Suppliers of significant materials and equipment, when such field representatives are performing onsite services under the Contract, or as otherwise deemed necessary by Contractor relative to conference participation.
 - e. Engineer: Project manager or delegate and Resident Project Representative.
5. Required participants may invite to construction progress conferences others they deem necessary or appropriate.

C. Handouts:

1. Contractor shall bring to each construction progress conference not less than 6 paper copies of each of the following:
 - a. List of Work accomplished since the previous construction progress conference and list of construction activities planned through the next, subsequent construction progress conference. Coordinate list of planned activities with both the updated Progress Schedule and look-ahead schedule.
 - b. Up-to-date Progress Schedule, in accordance with Section 01 32 16 - Construction Progress Schedule.
 - c. Up-to-date Schedule of Submittals, in accordance with Section 01 33 00 - Submittal Procedures.
 - d. "Look-ahead" schedule, in accordance with Section 01 32 16 - Construction Progress Schedule.
 - e. When applicable, list of upcoming, planned time off (with dates) for personnel with significant roles on the Project, and the designated contact person in their absence.

D. Preliminary Agenda for Construction Progress Conferences:

1. Review, comment, and amend (if necessary) of minutes of previous progress conference.
2. Review of progress since the previous progress conference.
3. Planned progress through next progress conference.
4. Overview of Progress Schedule:
 - a. Review of the Contract Times; Contractor's ability to comply with Contract Times.
 - b. Identification of critical path activities.
 - c. Schedules for fabrication and delivery of materials and equipment.
 - d. Corrective measures, if necessary, including recovery schedule(s).
5. Submittals:
 - a. Review status of critical Submittals.
 - b. Review revisions to Schedule of Submittals.
6. Contract Modifications:
 - a. Requests for interpretation.
 - b. Written clarifications.
 - c. Field Orders.
 - d. Proposal Requests.
 - e. Change Proposals.
 - f. Work Change Directives.
 - g. Change Orders.
 - h. Claims.
7. Progress Payment Requests:
 - a. Status and deadline for submittal.
 - b. Stored materials and equipment; observation by Engineer or RPR; documents required.
 - c. Set-offs to which Owner is entitled (as applicable).
 - d. Other matters related to progress payments.
8. Problems, conflicts, and observations.
9. Quality standards, testing, and inspections.
10. Coordination between Project participants.
11. Site management issues, including vehicular access and parking, traffic control, security, status of temporary controls and temporary utilities, site maintenance and cleaning, and other Site matters.
12. Safety and protection.
13. Permits and compliance.
14. Construction photographic documentation.
15. Record documents status.
16. Completion matters (as appropriate):
 - a. Status of checkout, startup, field quality control activities.
 - b. Status of training of facility O&M personnel and O&M manuals.
 - c. Partial utilization; requesting and scheduling inspection for Substantial Completion.
 - d. Punch list status (as applicable).
 - e. Other closeout matters (if any).
17. Other business.

1.5 CLOSEOUT CONFERENCES

- A. The requirements of Article 1.2 of this Section also apply to this Article.
- B. Closeout Conferences – General.

1. Purpose of closeout conferences is to familiarize participants with administrative and procedural requirements for Substantial Completion (including partial utilization by Owner) and readiness for final payment, and status of the Work required for achieving Substantial Completion and readiness for final payment.
 2. Conference Chair: Same as indicated elsewhere in this Section for construction progress conferences.
 3. Location, Date, and Time:
 - a. Location, date, and time will be the same as indicated elsewhere in this Section regarding construction progress conferences.
 - b. In general, as the Work, or a designated part thereof, progresses toward Substantial Completion, topics addressed at construction progress conferences will transition to discussing closeout-related topics.
 - c. The conference chair may require one or more additional closeout conferences as the conference chair deems necessary. Required participants shall participate in such conferences without changes in the Contract Price or the Contract Times.
 - d. Should additional closeout conferences be necessary, or should location, date, or times for closeout conferences differ from those established for construction progress conferences, the conference chair will so advise required participants, and others as appropriate, in accordance with Article 1.2 of this Section.
 4. Required Participants: Same as required participants for construction progress conferences, unless otherwise indicated by conference chair.
- C. Preliminary Agenda for Closeout Conferences:
1. Same as "Completion matters" portion of preliminary agenda for construction progress conferences as indicated elsewhere in this Section.
 2. Checkout and startup planning meeting.
 3. Training schedule conference.
 4. Additional closeout related topics as determined by closeout conference chair.

1.6 OTHER CONSTRUCTION CONFERENCES

- A. The requirements of Article 1.2 of this Section also apply to this Article.
- B. Other Construction Conferences – General.
1. Other construction conferences may be scheduled and held as deemed necessary by Owner or Engineer. Such conferences may be focused on specific matters, such as discussing remedies and schedules for defective Work, negotiating changes in the Contract Price and Contract Times, or other matters related to the Project where time limits prevent addressing such items as part of other conferences addressed elsewhere in the Contract Documents.
 2. Conference Chair: Engineer's [project manager or delegate.
 3. Location, Date, and Time:
 - a. Location: Same as location of construction progress conferences as indicated elsewhere in this Section, unless location is changed in accordance with Article 1.2 of this Section.
 - b. Other construction conferences will be held on a day and at a time to be established by Engineer, following consultation with principal representatives of Owner, Contractor, and other required participants.
 - c. Each other construction conference is one hour, plus time that may be necessary for visiting the Site when conference purpose warrants.
 - d. Location, date, and time will be established in accordance with requirements of Article 1.2 of this Section.
 4. Required Participants: As deemed necessary by conference chair.

- C. Agenda: Agenda presenting topics to be discussed at each other construction conference will be developed by the conference chair and distributed to required participants, and others as appropriate, in accordance with Article 1.2 of this Section.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

This page intentionally left blank.

SECTION 01 31 26
ELECTRONIC COMMUNICATION PROTOCOLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Procedures with which Users will comply regarding transmission or exchange of Electronic Documents for the Project.
- B. Related Requirements:
 - 1. Refer to the General Conditions, as may be modified by the Supplementary Conditions, regarding transmitting Electronic Documents by Electronic Means.
 - 2. In addition to the requirements of this Specifications Section, comply with the requirements for Electronic Documents in the following Specifications:
 - a. Section 01 32 16 - Construction Progress Schedule.
 - b. Section 01 32 33 - Photographic Documentation.
 - c. Section 01 33 00 - Submittals.
 - d. Section 01 78 39 - Project Record Documents.

1.2 DEFINITIONS

- A. The following terms are defined for use in this Specifications Section and are indicated herein using initial capital letters. The terms have the associated meaning regardless of whether indicated in singular or plural.
 - 1. Electronic Documents Protocol (abbreviated as "EDP"): Procedures and requirements set forth in this Specifications Section for the exchange of Electronic Documents by Electronic Means.
 - 2. Project Website: An internet-based software platform, such as a website or other project management information system (PMIS) designated by Contract or mutual consent of Users as the means of exchanging Electronic Documents during the Project.
 - 3. System Infrastructure: Hardware, operating system(s) software, internet access, e-mail service and software, security software, and large-file transfer functions.
 - 4. Users: Owner, Contractor, Engineer, and others exchanging Electronic Documents on the Project in accordance with the EDP.

1.3 ADMINISTRATIVE REQUIREMENTS.

- A. Coordination:
 - 1. Contractor shall require all Subcontractors and Suppliers to comply with the EDP established in the Contract Documents.

1.4 GENERAL PROVISIONS OF ELECTRONIC DOCUMENT PROTOCOL

- A. EDP – General:
 - 1. To the fullest extent practical, Users agree to and will transmit and accept Electronic Documents transmitted by Electronic Means in accordance with the requirements of this Specifications Section. Use of the Electronic Documents and any information contained therein is subject to requirements of this Specifications Section and other provisions of the Contract Documents governing transmittal of Electronic Documents.
 - 2. Content of Electronic Documents will be the responsibility of transmitting User.
 - 3. Unless otherwise provided in: (1) the EDP, (2) elsewhere in the Contract Documents, or (3) or other agreement between two or more Users governing use of Electronic Documents, Electronic Documents exchanged in accordance with the Contract Documents may be used

in the same manner as paper or other printed versions of the same documents exchanged using other than Electronic Means, subject to the same governing requirements, limitations, and restrictions set forth in the Contract Documents.

4. Except as otherwise explicitly indicated in the EDP, the terms of this EDP will be incorporated into any other agreement or subcontract between a party and a third party for a portion of the Work or Project-related services, where such third party is, either directly or indirectly, required to exchange Electronic Documents with Owner, Contractor, or Engineer. Nothing in this EDP modifies the requirements of the Contract Documents regarding communications between and among Owner, Contractor, and Engineer Subcontractors, Suppliers, consultants, and others for which each is responsible.
5. When transmitting Electronic Documents, transmitting User makes no representations regarding long-term compatibility, usability, or readability of the items resulting from the receiving User's use of software applications or System Infrastructure differing from those established in this EDP.
6. This EDP does not negate or mitigate any obligation: (1) in the Contract Documents to create, provide, or maintain an original paper record version of Drawings and Specifications, signed and sealed in accordance with Laws or Regulations; (2) to comply with Laws and Regulations governing signing and sealing of design documents or signing and electronic transmission of other documents; or (3) to comply with notice requirements of the General Conditions (as. May be modified by the Supplementary Conditions).
7. Modifications to EDP:
 - a. When modifications to the EDP are necessary to address issues affecting System Infrastructure, Users shall cooperatively resolve the issues.
 - b. If resolution within a reasonable time is not achieved, Owner is empowered to require reasonable and necessary changes to the EDP consistent with the original intent of the EDP.
 - c. If such changes result in additional cost or delay to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in the Contract Price, Contract Times, or both in accordance with the Contract Documents.

B. System Infrastructure and Systems for Exchanging Electronic Document:

1. Each User will provide System Infrastructure (as defined in this EDP) at its own cost and sufficient for complying with EDP requirements. Except for minimum standards set forth in this EDP and explicit system requirements specified by attachment to this EDP, it is the obligation of each User to determine, for itself, such User's own System Infrastructure.
 - a. Maximum size of e-mail file attachment under this EDP is 25 megabytes (MB). Attachments larger than the maximum size indicated in this paragraph shall be exchanged via secure electronic transfer using method mutually acceptable to Owner, Engineer, and Contractor.
 - b. Each entity transmitting or receiving Electronic Documents has full responsibility for its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, and otherwise enabling its System Infrastructure for use in accordance with this EDP.
 - c. Each User will provide its own printing facilities and will be responsible for its own costs of printing Electronic Documents.
2. Each User is responsible for its own system operations, security, back-up, archiving, audits, and other technology and resources for operations of its System Infrastructure during the Project, including coordination with the User's individual(s) or subcontractor(s) responsible for managing its System Infrastructure and capable of addressing communications and other technology issues affecting exchange of Electronic Documents.
3. Security:
 - a. Each User will operate and maintain industry-standard, industry-accepted, ISO standard, commercial-grade security software and systems to protect against threats including software viruses and other malicious software including worms, trojans, adware; data breaches; loss of confidentiality; and other threats in transmission to, or

storage of, Electronic Documents from other Users, including transmission of Electronic Documents by physical media including flash drives/thumb drives, hard drives, compact discs (CD), digital video discs (DVD), and other portable devices, whether connected physically or wirelessly.

- b. To the extent that a User maintains and operates such security software and appropriate System Infrastructure, such User will not be liable to other Users participating in the Project for breach of system security.
- 4. Principal means of exchanging Electronic Documents will be e-mail and files attached to e-mail, in accordance with the EDP.

C. General Requirements and Limitations for Software for Electronic Document Exchange:

- 1. Software and file formats for exchange of Electronic Documents shall be as indicated in Article 1.5 of this Specifications Section.
- 2. Software Versions:
 - a. Each User will acquire the software and associated licenses necessary to create, transmit, receive, read, and use Electronic Documents for the Project, using the software and file formats indicate in Article 1.5 of this Specifications Section.
 - b. Prior to using any updated version of the software required in the EDP for Electronic Document(s) transmitted to other User(s), the originating User will first notify and either (1) receive concurrence from receiving User(s) for use of the updated version, or (2) adjust its transmission to comply with the EDP.
- 3. Preservation of Intellectual Property and Confidentiality of Electronic Documents:
 - a. Users agree to not intentionally edit, reverse-engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes Electronic Documents, and information and data contained therein, transmitted in a file format, including portable document format (PDF), intended by transmitting User to not be modified, unless the receiving User (1) obtains permission from owner of the Electronic Document and intellectual property contained therein, or (2) is expressly allowed by the EDP to edit or modify the Electronic Document.
 - b. Where modifying, editing, decryption, or reverse-engineering is allowed by the EDP, such use is conferred only for the Project.
 - c. The EDP does not transfer any ownership or rights of any sort regarding use outside of the Project of Electronic Documents.
 - d. Users shall not cite or quote excerpts of Electronic Documents for purposes outside of the Project unless required to do so by Laws and Regulations.

D. Contractor's Requests for Electronic Documents in Other Formats:

- 1. Release of Electronic Documents in format(s) other than those indicated in in Article 1.5 of this Specifications Section and elsewhere in the Contract Documents will be at the discretion of Owner and subject to terms and conditions required by the owner of such files and documents, and the provisions indicated below.
- 2. To extent determined by Owner, in its sole discretion, to be appropriate, release of Electronic Documents in alternative format(s) requested by Contractor ("Request") are subject to provisions of Owner's response to the Request and to the following:
 - a. Contractor's Request shall be in writing. Owner and others, as appropriate, will consider and respond to Request promptly, but neither Owner nor Engineer will be responsible for any time or cost impacts on Contractor associated with timing of the Request, or with Owner's decision associated therewith.
 - b. When Engineer is the owner of the Electronic Documents requested by Contractor in native format, prior to Engineer transmitting such Electronic Documents to Contractor, Contractor shall sign and deliver to Engineer, without modifying or amending, Engineer's "Electronic Media Release" agreement.
 - c. Content included in Electronic Documents created by Engineer and furnished in response to the Request was prepared by Engineer as an internal working document

for Engineer's purposes solely and, when provided to Contractor, is on an "as-is" basis without warranties of any kind, including, but not limited to any implied warranties of fitness for purpose. Contractor acknowledges that content of Electronic Documents furnished in response to the Request may not be suitable for Contractor's purpose(s), or may require substantial modification and independent verification by Contractor. Content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other shown or indicated information that may affect subsequent use by Contractor or others for whom Contractor is responsible.

- d. Electronic Documents containing text, graphics, metadata, or other types of data furnished by Engineer in response to the Request are only for Contractor's convenience and any and all conclusions or information obtained or derived from such Electronic Documents will be at Contractor's sole risk and expense. Contractor waives any and all claims against Engineer, Owner, or both arising from Contractor's use of Electronic Documents furnished in response to the Request.
- e. Contractor shall indemnify and hold harmless Owner, Engineer, and their respective consultants and subconsultants from any and all claims, damages, losses, and expenses, including attorneys' fees and defense costs, fees and costs of engineers, architects, geologists, accountants, and other professionals, and any and all other costs, direct and indirect, resulting from Contractor's use, adaptation, or distribution of Electronic Document(s) furnished in response to the Request.
- f. Contractor shall not sell, copy, transfer, forward, give away or otherwise distribute the Electronic Documents (in source format or modified file format) to any third party without direct written authorization of Engineer or other entity that owns the Electronic document(s), unless such distribution is specifically indicated in the Request and is limited to Subcontractors and Suppliers. Contractor warrants that subsequent use by Subcontractors and Suppliers complies with terms and conditions of the Contract Documents, Owner's response to the Request, and release agreement(s) (if any) by owner of the Electronic Documents (including Engineer, where applicable).

3. .

1.5 EXCHANGE OF ELECTRONIC DOCUMENTS

- A. Comply with the Electronic Document formats, transmission methods, and permitted uses set forth in Table 01 31 26-A, Exchange of Electronic Documents, below, when transmitting or using Electronic Documents on the Project. Where a row in the table has no indicated means of transmitting Electronic Documents, use for such documents only paper copies transmitted to the receiving party via appropriate delivery method.

TABLE 01 31 26-A – EXCHANGE OF ELECTRONIC DOCUMENTS

Electronic Document Type	Format	Transmitting User	Transmission Method	Receiving User	Allowed Uses	Notes
1.5.A.1. Project communications						
General communications & correspondence	EM, PDF	O, E, C	EM, EMA	O, E, C	R	
Meeting notices and agendas	EM, PDF	E	EM, EMA	O, C	R	
Meeting minutes	PDF	E	EM, EMA	O, C	R	
1.5.A.2. Contractor's Submittals to Engineer						
Shop Drawings	PDF	C	EMA	E	M (1)	(1)
Product data Submittals, delegated design Submittals, and other action Submittals (except Samples)	PDF	C	EMA	E	M (1)	(1)

Electronic Document Type	Format	Transmitting User	Transmission Method	Receiving User	Allowed Uses	Notes
Informational and closeout Submittals:	PDF	C	EMA	E	M (1)	(1) (6)
Documentation of delivery of maintenance materials submittals	PDF	C	EMA	E	M (1)	
1.5.A.3. Engineer's return of reviewed Submittals to Contractor						
Shop Drawings	PDF	E	EMA	O., C	R	
Product data Submittals, delegated design Submittals, and other action Submittals	PDF	E	EMA	O., C	R	
Informational and closeout Submittals:	PDF	E	EMA	O., C	R	(6)
Documentation of delivery of maintenance materials submittals	PDF	E	EMA	O. C	R	
1.5.A.4. Contract Modifications Documents						
Requests for interpretation to Engineer	PDF	C., O	EMA	E	M (1)	(1)
Engineer's interpretations (RFI responses)	PDF	E	EMA	C, O	R	
Engineer's clarifications to Contractor	EM, PDF	E	EM, EMA	C, O	R	
Engineer's issuance of Field Orders	PDF	E	EMA	C, O	R	
Proposal Requests	PDF	E, O	EMA	C	R	
Change Proposals – submitted to Engineer	PDF	C	EMA	O, E	S	
Change Proposals – Engineer's response	PDF	E	EMA	C. O		
Work Change Directives (for Contractor signature)	PDF	E	EMA	C	R	(2)
Change Orders (for Contractor signature)	PDF	E	EMA	C	R	(2)
1.5.A.5. Applications for Payment						(3)
1.5.A.6. Claims and other notices						(4)
1.5.A.7. Closeout Documents						
Record drawings	DWG and PDF	C	EMA	E, O	M (5)	(5)
Other record documents	PDF	C	EMA	E. O	M (5)	(5)
Contract closeout documents						

1. Key to Table 01 31 26-A:

a. Data Format:

- 1) EM: .msg, .htm, .txt, .rtf, e-mail text.
- 2) W: .docx, Microsoft Word 2013 or later.
- 3) EX: .xlsx, Microsoft Excel 2013 or later.
- 4) PDF: .pdf. portable document format.
- 5) DWG: .dwg. Autodesk AutoCAD 2014 drawing.

- b. Transmitting User:
 - 1) O: Owner.
 - 2) C: Contractor.
 - 3) E: Engineer.
- c. Transmission Method:
 - 1) EM: Via e-mail.
 - 2) EMA: Attachment to e-mail transmission.
 - 3) PORT: Delivered via portable media such as flash drive/thumb drive, CD, or DVD
 - 4) PW: Posted to Project Website.
 - 5) FTP: FTP transfer to receiving FTP server.
- d. Receiving User:
 - 1) O: Owner.
 - 2) C: Contractor.
 - 3) E: Engineer.
- e. Permitted Uses:
 - 1) S: Store and view only.
 - 2) R: Reproduce and distribute.
 - 3) I: Integrate (incorporate additional electronic data without modifying data received)
 - 4) M: Modify as required to fulfill obligations for the Project.
- f. Notes:
 - 1) Modifications by Engineer to Contractor's Submittals and requests for interpretations are limited to printing, marking-up, and adding comment sheets.
 - 2) May be distributed only to affected Subcontractors and Suppliers. Print, sign document, and return signed paper originals to Engineer.
 - 3) Submit printed Applications for Payment with original ("wet") signatures.
 - 4) Submit notices, including Claims, in accordance with the notice provisions of the General Conditions, as may be modified by the Supplementary Conditions.
 - 5) Submit record drawings in native CAD format indicated when Contractor has signed Engineer's standard agreement for release of electronic media. In addition, always submit record drawings as PDF files. Comply with Contract Documents requirements for Project record documents.
 - 6) For operation and maintenance data, also submit paper copies as required by Section 01 78 23 - Operations and Maintenance Manuals.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for Contractor's construction Progress Schedules and related Submittals, including:
 - a. Administrative requirements regarding progress Schedules.
 - b. Qualifications of Progress Schedule preparer and related personnel.
 - c. Submittals of Progress Schedules and associated schedule-related Submittals..
 - d. Initial Progress Schedules.
 - e. Look-ahead schedules.
 - f. Progress Schedule updates.
 - g. Narrative reports.

B. Scope:

1. Contractor shall prepare and submit to Engineer required Progress Schedules and related Submittals, as required by this Section and elsewhere in the Contract Documents. Maintain and update Progress Schedules and related Submittals throughout the Project.
2. Owner, facility manager (if other than Owner), Engineer, and others involved with the Project have the right to rely on accuracy of Contractor-prepared Progress Schedule.
3. Engineer's review or acceptance of the Progress Schedule or related Submittals, and Engineer's comments on and expressed opinions concerning activities in the Progress Schedule and related Submittals, and progress of the Work, does not control Contractor's independent judgment concerning construction means, methods, techniques, sequences and procedures, unless the associated means, method, technique, sequence, or procedure is required by the Contract Documents. Contractor is solely responsible for complying with the Contract Times.

C. Related Requirements: Include, but are not necessarily limited to:

1. Section 01 11 00 - Summary of Work.
2. Section 01 26 00 - Contract Modification Procedures.
3. Section 01 31 19 - Project Meetings.

1.2 REFERENCES.

A. Defined Terms and Terminology:

1. Defined terms, indicated with initial capital letters, are indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Terminology: The following are not defined terms and are not indicated with initial capital letters but, when used in this Section, have the meaning indicated below, whether applied to the singular or plural thereof.
 - a. "Activity" is an element of the Work that has the following specific characteristics: consumes time, requires resources, has a definable start and finish, is assignable, and is measurable.
 - b. "Baseline Progress Schedule" means, in addition to the General Conditions' definition of "Progress Schedule", the version of the Progress Schedule (for the entire Project) initially accepted by the Engineer. In the event of subsequent modifications to the Project, Contractor and Engineer may mutually agree that a subsequent revision of the

Progress Schedule constitutes a new baseline Progress Schedule that supersedes the prior baseline Progress Schedule.

- c. "Constraint" means an imposed date on the Progress Schedule or an imposed time between activities. The Contract Times are constraints.
- d. "CPM Progress Schedule" means, in addition to the General Conditions' definition of "Progress Schedule", a computerized Progress Schedule in critical path method (CPM) format, for the entire Work, indicating interrelationships between elements of the Work; indicates sequences, dates, and durations for Work performed to date; indicates sequences, dates, and duration for incomplete Work yet to be performed; indicates constraints; and indicates the critical path for the Work.
- e. "Critical path" is the continuous chain of activities, from start to completion of the Work, with the longest duration for completion within the Contract Times.
- f. "Early finish" means the earliest date an activity can finish according to the assigned relationships among the activities in the Progress Schedule.
- g. "Early start" means the earliest possible date an activity can start according to the assigned relationships among activities in the Progress Schedule.
- h. "Float" means the time difference between the calculated duration of an activity chain on the Progress Schedule and the critical path.
- i. "Late finish" means the latest date an activity on the Progress Schedule can finish without extending the Contract Times.
- j. "Late start" means the latest date an activity on the Progress Schedule can start without extending the Contract Times.
- k. "Network diagram" means a time-scaled logic diagram showing the durations and relationships of the activities on the Progress Schedule.
- l. "Schedule date" (and similar terms, whether used in this Section or Project communications related to Progress Schedules) mean the "early start" and "early finish" date for the associated activity. "Late start" and "late finish" dates are for determining float and do not represent the schedule dates.
- m. "Total float" means the total number of days an activity (or chain of activities) on the Progress Schedule can be delayed without affecting the Contract Times.
- n. "Work areas" and "work system" means a logical breakdown of the Work elements or a group of activities which, when collectively assembled, are readily identifiable on the Project (for example: yard piping, a structure or building, a treatment process, or other logical grouping).

1.3 ADMINISTRATIVE REQUIREMENTS

A. General Provisions on Progress Schedules:

- 1. This Section augments requirements for the Progress Schedule, and Contractor's control of the Work, indicated in the General Conditions, as may be augmented by the Supplementary Conditions..

B. Use of Float:

- 1. Float belongs to the Project and may be used by Contractor or Owner to accommodate changes in the Work, or to mitigate the effect of events delaying the Work or compliance with the Contract Times.
- 2. Changes or delays that influence activities that have float and do not extend the critical path do not justify changes in the Contract Times.
- 3. Float Suppression: Pursuant to float sharing requirements of this Section, use of float suppression techniques in Progress Schedules, such as preferential sequencing logic, special lead/lag logic restraints, and extended activity durations are unacceptable.

C. Factors Affecting the Progress Schedule:

- a. In preparing and updating the Progress Schedule, take into consideration: preparing and signing subcontracts and purchase orders, complying with Submittal requirements

and Submittal review times, fabricating materials and equipment, source quality control (including required shop tests and inspections), shipping and deliveries, field quality control (including required field tests and inspections at the Site), Work by Subcontractors, coordination with others (such as other contractors including those indicated in Section 01 11 00 – Summary of Work, utility owners, and owners of transportation facilities), compliance with Laws and Regulations and permits, availability of construction equipment and machinery, abilities of workers, weather conditions, condition of the Site, seasonal restrictions, restrictions in operations at the Site and coordination with Owner's (or facility manager's) operations, training of facility operation and maintenance personnel, checkout, startup, adjusting and balancing, and other factors that have the potential to affect completion of the Work within the Contract Times.

D. Scheduling Workshop Conferences:

1. Prior to preparing the preliminary Progress Schedule, Contractor shall participate with Engineer in one workshop conference(s), each up to two hours in duration, to discuss technical requirements relative to sequencing and organizing the Work, Progress Schedule development, and Progress Schedule procedures.
2. Contractor and Engineer will mutually agree on the date, time, and location of scheduling workshop conference(s).
3. Required Attendees:
 - a. Contractor's project manager, site superintendent, and Progress Schedule preparer.
 - b. Engineer
 - c. Owner or facility manager (if other than Owner) may attend scheduling workshop conferences.
4. Engineer will prepare minutes of the scheduling workshop conferences and distribute minutes to conference attendees and others as deemed appropriate by Engineer.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Progress Schedule Preparer.
 - a. Contractor shall retain services of a scheduling consultant to, or shall self-perform, preparation and updating of the Progress Schedule using qualified personnel experienced in: (1) construction scheduling, (2) the scheduling software required for the Project, and (3) serving as Progress Schedule preparer on construction projects of similar type, size, and complexity as the Project.
 - b. Prior to engaging a scheduling consultant or using a qualified, experienced employee, submit to Engineer the following qualifications information:
 - 1) Name, employer, and business address of proposed Progress Schedule preparer and names, employer(s), and business address(es) of personnel who will be assigned to assist the preparer in developing and updating the Progress Schedule.
 - 2) Information sufficient to demonstrate that proposed Progress Schedule preparer and scheduling assistant personnel possess qualifications complying with this Section. For each person assigned, submit list of similar type, size, complexity, and construction contract amount for each project, together with project name, owner, location, and dates, and name(s) of scheduling personnel involved.
 - c. Engineer's Review of Qualifications:
 - 1) Engineer will complete review of Progress Schedule preparer qualifications within three days of Engineer's receipt of such qualifications.
 - 2) If qualifications are unacceptable, submit qualifications of acceptable personnel within three days of Contractor's receipt of Engineer's non-acceptance.
 - 3) Engineer's acceptance or non-acceptance of qualifications does not reduce or mitigate Contractor's obligations under the Contract Documents.

- d. If Contractor intends to replace any Progress Schedule preparer personnel previously acceptable to Engineer, submit qualifications of proposed replacement(s) in accordance with this Article.

1.5 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Qualifications Statements:
 - a. Submit qualifications of Progress Schedule preparer, and other personnel that will assist Progress Schedule preparer in preparing and updating the Progress Schedule.
 - b. Obtain Engineer's acceptance of qualifications prior to starting preparation of preliminary Progress Schedule..
2. Planned Work Schedule:
 - a. Submit initial and updated (as necessary) planned work schedule, in accordance with this Section's "Progress Schedule" Article.
3. Progress Schedule:
 - a. Preliminary Progress Schedule with associated narrative report.
 - b. Acceptable Progress Schedule ("baseline Progress Schedule") with associated narrative report.
4. Look-Ahead Schedules:
 - a. Submit 30-day look-ahead schedule at each construction progress meeting, in accordance with this Section's "Look-Ahead Schedules" Article.
5. Progress Schedule Updates:
 - a. Progress Schedule updates shall comply with requirements of this Section, and shall include updated Progress Schedule and narrative report.
 - b. Submit updated Progress Schedule prior to each associated construction progress meeting. When a Progress Schedule remains unchanged from one construction progress meeting to the next, submit written statement expressly so stating. In addition to monthly Progress Schedule update Submittals, also bring to construction progress meetings the number of paper copies of the updated Progress Schedule indicated in Section 01 31 19 - Project Meetings.
6. Time Impact Analyses: Submit in accordance with this Section.
7. Recovery Schedules: Submit in accordance with this Section.

1.6 INITIAL PROGRESS SCHEDULES

A. Applicability of this Article:

1. This Article addresses the initial Progress Schedules and selected, related Submittals required at the outset of the Project's construction phase, through Engineer's acceptance of the Progress Schedule and its related Submittals.
2. Subsequent Progress Schedule Submittals, including Progress Schedule updates, recovery schedules, and other schedule-related Submittals, shall comply with software, type, organization, content, and similar requirements of this Article.

B. Type and Organization of Progress Schedules:

1. Prepare Progress Schedules using Oracle Primavera P6 software, unless other scheduling software is acceptable to Engineer.
2. Sheet Size: 22 inches by 34 inches, unless otherwise accepted by Engineer.
3. Time Scale: Indicate first date of each work week.
4. Activity Assignments and Designations:
 - a. Limit activities, where possible, excluding fabrication of materials and equipment, to durations not longer than 20 days. Activities shall be definable and measurable. For example, an activity described only as "Concrete" will likely be unacceptable.
 - b. Assign to each activity an appropriate, unique numerical designation and description.

- c. Numerical designation shall incorporate the associated Specifications section number.
 - d. Activity description shall include sufficient detail to clearly communicate the intended activity. Descriptions shall include identifiers for physical locations of work area or work system, such as (where appropriate): column lines, stationing (for linear projects), and elevations. Indicate unique description for each activity.
 - e. Group deliveries of materials and equipment into a separate sub-schedule that is part of the Progress Schedule.
 - f. Group construction into work area sub-schedules (that are part of the Progress Schedule) by activity.
 - g. Clearly indicate, as activities separate from installation, necessary and required curing periods.
5. Organization of Progress Schedules:
- a. Indicate interfaces and dependencies with preceding, concurrent, and follow-on activities, including those associated with the Work, other contractors at the Site, Owner and facility manager, Owner's consultants (including Engineer), authorities having jurisdiction, and others as appropriate. Clearly indicate activities not under Contractor's control.
 - b. Progress Schedules shall be CPM Progress Schedules.
 - c. Indicate on the separate Schedule of Submittals dates for submitting and reviewing Shop Drawings, product data Submittals, Samples, and other required Submittals. Coordinate Progress Schedule with the Schedule of Submittals.
 - d. Clearly indicate the critical path on the Progress Schedule.
- C. Planned Work Schedule:
- 1. Within 30 days of the Effective Date of the Contract, indicate to Engineer the work days and hours proposed by Contractor. Also indicate planned non-work days, such as Contractor's holidays, weekends, and the like.
 - 2. Enforce Subcontractors' and Suppliers' (when at the Site) compliance with Contractor's work schedule submitted to Engineer.
 - 3. In the event of changes, submit to Engineer revised work schedule. Furnish such Submittal not less than three days prior to changing Contractor's work schedule, except in event of unanticipated emergency.
- D. Preliminary Progress Schedule:
- 1. Within 10 days after the Contract Times commence running, Contractor shall submit to Engineer the preliminary Progress Schedule covering the entire Project, with associated schedule-related Submittals required in this Section's "Submittals" Article.
 - 2. Submit preliminary Progress Schedule in accordance with Section 01 31 26 - Electronic Communication Protocols and Section 01 33 00 - Submittal Procedures. Also submit preliminary Progress Schedule in its native (executable) format generated by the scheduling software, transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols.
 - 3. Engineer will perform timely review of the preliminary Progress Schedule.
 - 4. Preliminary Progress Schedule shall comply with the Contract Documents relative to Progress Schedules.
- E. Initial Acceptance of Progress Schedule:
- 1. Not less than 10 days before submission of the first Application for Payment, a scheduling conference attended by Contractor, Progress Schedule preparer, Engineer, and others as appropriate will be held at the Site to review for acceptability to Engineer the preliminary Progress Schedule and associated schedule-related Submittals. Following the scheduling conference, Contractor shall have five days to make corrections and adjustments and to complete and resubmit the Progress Schedule and associated schedule-related Submittals. Contractor will not be eligible for first progress payment until acceptable Progress Schedule

and associated schedule-related Submittals are submitted to Engineer and are acceptable to Engineer.

2. Submit acceptable Progress Schedule, together with associated schedule-related Submittals in accordance with this Section's "Submittals" Article, Section 01 31 26 – Electronic Communication Protocols, and Section 01 33 00 - Submittal Procedures. Also submit acceptable form of Progress Schedule in its native (executable) format generated by the scheduling software, transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols.
3. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times, in accordance with the Contract Documents.
4. Initially-accepted Progress Schedule shall be identified as the baseline Progress Schedule.

F. Planned Completion Different from the Contract Times:

1. If the Progress Schedule accepted by Engineer indicates completion date(s) different than the Contract Times, the Contract Times are not thereby changed.
2. Where the Progress Schedule accepted by Engineer indicates date(s) by which the Work, or designated portion thereof, will (a) achieve a Contractually stipulated Milestone, or (b) be substantially complete, or (c) all the Work will be complete and ready for final payment, earlier than the Contract Times ("early completion date"), Contractor shall, not less than 30 days prior to the associated Contract Time, prepare and submit a Change Proposal setting forth Contractor's request to modify the Contract Times to an earlier date, which may or may not be the same as the scheduled early completion date. The Contract Times can be modified only via a Change Order.
3. In the event the Progress Schedule accepted by Engineer indicates one or more early completion dates and the Contract Times have not been reduced, Owner may, at Owner's option, use available float without Owner being liable for Contractor's costs to remain onsite, mobilized, and working (whether on the original scope of the Work or for modified Work) beyond the scheduled early completion date(s), as long as the Work will be completed within the Contract Times.
4. When the Work will not be completed within the Contract Times, the Contract Documents' provisions concerning delays and changes in the Contract Times govern.

1.7 LOOK-AHEAD SCHEDULES

A. Look-Ahead Schedules – General:

1. Look-ahead schedules are short-duration, often more-detailed, time-based schedules for the Work to be performed during the coming month or other required span of the look-ahead schedule.
2. Purpose of look-ahead schedules is to present, for Project stakeholders, including Owner, facility manager (if other than Owner), Engineer, Owner-hired testing and inspection entities, other contractors working at or adjacent to the Site, utility owners, transportation facility owners, and others as necessary, Contractor's detailed, time-based plan for performing the Work during the period covered by the timespan of the look-ahead schedule.
3. This Section's "Submittals" Article indicates the required span and frequency of look-ahead schedules.
4. Each look-ahead schedule shall be fully coordinated and consistent with the current Progress Schedule update.
5. Submit look-ahead schedules concurrent with construction progress meetings, in accordance with Section 01 31 26 - Electronic Communication Protocols, and Section 01 33 00 - Submittal Procedures. Also submit look-ahead schedules in native (executable) format, in accordance with Section 01 31 26 - Electronic Communication Protocols.
6. As handouts, bring to each construction progress meeting the quantity of paper copies of the new look-ahead schedule indicated in Section 01 31 19 - Project Meetings. If quantity is

not indicated in Section 01 31 19 - Project Meetings, furnish quantity equal to typical number of attendees of progress meetings.

B. Organization and Content of Look-Ahead Schedules:

1. Look-ahead schedules shall be prepared from the current Progress Schedule update, of the same type, using the same software, content, and organization required in this Section for initial Progress Schedules.
2. Activity designations on look-ahead schedules shall incorporate the associated activity designations from the Progress Schedule.
3. Sheet Size: Format look-ahead schedules to sheet size of 11 inches by 17 inches, unless other sheet size is acceptable to Engineer.
4. Look-ahead schedules should generally be more-detailed than the Progress Schedule. Activity durations on look-ahead schedules should not exceed five days.

1.8 PROGRESS SCHEDULE UPDATES

A. Updates – General:

1. Update the Progress Schedule not less-often than once per month. If during progress of the Work events develop that necessitate changes in the initially accepted Progress Schedule (baseline Progress Schedule), identify updated Progress Schedules sequentially as "Progress Schedule Revision "1", "2", "3", and continuing in sequence as required. Number the Progress Schedule submittals in accordance with Section 01 33 00 - Submittal Procedures.
2. Progress Schedule updates shall comply with this Section's requirements for initial progress Schedule, relative to type, required software, organization, content, and related matters.
3. Starting with first Progress Schedule update, and continuing with each subsequent update, indicate on the Progress Schedule the actual start and finish dates of each activity that is completed or is currently underway. Inaccurate representation of completed or in-progress activities will be grounds for Engineer's non-acceptance of the Progress Schedule update.
4. Contractor's Progress Schedule update shall include a narrative report in accordance with this Section. Narrative report shall include description of: progress achieved to date and status of each work area of the Project, planned progress for the upcoming period, identification of the critical path, current or potential delays, Change Orders (pending and approved since the previous Progress Schedule update), and other problems associated with performing the Work in accordance with the baseline Progress Schedule and complying with the Contract Documents, including the Contract Times. Indicate in the narrative report delays that have occurred since the previous updated Progress Schedule.
5. The update to the Progress Schedule shall be based on retained logic. Progress override logic is not allowed.
6. Submit to Engineer updated Progress Schedule, together with associated schedule-related Submittals, in accordance with this Section's "Submittals" Article, Section 01 31 26 - Electronic Communication Protocols, and Section 01 33 00 - Submittal Procedures. Also submit updated Progress Schedule in its native (executable) format generated by the scheduling software, transmitted in accordance with Section 01 31 26 - Electronic Communication Protocols.

B. Monthly Schedule Meeting:

1. During the month, utilizing the previous month's look-ahead schedule. Contractor shall record the percent complete, start and finish dates of each scheduled activity with the remaining duration for each activity started but not completed, including activities associated with procurement of materials and equipment.
2. On the same day each month, not less than one week prior to a progress meeting, Contractor, Progress Schedule preparer, Engineer (or Resident Project Representative), and others as appropriate shall meet at the Site to tour the Work to review and recommend updates to the Progress Schedule and progress information gathered by Contractor during the month. After discussion of Contractor's current progress information and attendees'

review of the current status of the Work, Progress Schedule preparer shall appropriately and accurately update the Progress Schedule.

1.9 NARRATIVE REPORTS

A. Narrative Reports – General:

1. Prepare and include with the preliminary Progress Schedule Submittal and each subsequent Progress Schedule Submittal, written narrative report describing the schedule-related constraints required by the Contract Documents and Contractor's plan and schedule for complying with such requirements. Narrative reports shall also include required content indicated above in this Section's "Progress Schedule Updates" Article.
2. Narrative report shall describe the methods of sequencing and operation, resources to be employed, time frames for the construction of each of the major work area or work system on the Project, and time frames for complying with the Contract Times and Contractor's interim schedule milestones.
3. Prepare narrative reports on Contractor's company letterhead and clearly indicate the Progress Schedule revision and date associated with the narrative report.
4. Narrative reports shall be written in English and typed. Use clear, concise, complete, and accurate language in narrative reports. Clearly indicate in narrative report the name of person preparing the narrative report and date of preparation
5. Narrative report Submittals do not constitute contractual Change Proposals, nor are they notice of a Claim.
6. Engineer's receipt, review, and acceptance of narrative reports does not mitigate or reduce Contractor's obligations to furnish contractually required notices.

B. Evaluation by Engineer and Acceptance:

1. Engineer's evaluation of each time impact analysis comprised of complete information will be completed in timely manner (in accordance with the Contract Documents) after Engineer's receipt.
2. When time impact analysis is incomplete or otherwise inappropriate, Engineer will furnish comments to Contractor. When time impact analysis is complete and apparently appropriate, its acceptability will be indicated by associated Contract modification or allowance authorization.
3. Changes in the Contract Times will be made only by Change Order.
4. When mutual agreement is reached between the parties on effect of the change or delay in the Project, incorporate into the next Progress Schedule update the associated fragnets illustrating the influence of changes and delays.

1.10 RECOVERY SCHEDULES

A. Recovery Schedules – General:

1. When updated Progress Schedule indicates the ability to comply with the Contract Times falls 14 days or more behind schedule, and there is no excusable delay, Change Order, or Work Change Directive to support an extension of the Contract Times, Contractor shall prepare and submit to Engineer Contractor's recovery schedule.
2. Recovery schedule is a Progress Schedule demonstrating Contractor's plan to accelerate the Work to achieve compliance with the Contract Times. If achieving the Contract Times is not feasible, Contractor's recovery schedule shall indicate Contractor's plan to recover as much of the lost time as possible to complete the Work as close as possible to the Contract Times.
3. Submit recovery schedule within 10 days after submittal of updated Progress Schedule where need for recovery schedule is indicated.

B. Recovery Schedule Report:

1. With each recovery schedule Submittal, include recovery schedule narrative report, manually prepared by Contractor, on Contractor's company letterhead, indicating name of person responsible for preparing the recovery schedule and report.
2. Recovery schedule report shall verbally indicate Contractor's plan for accelerating the Work and recovering lost time, and shall indicate the total number of days expected to be recovered by Contractor's implementation of the recovery schedule. Clearly indicate how the intended actions will recover lost time.
3. Contractor is fully responsible for complying with the Contract Documents, including the contract Times.

C. Implementation of Recovery Schedule:

1. At no additional cost to Owner, do one or more of the following, as appropriate: (a) furnish additional labor, (b) provide additional construction equipment and machinery, (c) provide suitable materials to accelerate the Work, (d) employ additional work shifts, (e) expedite procurement of materials and equipment to be incorporated into the Work or otherwise expedite delivery of such items, (f) provide other needed resources, and (g) provide other measures necessary to complete the Work within the Contract Times.
2. Upon acceptance of recovery schedule by Engineer, incorporate recovery schedule into the next Progress Schedule update.

D. Contractor's Failure to Recover Lost Time:

1. Contractor's refusal, failure, or neglect to take appropriate measures to recover lost time, or to submit a recovery schedule, shall constitute reasonable evidence that Contractor is not prosecuting the Work, or designated part of the Work, with diligence to ensure completion in accordance with the Contract Times. Such action or inaction by Contractor shall constitute sufficient basis for Owner to exercise remedies available to Owner under the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

This page intentionally left blank.

SECTION 01 32 33
PROJECT PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for the following types of Contractor-furnished construction photographic documentation:
 - a. Still photographs.
 - b. Video.
 - 2. Requirements for preconstruction, construction progress, and final photographic documentation.
- B. Scope:
 - 1. Contractor shall perform construction photography and submit construction photographic documentation, including providing all labor, materials, equipment, and services required.
 - 2. Perform photography (i.e., still photography and video) and submit construction photographic documentation, in accordance with this Section, throughout the Work.
 - 3. Obtain and pay for required permits and licenses, if any, and obtain approvals required by authorities having jurisdiction for Contractor's construction photography.
- C. Related Requirements:
 - 1. Section 01 31 26 - Electronic Communication Protocols.
 - 2. Section 01 33 00 - Submittal Procedures.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate construction photography with progress of the Work. Unless otherwise required by the Contract Documents, do not cover or conceal the Work until construction photographic documentation has been properly obtained.
 - 2. Coordinate dates and times for performing construction photography with Engineer and Resident Project Representative (RPR).
 - 3. Coordinate construction photography with other contractors and at the Site.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Construction Photographer:
 - a. Photographer shall be a specialist regularly engaged in professional photography and experienced in photographing construction sites for the purpose of project photographic documentation.
 - b. One photographer shall furnish all required construction photographic documentation for the Project, unless otherwise accepted by Engineer.
 - c. Contractor may propose, as a substitute, a non-professional photographer, who may be Contractor's employee. Comply with Contract requirements for substitutions. When proposed. As part of such substitution request, submit Change Proposal indicating the proposed, associated reduction in the Contract Price.
 - d. Upon Engineer's request, submit photographer's name, business name, address, and documentation of photographer having successfully performed photographic documentation for not less than five previous, completed construction projects, each lasting not less than six months.

B. Selection of Views for Construction Photography:

1. At the Site, Engineer or Resident Project Representative will indicate the views to be taken and will select time at which images will be obtained.
2. Photographic subjects, views, and angles will vary with progress of the Work.

1.4 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Preconstruction Photographic Documentation:
 - a. Submit Electronic Documents (still photographs and video).
 - b. Submit acceptable preconstruction photographic documentation prior to mobilizing to and disturbing the Site, and not later than the first progress payment request, unless other schedule for preconstruction photographic documentation is accepted by Engineer.
2. Construction Progress Photographic Documentation:
 - a. Submit prints and Electronic Documents (still photographs and video).
 - b. Obtain construction progress photographic documentation at the frequency indicate in this Section. Coordinate submittal of construction progress photographic documentation with submittal of each progress payment requests.
3. Qualifications Statements:
 - a. Photographer: When requested by Engineer, prior to starting photographic documentation Work, submit photographer qualifications and record of experience. List of construction photography experience shall include for each project:
 - 1) Project name and location
 - 2) Nature of construction.
 - 3) Photographer's client with contract information.
 - 4) Approximate duration of photographer's services.

B. Closeout Submittals: Submit the following:

1. Final Photographic Documentation:
 - a. Submit prints and Electronic Documents (still photographs and video).
 - b. Submit acceptable final photographic documentation prior to requesting final inspection.

1.5 CONSTRUCTION PHOTOGRAPHY – GENERAL

A. Images - General:

1. Photographic documentation shall be in color.
2. Photographic images shall be suitably staged and set up ("framed"), focused, and have adequate lighting to illuminate the Work and conditions that are the subject of the photograph.
3. For still photographs and video, use digital camera equipment with resolution of not less than 16.0-megapixels.
4. Do not imprint date and time in the image.

B. Photographic Electronic Documents:

1. For each still photograph submitted, furnish high-quality, high-resolution digital image in JPEG (".jpg") file format compatible with Microsoft Windows 10 and higher operating systems.
2. GPS geo-tagging enabled and recorded with each image.
3. Image Resolution: Sufficient for clear, high-resolution digital images and prints. Minimum resolution shall be 600 dots per inch (dpi). Minimum size of digital images shall be:
 - a. Non-Aerial Still Photographs: Eight inches by ten inches.

4. Electronic Document image filename shall describe the image; do not submit filenames automatically created by camera. For example, acceptable Electronic Document image filenames are, "Equipment Bldg. – Looking West at Blower 2.jpg". and "Main St.-Elm St. Intersection – Looking North.jpg"
5. Submittal of Electronic Documents Still Photographs:
 - a. Submit in accordance with Section 01 31 26 – Electronic Communication Protocols.
 - b. When use of online document management system is required by the Contract Documents, also save copy of Electronic Documents of photographic documentation in a directory for Contractor's photographic images. Each time photographs are obtained , save the associated Electronic Documents files in a new subdirectory named for the date and basic subject of the photographs. For example, "2022-06-30 – Site Work" and "2023-03-21 – New Control Room".
 - c. Submit Electronic Documents of still photographs not more than 72 hours after such images are obtained.

C. Video:

1. Video shall be high-definition (HD), high-quality video of the Site and Project work.
2. Submit all video files for the entire Project as Electronic Documents in a single type of container file. Electronic Document video files shall be in one of the following container file types:
 - a. ".mp4" (MPEG-4 Part 14).
 - b. ".wmv" (Windows Media Video).
 - c. ".webm" (Matroska Video).
 - d. ".mkv" (Matroska Video).
 - e. ".f4v" (Flash Video).
3. Video image shall include imprinted date and time the video was taken.
4. Include audio track narration, in American-English, sufficient to explain the scenes shown.
5. Electronic Document video filename shall indicate date video was taken and shall describe the video; do not submit filenames automatically created by camera. For example, acceptable Electronic Document video filenames are, "2023-07-24 – Site Work" or "2024-09-29 – Primary Clarifiers".
6. Submittal of Video Electronic Documents:
 - a. Submit in accordance with Section 01 31 26 – Electronic Communication Protocols.
 - b. When use of online document management system is required by the Contract Documents, also save copy of Electronic Documents of video in a directory for Contractor's photographic video documentation. Save each video to same directory. When video taken on the same visit to the Site depicts different parts of the Work, save as separate video files.

1.6 PRECONSTRUCTION PHOTOGRAPHIC DOCUMENTATION

A. Preconstruction Photographic Documentation:

1. Obtain and submit sufficient preconstruction photographic documentation to record conditions at the Site prior to construction. Photography shall document all work areas for the Project.
2. Preconstruction photography is separate from construction progress photographic documentation required in this Section.
3. Submit preconstruction video of all work areas included in the Project, including indoor and outdoor work areas and areas to be occupied by field offices, temporary sheds, material and equipment storage areas, staging and laydown areas, areas that will be used by or for construction vehicular traffic and parking, and other locations that will or may be disturbed by construction of the Project.

- B. If disagreement arises on the condition of the Site and insufficient preconstruction photographic documentation was submitted prior to the disagreement, restore the property in question to extent directed by Engineer and to Engineer's satisfaction.

1.7 CONSTRUCTION PROGRESS PHOTOGRAPHIC DOCUMENTATION

A. Progress Photography:

1. Take still photographs not less often than once per month
2. Take not less than 10 still photographs each time photographer is at the Site.
3. Maximum number of progress photographs required is 200, based on the Contract Times to Substantial Completion of the entire Project and scope of the Project on the Effective Date of the Contract. Proportionately modify the extent of photographic documentation if scope of the Project or the Contract Times are modified.
4. Obtain and submit interior and exterior photographic documentation of each building and structure in the work area as directed by Engineer or Resident Project Representative at the time photographs are taken.

B. Video:

1. Obtain construction progress video each time Contractor's photographer is at the Site.
2. Construction progress videography shall cover all areas of work on the Project since the previous video was obtained.

1.8 FINAL PHOTOGRAPHIC DOCUMENTATION

A. Final Photography:

1. Take still photographs at time and day acceptable to Engineer. Do not take final photographs prior to Substantial Completion of the entire Project, removal of temporary facilities, and restoration. Work documented in final, still photographs shall be complete in accordance with the Contract Documents, including painting and finishing, furnishings, landscaping, and other visible Work
2. Submit not less than 20 final photographs, based on scope of the Project upon the Effective Date of the Contract. Proportionately modify the quantity of final, still photographs if scope of the Project is modified. Final, still photographs are not part of construction progress photographs required elsewhere in this Section.

B. Video:

1. Record final video at same time final, still photographs are taken.
2. Final video shall show final conditions of all areas of the Project.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Definition of various types of Submittals.
2. Coordination requirements for Submittals.
3. General provisions concerning Submittals.
4. Schedule of Submittals.
5. Contractor's preparation of Submittals, including:
 - a. Numbering.
 - b. Marking.
 - c. Organization and content.
 - d. Proposed "or-equals", substitutes, and deviations from Contract requirements.
 - e. Electronic Documents Submittals.
 - f. Contractor's review and approval of each Submittal.
 - g. Resubmittals.
6. Contractor's transmittal of Submittals, including transmittal letters, transmittal and delivery method, and delivery of Samples, Closeout Submittals, and Maintenance Materials Submittals.
7. Engineer's review, including:
 - a. Timing.
 - b. Meaning of Engineer's Submittal action code(disposition) assigned.
 - c. Delivery of Engineer's responses on Submittals.

B. Scope:

1. Contractor shall provide all labor, materials, equipment, tools, services, incidentals, and other effort necessary to furnish Shop Drawings, product data Submittals, Samples, and other Submittals in accordance with the Contract Documents.
2. This Section's Article, "General Provisions Concerning Submittals" includes a summary of the Contract Documents' locations of Submittals requirements.
3. Shop Drawings, product data Submittals, Samples, and other Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Engineer's approval or acceptance, as applicable, of a Submittal does not alter or modify the Contract Documents.
4. Engineer and Owner have the right to rely on Contractor's representations and certifications made regarding each Submittal.

C. Related Requirements: Include but are not limited to:

1. Section 01 25 00 - Substitution Procedures.
2. Section 01 31 26 - Electronic Communication Protocols.
3. Section 01 32 16 - Construction Progress Schedule.

1.2 REFERENCES

A. References – Introduction:

1. This Article presents definitions and terminology used in this Section and throughout the Contract Documents.
2. Applicability of the Term “Submittals”: Where reference is made to Shop Drawings, product data Submittals, Samples, or other Submittals in this Section and elsewhere in the Contract Documents, the term “Submittals”, as defined in the Contract Documents, is intended. The foregoing applies regardless of whether such term is indicated with an initial capital letter, unless context of the subject provision clearly indicates otherwise.
3. Types of Submittals:
 - a. Submittal types are classified as follows: (1) Action Submittals, (2) Informational Submittals, (3) Closeout Submittals, and (4) Maintenance Materials Submittals.
 - b. Type of each required Submittal is indicated in the associated Specifications section. When Submittal type is not clearly indicated in the associated Specifications section, Submittal will be classified as indicated in this Article. Submit request for interpretation when Contractor is uncertain of required Submittal type.

B. Action Submittals:

1. Action Submittals require an explicit, written approval or other appropriate action by Engineer (or other entity to whom the Submittal is required to be furnished, in accordance with the Contract Documents) before Contractor may release the associated item(s) for raw materials procurement, fabrication, production, and shipping.
2. Unless otherwise indicated in the Contract Documents, Action Submittals include the following:
 - a. Shop Drawings.
 - b. Product data.
 - c. Samples.
 - d. Testing plans for quality control activities required by the Contract Documents.
 - e. Delegated Designs: Delegated design professional’s “instruments of service” Submittals required by the Contract Documents.
3. General Conditions’ requirements for Shop Drawings and Samples hereby apply to all Action Submittals.

C. Informational Submittals:

1. Informational Submittals are so indicated in the Contract Documents. Unless otherwise indicated, Informational Submittals include certifications, evaluation reports, results of source quality control activities, results of field quality control activities, Supplier instructions, reports of Suppliers’ visits to the Site, sustainable design Submittals (that are not Closeout Submittals), delegated design Submittals that are not “instruments of service” Submittals, qualifications statements, and others.
2. Informational Submittals, when submitted in accordance with the Contract and indicating full compliance with the Contract Documents, do not require explicit response from Engineer (or other entity to whom the Submittal is to be delivered); Engineer’s (or other entity’s) acceptance thereof will be indicated in the Engineer’s

Submittals log. Copy of Engineer's Submittals log is available to Contractor upon Contractor's written request.

3. When Informational Submittal does not indicate full compliance with the Contract Documents, Engineer (or other entity to which Submittal is to be delivered) will indicate the non-compliance in a written response to Contractor.

D. Closeout Submittals:

1. Closeout Submittals are so indicated in the Contract Documents and are, in general, required before the associated Work is completed, unless earlier submittal is required by the Contract Documents.
2. Unless indicated otherwise in the Contract Documents, Closeout Submittals include maintenance contracts, operation and maintenance data, warranties, bonds (other than performance and payment bonds required prior to the start of construction), record documents, sustainable design closeout Submittals, software, keys, and others.
3. Closeout Submittals are processed in the same manner as described above for Informational Submittals.

E. Maintenance Materials Submittals:

1. Maintenance materials include spare parts, extra materials, tools, and similar items required to be furnished in accordance with the Contract Documents.
2. Furnish required physical maintenance materials, delivered to Owner or facility manager (if other than Owner), as applicable, at the location(s) indicated in the Contract Documents, for the corresponding required Maintenance Materials Submittals.
3. Maintenance Materials Submittals are documentation of delivery to Owner's or facility manager, and their acceptance of, required physical maintenance materials.
4. Maintenance Materials Submittals are processed in the same manner as described above for Informational Submittals.

F. Additional Terms:

1. The following terms have the meanings indicated below, regardless of whether such terms are indicated using initial capital letters, and apply to singular and plural of each:
 - a. "Product data" means illustrations, standard schedules, performance charts, Supplier's published instructions, brochures, diagrams, and other information furnished by Contractor to illustrate or describe materials or equipment for some portion of the Work. In general, product data are manufacturers' pre-published information on the items proposed to be incorporated into the Work. Product data includes manufacturer's catalog pages and similar documents with contractor-made markings and indications of proposed products and proposed options.
 - b. The term "Shop Drawings", defined in the General Conditions, is supplemented by the following: Shop Drawings include: (1) fabrication and assembly drawings, usually having a title block, or (2) schedules, prepared specifically for the Project. Here, "schedules" means a Project-specific summary of systems and components, such as a schedule of HVAC equipment, schedules of doors and door hardware, or windows, or a schedule of paint systems by room and surface, or other, similar Project information in a tabular format. In contrast, construction Progress Schedules, Schedules of Submittals, and Schedules of Values are not Shop Drawings. Unless expressly required otherwise in the

Contract Documents, Shop Drawings shall not be prepared from, or on, the Drawings or any other component of the Contract Documents.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Furnish Submittals well in advance of need for the associated material or equipment, or procedure (as applicable), in the Work and with ample time necessary for delivery of materials and equipment and to implement procedures following Engineer's approval or acceptance of the associated Submittal.
2. Work covered by a Submittal will not be included in payments by Owner until approval or acceptance (as applicable) of related Submittals has been obtained in accordance with the Contract Documents.

1.4 GENERAL PROVISIONS CONCERNING SUBMITTALS

A. Locations of Requirements:

1. Requirements concerning Submittals are generally located as follows:
 - a. General Conditions, as may be modified by the Supplementary Conditions, applicable to the Project.
 - b. This Section, which presents general requirements for Submittals applicable to the Project.
 - c. Other Division 01 Specifications that include general requirements for certain types of Submittals, such as Section 01 31 26 - Electronic Communications Protocols, Section 01 78 23 - Operation and Maintenance Data, and others.
 - d. The "Submittals" Article of the various Specifications sections, which indicates the required Submittals for the associated Work. Furnish all Submittals required by the Contract Documents regardless of whether explicitly indicated in the associated Specifications' "Submittals" Article.

- B. This Section augments and supplements the requirements of the General Conditions, as may be modified by the Supplementary Conditions, relative to Submittals.

1.5 SCHEDULE OF SUBMITTALS

A. Informational Submittals: Submit the following:

1. Schedule of Submittals:
 - a. Timing:
 - 1) Furnish Schedule of Submittals within time frames indicated in the General Conditions, as may be modified by the Supplementary Conditions.
 - 2) Submit updated Schedule of Submittals with each submittal of the updated Progress Schedule.
 - b. Content: In accordance with the General Conditions, as may be modified by the Supplementary Conditions, and this Section. Requirements for content of preliminary Schedule of Submittals and subsequent Submittals of the Schedule of Submittals are identical. Identify on Schedule of Submittals all Submittals required in the Contract Documents. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Clearly indicate Submittals that are on the Project's critical path. Indicate the following for each Submittal:
 - 1) Date by which Submittal will be received by Engineer.
 - 2) Whether Submittal will be for a substitution or "or-equal".

- 3) Date by which Engineer's response is required. Allow not less than 14 days for Engineer's review, starting on Engineer's actual receipt of each Submittal. Allow increased time for large or complex Submittals.
- 4) For Submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of others (if any).
- c. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules in Section 01 32 16 - Construction Progress Schedule.
- d. Coordinate Schedule of Submittals with the Progress Schedule.
- e. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate Submittals on the Project's critical path, or that places extraordinary demands on Engineer for time and resources, is unacceptable. Do not include Submittals not required by the Contract Documents.
- f. In preparing Schedule of Submittals:
 - 1) Considering the nature and complexity of each Submittal, allow sufficient time for reviews and revisions.
 - 2) Allow reasonable time for: Engineer's review and processing of Submittals, for Submittals to be revised and resubmitted, and for returning Submittals to Contractor.
 - 3) Identify and accordingly schedule Submittals that are expected to have long anticipated review times.

1.6 PREPARATION OF SUBMITTALS

A. Prior to Submittal Preparation:

1. The General Conditions, as may be modified by the Supplementary Conditions, address Contractor's responsibility for submitting for Owner's acceptance identification of Subcontractors and Suppliers. Obtain Owner's acceptance before entering into subcontracts and purchase orders for the Work.
2. Comply with the Contract Documents relative to terms and conditions of subcontracts and purchase orders for the Work.
3. Contractor's responsibilities for the following are set forth in the General Conditions, as may be modified by the Supplementary Conditions, and as may be augmented elsewhere in the Contract Documents:
 - a. Obtaining field measurements and dimensions.
 - b. Determining and verifying required quantities.
 - c. Verifying compatibility of materials.
 - d. Apportioning the Work among Subcontractors, Suppliers, and Contractor.
 - e. Reconciling required materials, equipment, and other Contract requirements with Contractor's means, methods, techniques, sequences, and procedures of construction and with Contractor's safety and protection programs and precautions incident thereto.
 - f. Reviewing applicable provisions of the Contract Documents and obtaining from Engineer necessary interpretations or clarifications.

B. Submittal Identification:

1. Submittal Number: Shall be a unique number assigned to each individual Submittal. Assign Submittal numbers as follows:

- a. First part of Submittal number shall be the applicable Specifications section number, followed by a hyphen.
 - b. Second part of Submittal number shall be a three-digit number (sequentially numbered from 001 through 999) assigned to each separate Submittal furnished under the associated Specifications section.
 - c. Example: Submittal number for the third Submittal furnished for Section 10 14 00 - Signage, would be "10 14 00-003".
2. Review Cycle Number: Each resubmittal of a given Submittal shall be indicated with a lower-case letter designation:
 - a. No letter designation for initial (first) submittal of the Submittal number.
 - b. "a" shall indicate first resubmittal of the Submittal number.
 - c. "b" shall indicate second resubmittal of the Submittal number.
 3. Examples:

Example Description	Submittal Identification	
	Submittal No.	Review Cycle
Initial (first) review cycle of the third Submittal furnished under Section 10 14 00 – Signage	10 14 00-003-	
Second review cycle (first resubmittal) of third Submittal furnished under Section 10 14 00 - Signage	10 14 00-003-	a

C. Marking of Submittals:

1. Mark on each page of each Submittal and each individual component submitted with Submittal number and applicable Specifications paragraph.
2. Mark each page of each Submittal with the Submittal page number.
3. Each Shop Drawing sheet shall have title block with complete identifying information satisfactory to Engineer.
4. For product data Submittals, operation and maintenance data Submittals, and other Submittals:
 - a. Mark options to be furnished using broad, dark arrows or "clouds" clearly drawn around the relevant text or diagrams. Do not use highlighter for indicating options and features.
 - b. Indicate options and features not furnished using clear strikeouts through the text or diagrams.

D. Submittal Organization and Content – General:

1. Page or Sheet Size; Furnish Submittals with one or more of the following page or sheet sizes: (a) 8.5 inches by 11 inches; (b) 11 inches by 17 inches; (c) 22 inches by 34 inches; unless another sheet size is acceptable to Engineer.
2. Language: All parts of each Submittal shall be in the English language.
3. Units of Measurement: Clearly indicate units of measurement on Shop Drawings, product data Submittals, record documentation, and operation and maintenance data Submittals.
4. Organize each Submittal logically to facilitate ease of understanding and review.
5. To the extent practicable, arrange Submittal information in same order as requirements are written in the associated Specifications section.

6. Each Submittal shall cover Work under only one Specifications section.
7. To the extent practicable, package together Submittals for the same Specifications section. Do not furnish required information piecemeal.
8. For large or complex Submittals, include a title page and table of contents.
9. Include appropriately labeled fly sheets to separate distinct parts of each Submittal.
10. Ensure legibility of all pages in each Submittal.
11. Minimize extraneous and unnecessary information in Submittals for materials and equipment. Do not submit information not relevant to the Submittal and associated requirements of the Contract Documents.
12. Contractor's, Subcontractor's, and Supplier's written comments on Shop Drawings and product data diagrams shall be colored green
13. Do not submit under Specifications sections with title that includes either, "Common Work Results for" or, "Basic Requirements", unless the subject material or equipment is specified, in total, in a Specifications section with the words, "Common Work Results for" or, "Basic Requirements" in its title.

E. Electronic Documents Submittals:

1. Format: Electronic Documents Submittals shall be "portable document format" (.PDF) files unless expressly required otherwise by applicable provisions of the Contract Documents.
2. Electronic Documents Submittals must be electronically searchable when delivered to Engineer and other recipients.
3. Organization and Content:
 - a. Each Electronic Documents Submittal shall be one file; do not divide individual Submittals into multiple Electronic Documents files each unless file size will exceed 20 MB.
 - b. When Submittal is large or contains multiple parts, furnish PDF file with suitably titled electronic bookmark for each section of the Submittal.
 - c. Content shall be identical to paper or other original Submittal. First page of each Electronic Documents Submittal shall be transmittal letter required in this's Paragraph 1.7.A.
4. Quality and Legibility: Electronic Documents Submittal files shall be made from the original and shall be clear and legible. Markings applied by Contractor, Subcontractor, or Supplier shall be clear, distinct, and readily apparent. Electronic Documents file shall be full size of original documents. Properly orient all pages for convenient reading on a computer display; do not furnish pages sideways or upside-down..
5. Provide sufficient internet service, software, and systems for Contractor with capability appropriate for transmitting the necessary files and receiving responses from Engineer or other entities.
6. Check not less than once per day for distribution of Electronic Documents Submittals responses and related Electronic Documents correspondence.

F. Proposed "Or-Equals", Substitutes, and Deviations from Contract Requirements:

1. "Or-Equals":
 - a. The meaning of "or-equal" is addressed in Section 01 25 00 - Substitution Procedures.
 - b. Contractor's request for approval of "or-equals" is to be presented via the associated Action Submittal(s) and shall include the information required in provisions governing "or-equals".

- c. Expressly and prominently indicate, "Proposed Or-Equal" on the associated Action Submittals when Submittal is for an "or-equal".
 - d. Submittals requesting approval of an "or-equal" but not accompanied by the required, supplemental information will be deemed incomplete by Engineer and returned to Contractor without approval.
2. Substitutes:
- a. The meaning of "substitute" is indicated in Section 01 25 00 - Substitution Procedures.
 - b. Requests for approval of substitutes shall comply with Section 01 25 00 - Substitution procedures, and other relevant provisions of the Contract Documents.
 - c. Contractor's request for approval of substitute is separate from the associated Action Submittal(s). Action Submittals that request approval of a substitute when a separate, formal substitution request (furnished in accordance with the Contract Documents) was not previously furnished to Engineer, followed by formal approval in via an appropriate contract modification (typically either a Field Order or Change Order), will be deemed by Engineer as non-compliant with the Contract Documents and will be returned to Contractor without approval.
 - d. Contractor is solely responsible for delays incurred due to substitutes proposed via Submittals that have not been previously duly approved via an appropriate Contract modification.
 - e. Action Submittals for items or procedures approved via an appropriate Contract modification shall include a copy of the Contract modification in which the substitute was approved.
3. Submittals with Proposed Deviations from Contract Requirements:
- a. When Submittal proposes deviations from requirements of the Contract Documents, the Submittal shall clearly and expressly indicate each proposed deviation.
 - b. Also comply with this Section's provision, in the Article below, on Contractor's transmittal letter expressly alerting Engineer to the proposed deviations.
 - c. Comply with requirements of the Contract regarding substitutes and "or-equals".
 - d. When deviation is proposed, also appropriately revise text of Contractor's approval, from that required below in this Article.
 - e. When Submittal includes deviations from Contract requirements and either the Submittal itself, Contractor's transmittal letter, or both, do not comply fully with Contract requirements for indicating deviations in Submittals and giving separate written notice thereof, Engineer's approval of such deviations will be deemed null and void unless Engineer's written response to the Submittal has expressly acknowledged such deviation and indicated Engineer's approval thereof.
 - f. Contractor is solely responsible for delays and costs incurred due to any and all Submittals with deviations from Contract requirements that were not properly, expressly indicated and approved in accordance with the Contract Documents. Deviations not duly approved in accordance with the Contract Documents may be deemed defective Work. Contractor is solely responsible for remedying defective Work and all associated cost and time impacts.

G. Contractor's Approval of Submittals:

1. Contractor's Review: Before transmitting Submittals to Engineer, review each Submittal to:
 - a. Ensure proper coordination of the Work.
 - b. Determine that each Submittal is in accordance with Contractor's desires.
 - c. Verify that Submittal contains sufficient information for Engineer to determine compliance with the Contract Documents.
2. Incomplete or inadequate Submittals will be returned without detailed review by Engineer.
3. Contractor's Approval Stamp and Signature:
 - a. Each Submittal furnished shall bear Contractor's approval stamp (or facsimile thereof) and signature, as evidence that the Submittal has been reviewed and approved by Contractor and verified as complete and in accordance with the Contract Documents.
 - b. Submittals without Contractor's approval and signature (as required by the contract Documents) will be returned to Contractor without further review by Engineer and deemed incomplete.
 - c. Engineer reserves the right to reject as incomplete Submittals where Contractor's approval signature appears computer-generated or reproduced without the active involvement or review of Contractor's signatory.
 - d. Contractor's approval shall contain the following text:

Project Name: _____
Contractor's Name: _____
Contract Designation: _____
Date: _____

----- Reference -----

Submittal Title: _____
Specifications: _____
Section: _____
Page No.: _____
Paragraph No.: _____
Drawing No.: [] of _____
Location of Work: _____

Submittal No. and Review Cycle: _____
Coordinated by Contractor with Submittal Nos.: _____

I hereby certify that Contractor has satisfied Contractor's obligations under the Contract Documents relative to Contractor's review and approval of this Submittal, including: (1) reviewed and coordinated the Submittal with other Submittals and with the requirements of the Work and the Contract Documents; (2) determined and verified all: field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal, (b) 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 (c) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; (3) confirmed the Submittal is complete with respect to all related data included in the Submittal; and (4) clearly and expressly indicated all proposed deviations (if any) from

the requirements of the Contract Documents both in the Submittal itself and in the Submittal's transmittal letter. Accordingly, this Submittal is hereby approved for Contractor by:

Approved for Contractor by: _____

H. Resubmittals:

1. Refer to the General Conditions, as may be modified by the Supplementary Conditions, for requirements regarding resubmitting required Submittals.
2. Do not increase the scope of prior review cycle of the same Submittal.
3. Indicate on Contractor's transmittal letter how Submittal was revised from previous review cycle of the Submittal and where the revisions or corrections are located within the resubmittal.
4. Expressly address and provide response for all components previously transmitted by Engineer on prior review cycles of the subject Submittal. Where resubmittal lacks complete response to Engineer's prior comments, Engineer may deem such resubmittal as incomplete and return it to Contractor without further review.
5. Where part of the Submittal's prior review cycle was expressly approved or accepted, as applicable, by Engineer, do not include such items in subsequent resubmittals.
6. Indicate, "Not Yet Resolved—To Be Resubmitted at a Later Date" for any items not approved in prior review cycle of the Submittal for items not included in the subject resubmittal. Engineer reserves the right to deem incomplete Submittals "Not Approved" or "Revise and Resubmit". Furnishing incomplete or partial resubmittals is discouraged.
7. Resubmittal of Previously Approved or Accepted Items:
 - a. Do not resubmit on a given item previously approved or accepted, as applicable, by Engineer, without Engineer's advance consent. Consent will be given for bona-fide unavailability of a previously approved or accepted item where Contractor has acted in good faith in a timely manner with due diligence to comply with the Contract Times.
 - b. Destroy or conspicuously mark "SUPERSEDED" on all documents having previously received Engineer's approval or acceptance, as applicable, that are superseded by a resubmittal.

1.7 TRANSMITTAL OF SUBMITTALS BY CONTRACTOR

A. Contractor's Transmittal Letters for Submittals:

1. Furnish separate transmittal letter with each Submittal. Use transmittal form attached to this Section (as Exhibit 01 33 00-A) unless other transmittal form is acceptable to Engineer at the start of the Project's construction.
2. When transmittal form other than this Section's Exhibit 01 33 00-A is acceptable to Engineer, at beginning of each transmittal, include a reference heading indicating: Contractor's name, Owner's name, Project designation, Contract designation, transmittal number, and Submittal number (with review cycle).
3. "Or-Equals": When the Submittal is proposing an "or-equal", expressly so indicate on transmittal form submitted by Contractor.
4. Proposed Deviations from Contract Requirements: When the Submittal proposes deviations from requirements of the Contract Documents, transmittal letter shall specifically describe each proposed deviation.

B. Submittal Delivery Method:

1. This provision presents general requirements for delivery of all Submittals unless otherwise required elsewhere in the Contract Documents.
2. Furnish Submittals as Electronic Documents delivered in accordance with Section 01 31 26 – Electronic Communication Protocols.
3. Furnish Submittals to Engineer and each other entity indicated in the Contract Documents as receiving a Submittal directly from Contractor.
4. Address Submittals to Engineer as follows: HDR, Michael Plummer, Vice President, Michael.Plummer@hdrinc.com, or 440 S. Church Street, Suite 1200 Charlotte, NC 28202-2075.

C. Samples - Transmittal and Delivery:

1. Labeling and Tagging Samples:
 - a. Securely label or tag each Sample with Submittal identification number.
 - b. Label or tag shall include clear space at least 4 inches by 4 inches in size for affixing Engineer's review stamp indicating disposition assigned by Engineer.
 - c. Label or tag shall not cover, conceal, or alter Sample's appearance or features.
 - d. Label or tag shall not be separated from the Sample.
2. Timing: Deliver required Samples concurrently with other Action Submittals required for the same element of the Work, unless other delivery time frame is indicated in the Schedule of Submittals accepted by Engineer.
3. Quantity Required:
 - a. Where the Contract Documents require a Sample as a field mock-up, provide Sample at the Site or in the Work at location acceptable to Engineer. Provide the quantity of field mock-ups required by the contract Documents; if not otherwise shown or specified, provide one of each required field mock-up. .
 - b. For reasonably portable Samples, deliver the quantity of Samples required in the associated Specifications. If quantity of Samples is not indicated in the associated Specifications section, deliver to Engineer not less than three identical Samples of each item for which Sample is required.
 - c. Samples will not be returned to Contractor. If Contractor requires Sample(s) for Contractor's use, so advise Engineer in writing and furnish additional copies of the Sample. Contractor is responsible for furnishing, shipping, and transporting additional Samples.
4. Locations for Delivery of Reasonably Portable Samples for Review:
 - a. Deliver one physical Sample to Engineer's field office at the Site.
 - b. Deliver balance of required physical Samples to Engineer at address indicated in this Article for receipt of Submittals, unless otherwise directed by Engineer.

D. Closeout Submittals –Transmittal and Delivery:

1. Furnish the following Closeout Submittals in accordance with general requirements for transmitting and delivering Submittals, indicated above in this Article: maintenance contracts; warranty bonds (when required) and other bonds required for specific materials, equipment, or systems; warranty documentation; and sustainable design closeout documentation (when required). On documents such as maintenance contracts and bonds, include on each document furnished original ("wet") signature of entity issuing said document. When original "wet" signatures are required, furnish such Submittals to Engineer both on original paper and as

Electronic Documents, and to other entities furnish as indicated above in this Article for general requirements for Submittals.

2. Operations and Maintenance Manuals: Submit in accordance with Section 01 78 23 - Operation and Maintenance Data.
 3. Record Documents: Submit in accordance with Section 01 78 39 - Project Record Documents.
 4. Software: In addition to software installed on Owner's computer system, furnish number of copies of software required in the Specifications section where the software is specified. Preferred means of transmittal is via secure file transfer directly to Owner (or facility manager, if other than Owner) via secure file transfer method mutually acceptable to software developer and the receiving entity. When secure file transfer is used, submit to Engineer documentation signed or electronically acknowledged by Owner that the files were received. Where such software is available only on the software developer's portable media, furnish such software on software developer's original, portable media, sealed in software developer's original, unopened, clearly labeled packaging.
- E. Maintenance Materials Submittals – Delivery:
1. Deliver physical maintenance materials required by the Contract Documents in accordance with applicable provisions of the Contract, including Section 01 78 43 - Spare Parts and Extra Materials.
 2. Submit documentation of delivery of (Maintenance Materials Submittals) in accordance with general requirements for Submittals as indicated in this Section.

1.8 ENGINEER'S REVIEW OF SUBMITTALS

- A. This Article applies to review of all Submittals by Engineer or other entity to whom the Contract Documents require such Submittal be furnished.
- B. Timing:
1. Timing of Engineer's review will be in accordance with the Schedule of Submittals accepted by Engineer.
 2. When Submittal is delivered to Engineer on a date other than that indicated in the Schedule of Submittals accepted by Engineer, duration of Engineer's review may differ from that indicated in the Schedule of Submittals, based on Engineer's availability and resources. Engineer will make good-faith effort to furnish responses to Submittals in a timely manner.
 3. Contractor is responsible for communicating to Engineer when a Submittal is on the Project's critical path.
- C. Engineer's Review:
1. Markings:
 - a. Comments or responses marked directly on Submittal by Engineer (or other entity reviewing Submittal) will be colored red.
 - b. Engineer may also present narrative comments on a comment sheet inserted by Engineer into the Submittal or included on Engineer's transmittal letter for the Submittal. Such comments will be in black text. When a separate comment sheet is included by Engineer, such sheet will be clearly identified as Engineer's comments.
 2. Engineer's review and disposition assigned to Submittal are subject to the following:
 - a. Submittal disposition is subject to: Engineer's comments on the Submittal; disclaimer language on Engineer's Submittal transmittal letter; Engineer's

Submittal review stamp (when used) or equivalent (when used); and this provision.

- b. Engineer's review is only for general compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, and for general compliance with the information given in the Contract Documents.
 - c. Contractor shall be solely responsible for complying with the Contract Documents, as well as with Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations. Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.
 - d. Engineer is not responsible for resubmittals not yet furnished by Contractor or tracking Contractor's progress on resubmittals.
3. Documents not required by the Contract Documents but nonetheless furnished by Contractor as submittals will not be reviewed by Engineer.

D. Meaning of Submittal disposition Assigned by Engineer:

1. Action Submittals:

- a. "Approved" (Action Code A): Upon return of Submittal marked "Approved", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of production-related qualifications statements and certifications, and required source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents.
- b. "Approved as Noted" (Action Code B): Upon return of Submittal marked "Approved as Noted", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of production-related qualifications statements and certifications, and required source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents, and in accordance with Engineer's comments and notes indicated in Engineer's Submittal response
- c. "Revise and Resubmit" (Action Code C): Upon return of Submittal marked "Revise and Resubmit", make the revisions necessary and indicated and resubmit to Engineer for approval.
- d. "Not Approved" (Action Code D): This disposition indicates material or equipment that cannot be approved. "Not Approved" disposition may also be applied to Submittals that are incomplete. Upon return of Submittal marked "Not Approved", repeat initial submittal procedure utilizing approvable material or equipment, with a complete Submittal clearly indicating all information required.

2. Informational, Closeout, and Maintenance Materials Submittals:

- a. "Accepted" (Action Code F): Information included in Submittal complies with the applicable requirements of the Contract Documents and is acceptable. No further action by Contractor is required relative to such Submittal, and the Work covered by the Submittal may proceed. Materials and equipment with Submittals with this disposition may be shipped or operated, as applicable. Submittals assigned "Accepted" by Engineer (or other reviewing entity) does not indicate Engineer's acceptance of the associated Work, which is indicated

only as set forth in the General Conditions and Section 01 77 19 – Closeout Requirements.

- b. “Not Acceptable” (Action Code G): Submittal, or part thereof, does not indicate full compliance with applicable requirements of the Contract Documents and is not acceptable. Provide labor, materials, equipment, services, and incidentals necessary to properly and accurately revise Submittal and resubmit to indicate acceptability and compliance with the Contract Documents
- 3. Other:
 - a. “Submittal Not Reviewed” (Action Code E): Documents so marked by Engineer are not required by the Contract Documents. Submittals may also be marked with this disposition when information in the document was previously reviewed and approved or accepted by Engineer, as applicable.

E. Distribution of Engineer’s Responses:

- 1. Unless otherwise indicated in the Contract Documents, Engineer will distribute written responses (as Electronic Documents) to Submittals to the following:
 - a. Contractor.
 - b. Owner.
 - c. Engineer’s file.
- 2. Engineer’s acceptance of Informational Submittals, Closeout Submittals, and Maintenance Materials Submittals will be recorded in Engineer’s Submittal log. Copy of Engineer’s Submittals log is available from Engineer upon written request of Owner or Contractor. If no such request is received by Engineer, Engineer will distribute copy of Engineer’s Submittals log once per month (when Submittals have been received or acted on by Engineer). Engineer may distribute copy of Engineer’s Submittals log as an Electronic Document or as handout at construction progress meetings.
- 3. Paper copies of Engineer’s Submittal responses will not be distributed unless otherwise required by the Contract Documents or otherwise agreed to by Engineer.
- 4. Contractor is responsible for forwarding Engineer’s Submittals responses to Subcontractors and Suppliers as appropriate, and for coordinating the Work of all trades.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Section’s “End of Section” designation, are part of this Specifications Section:
 - 1. “Exhibit 01 33 00-A – Transmittal for Submittal No. ##” (one page).

END OF SECTION

Transmittal for Submittal

No. _____ - _____

Project Name:				Date Received:	
Project Owner:				Checked By:	
Contractor:		HDR Engineering, Inc.		Log Page:	
Address:		Address:		HDR No.:	
				Spec Section:	
				Drawing/Detail No.:	
Attn (Contractor):		Attn (HDR):		Review Cycle	
Date Transmitted by Contractor:		Date of Engineer's Response Transmittal:			
Item No.	Submittal No.	Description (indicate number of copies where paper copies of physical Samples are returned)	Manufacturer	Supplier Dwg or Data No.	Engineer's Disposition (Action Code) *
1					
2					
3					
4					
Contractor's Remarks (insert text):					
Engineer's Remarks (insert text): :					
* Legend for Action Code indicated above, assigned by Engineer:					
Action Submittal: A – Approved B – Approved as Noted C – Revise and Resubmit D – Not Approved		E – Submittal Not Reviewed Informational, Closeout, or Maintenance Materials Submittal: F – Accepted (this code normally recorded in Engineer's Submittals log). G – Not Acceptable			
Engineer's Disclaimer (for Submittals that do <u>not</u> involve delegated design):					
a. Submittal action code is subject to: Engineer's comments on the Submittal, comment sheets (if any), and this transmittal letter; disclaimer language on Engineer's Submittal review stamp or equivalent; and Specifications Section 01 33 00 – Submittal Procedures.					
b. Engineer's review is only for general compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, and for general compliance with the information given in the Contract Documents.					
c. Contractor shall be solely responsible for complying with the Contract Documents, as well as with Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations. Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.					
d. Engineer is not responsible for resubmittals or tracking progress of resubmittals.					
Reviewed for HDR by:				Date of Engineer's Review:	
Distribution:		Contractor	File	Field	Owner
					Other

This page intentionally left blank.

SECTION 01 35 44

SPILL PREVENTION CONTROL AND COUNTERMEASURES PLAN

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for Contractor's spill prevention control and countermeasures, in accordance with 40 CFR 112 and other Laws and Regulations.

B. Scope:

1. Contractor shall provide all labor, materials, equipment, tools, professional services (when necessary or required), and incidentals as shown, specified, and required to comply with Laws and Regulations regarding spill prevention, control, and countermeasures (SPCC) planning and compliance, including 40 CFR 112.
2. Single Prime Contract: Contractor shall determine whether a SPCC plan is necessary. If SPCC plan is necessary, Contractor shall prepare, implement, and maintain SPCC plan in accordance with Laws and Regulations.
3. Existing SPCC Plan: Owner's existing facility has an existing SPCC plan, administered and maintained by Owner or facility manager (if other than Owner). Contractor's SPCC plan shall be consistent with facility's existing SPCC plan. Copy of facility's existing SPCC plan and related documents (if any) are available upon request.

1.2 REFERENCES

A. Terminology:

1. Terminology indicated below are not defined terms and are not indicated with initial capital letters, but when used in this Section have the meaning indicated below:
 - a. "Oil" has the meaning set forth in Laws or Regulations and generally includes petroleum products, fuel oil, hydraulic fluid, oil sludge, oil refuse, oil mixed with wastes other than dredged material, synthetic oil, vegetable oil, animal fats and oils, and other oils defined in Laws and Regulations.
 - b. "Navigable waters of the United States" includes navigable waters of the United States, contiguous zones, and associated shorelines, as set forth in Laws and Regulations.
 - c. "SPCC" means "spill prevention control and countermeasures".
 - d. "SPCC plan" means a SPCC plan complying with this Section and Laws and Regulations.

1.3 DETERMINATION OF NEED FOR SPCC PLAN FOR PROJECT

A. Determination of Need for SPCC Plan:

1. Contractor shall determine need for SPCC plan for the Project.
2. Onsite oil storage thresholds at which a SPCC plan is necessary are indicated in this Article.
3. Depending on Site conditions and oil storage at the Site and other factors, the Project may:
 - (a) not need a SPCC plan, or
 - (b) need a SPCC plan prepared by a Contractor-hired professional engineer, or
 - (c) need part of the SPCC plan prepared by a Contractor-hired professional engineer. When Contractor-hired professional engineer is not necessary for all or part of a required SPCC plan, Contractor may self-prepare and self-certify SPCC plan elements not prepared by Contractor's professional engineer.
4. Contractor's Professional Engineer:
 - a. If the Site will include storage of more than 10,000 GAL of oil, as defined in Laws and Regulations, in aboveground storage, or if the Site does not comply with oil discharge history criteria of 40 CFR 112, Contractor shall retain a qualified professional engineer

- to determine need for SPCC plan for the Project and, if SPCC plan is necessary, Contractor's professional engineer shall prepare or supervise preparation of Contractor's SPCC plan.
- b. Qualifications requirements and basic responsibilities of Contractor's professional engineer are set forth in this Section's "Quality Assurance" Article.
 - c. If a professional engineer is not required to prepare the entirety of the Project's SPCC plan, but the SPCC plan includes environmentally-equivalent SPCC measures (as set forth in Laws or Regulations), or impracticality determinations (in accordance with Laws or Regulations), then Contractor shall retain a qualified professional engineer to prepare and certify those portions of the SPCC plan dealing with environmentally equivalent measures and impracticality determinations; the balance of the SPCC plan may be prepared by and be self-certified by Contractor.
5. Submit to Engineer letter presenting results of evaluation of whether a SPCC plan is necessary for the Project, in accordance with Laws and Regulations.
- B. SPCC plan is necessary when the Project activities at the Site meet the following criteria:
1. The Site and activities thereon are not exempt from Laws and Regulations relative to SPCC planning and implementation.
 2. Oil is stored, used, transferred, or otherwise handled at the Site, unless otherwise exempted by Laws or Regulations.
 3. Maximum oil storage capacity at the Site equals or exceeds either of the following thresholds: 42,000 GAL of completely-buried capacity, or 1,320 GAL of aboveground capacity. Capacity includes total storage tank volume and operational storage volume at the Site for Contractor, other prime contractors, and Subcontractors, including bulk storage tanks, containers with 55 GAL storage capacity and larger, mobile tanks located at the Site, and other containers covered by Laws or Regulations. Exempt from the storage capacity determination are motive storage containers, such as those integral to construction equipment and vehicles.
 4. There is reasonable expectation, based on location of the Site, that oil spill would reach navigable waters of the United States (or contiguous zones or adjoining shorelines).
- C. Reassessment of Need for SPCC Plan after Initial Determination that SPCC Plan is not Needed:
1. After initial determination that SPCC plan is not necessary, Contractor shall ensure that conditions that preclude the need for SPCC plan for the Project, including the activities of Contractor, all other prime contractors (if any), and Subcontractors working on the Project at the Site, are maintained throughout the Project's duration.
 2. Should changes that affect the storage, use, or handling of oil at the Site occur, reassess the need for SPCC plan for the Project at no additional cost to Owner and submit written reassessment to Engineer.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Contractor's Professional Engineer:
 - a. When required by Laws and Regulations, engage a licensed, registered professional engineer legally qualified to practice in the jurisdiction where the Site is located and experienced in performing engineering services of the type required. Submit qualifications data.
 - b. Responsibilities include but are not necessarily limited to:
 - 1) Carefully reviewing Laws and Regulations relative to SPCC.
 - 2) Preparing written requests for interpretations of the Contract Documents relative to SPCC for submittal to Engineer by Contractor, and obtaining from authorities having jurisdiction clarifications regarding Laws and Regulations as required.

- 3) Preparing or supervising the preparation of letter-report evaluation of need for Contractor's SPCC plan in accordance with the Contract Documents. Evaluation shall include professional engineer's seal or stamp, registration number, and original signature.
- 4) When Contractor's SPCC plan is necessary, preparing, supervising the preparation of, or reviewing Contractor's SPCC plan (or designated portions thereof when oil storage at the Site will be less than the threshold indicated in this Section or Laws and Regulations) in accordance with the Contract Documents. Contractor's SPCC plan (or designated portions thereof) shall include professional engineer's seal or stamp, registration number, and original signature..
- 5) Periodically re-evaluating the need for Contractor's SPCC plan and issuing findings as letter-reports with seal or stamp, license number, and signature. When Contractor's SPCC plan is required, periodically evaluating Contractor's SPCC plan and providing recommendations for compliance with Laws and Regulations, in accordance with the Contract Documents.
- 6) Certifying that:
 - a) it is familiar with the Laws and Regulations, including 40 CFR 112, and
 - b) it has visited, examined, and is familiar with the Site, planned modifications to the Site under the Project as such modifications pertain to SPCC Laws and Regulations, and
 - c) it has performed the evaluations and prepared Contractor's SPCC plan in accordance with the Contract Documents, and
 - d) procedures for required testing and inspections have been established, and
 - e) the said evaluations and Contractor's SPCC plan are adequate for the Project, and
 - f) the said evaluations and Contractor's SPCC plan comply with Laws and Regulations, applicable industry standards, and to prevailing standards of practice.

1.5 SUBMITTALS

- A. Furnish Submittals required under this Section to [Engineer.
- B. Submittals: Submit the following:
 1. Certifications:
 - a. With each evaluation letter and Contractor's SPCC plan Submittal, include certification signed by preparer of Submittal that the Submittal complies with the Contract Documents and Laws and Regulations. Signature on all certifications shall be original.
 2. Evaluations:
 - a. Submit letter presenting results of evaluation of whether Contractor's SPCC plan is required for the Project. Submit evaluation not later than 14 days after the Contract Times commence running, unless longer time is allowed (in writing) by Owner or Engineer.
 - b. Submit updated evaluations as required when conditions at the Site change. Submit updated evaluation not later than seven days after the conditions at the Site changed, or within seven days of Owner's or Engineer's request, unless longer time is allowed (in writing) by Owner or Engineer.
 - c. Owner, facility manager (if other than Owner), and Engineer have no responsibility for completeness, accuracy, or appropriateness of Contractor's evaluations and Contractor and Subcontractors (as applicable) have full responsibility and all liability associated therewith.
 3. Contractor's SPCC Plan: When SPCC Plan is required:
 - a. Submit jointly to Owner and facility manager (if other than Owner). Submit within 14 days of Owner's or facility manager's acceptance of evaluation Submittal.

- b. Limitations Regarding Reviews:
 - 1) Review and comments (if any) by Owner or facility manager on Contractor's SPCC plan Submittal are not for benefit of Contractor, Subcontractors, or anyone else for whom Contractor may be responsible.
 - 2) Such reviews and comments (if any) shall not impose on Owner, facility manager, or Engineer any obligation to evaluate the completeness, accuracy, or appropriateness of Contractor's SPCC plan.
 - 3) Contractor, together with Subcontractors (as applicable), bears full responsibility and all liability for completeness, accuracy, and appropriateness of Contractor's SPCC plan.
- 4. Record of Distribution of Contractor's SPCC Plan:
 - a. When Contractor's SPCC plan is required, submit copies of letters transmitting Contractor's SPCC plan and amendments (if any) to other prime contractors and Subcontractors working at the Site.
- 5. Qualifications Statements:
 - a. Submit qualifications of Contractor's professional engineer, when requested by Owner or Engineer.

1.6 CONTRACTOR'S SPCC PLAN AND IMPLEMENTATION

- A. When Contractor's SPCC plan is required, develop the SPCC plan and submit for acceptance to entity indicated in this Section's "Submittals" Article. Contractor's SPCC plan shall be specific to the Site and the Project and shall include the following:
 - 1. Seal or stamp, original signature, date, and license number of Contractor's professional engineer, when self-certification by Contractor is not allowed by Laws and Regulations.
 - 2. Site plan identifying the name (or tag number) and location of each tank and container that will contain a substance regulated in 40 CFR 112 and other Laws and Regulations, including aboveground and buried tanks. Site plan shall indicate general directions of storm water runoff, including storm sewers, drainage inlets, and catch basins. Show arrows indicating directions of storm water flow. Show and label all storm sewer outfall locations.
 - 3. For each tank and container shown or indicated on the Site plan, include a table indicating tank or container's name and tag number, type of oil stored therein, and maximum storage capacity in gallons. Indicate total storage capacity of all regulated tanks and containers at the Site covered by SPCC Laws and Regulations.
 - 4. Predictions of direction, rate of flow, and total quantity of oil that could be discharged from the Site as result of storage tank or container failure.
 - 5. Operating procedures that prevent oil spills, including procedures for oil handling, details of secondary containment structures at fuel and oil transfer areas, and details and descriptions of equipment to be used for oil handling, including piping.
 - 6. Control Structures and Secondary Containment:
 - a. Show details of and indicate descriptions of control measures to be provided at the Site by Contractor to prevent spill from reaching navigable waters of the United States, including secondary containment and diversionary structures.
 - b. For on-shore Sites, use not less than one of the following: dikes, berms, or retaining walls; curbing; culverts, gutters, or other drainage systems; weirs, booms, or other barriers; spill diversion ponds; retention ponds; or sorbent materials or methods.
 - c. Where appropriate, Contractor's SPCC plan shall clearly demonstrate that containment or diversionary structures or equipment are not practical.
 - d. Include brittle fracture evaluation, where necessary, for field-constructed aboveground storage containers undergoing repair, alteration, construction, or change in service.
 - 7. Plans for countermeasures to contain, clean up, and mitigate effects of oil spills that reach navigable waters of the United States, including written commitment of manpower, equipment, and materials to quickly control and remove spilled oil. Include estimation of time required to contain spills after spill occurs.

8. Contact list and telephone numbers for facility response coordinator, National Response Center, cleanup Subcontractors, and all appropriate federal, state, and local authorities having jurisdiction to be contacted in event of spill or discharge.
 9. Program for monthly inspections of the Site by Contractor for compliance with Contractor's SPCC plan and Owner's SPCC plan (as applicable). Advise Owner (and facility manager, if other than Owner) in writing of each inspection not less than 72 hours prior to each inspection.
 10. Measures for Site security relative to oil storage.
 11. Procedures for safely handling mobile containers such as totes and drums, and procedures for refueling vehicles and construction equipment and machinery at the Site.
 12. Procedures and schedules for periodic testing of integrity of tanks and containers, and associated piping and valves.
 13. Plans for bulk storage container compliance with Laws and Regulations and the Contract Documents.
 14. Plans for personnel training and oil spill prevention briefings.
 15. For SPCC plans that do not follow the format indicated in Laws and Regulations, provide cross-reference to requirements of Laws and Regulations, including 40 CFR 112.7.
- B. Obtain acceptance of Contractor's SPCC plan by entity indicated in this Section's "Submittals" Article, for coordination with Owner's Site-specific SPCC plan, if any.
 - C. Contractor's SPCC plan shall be reviewed by Contractor's professional engineer (when professional engineer is required) and Owner every five years, as applicable, unless more-frequent reviews or updates are required by Laws or Regulations. Contractor shall perform updates and revisions of Contractor's SPCC plan as necessary and submit same in accordance with the provisions of this Section for submittal and acceptance of Contractor's initial SPCC plan.
 - D. Post a copy of Contractor's accepted, certified SPCC plan in conspicuous location at the Site and furnish copies to Owner, facility manager (if other than Owner), other prime contractors (if any), and Subcontractors as appropriate. All contractors shall comply with Contractor's SPCC plan.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 SPILL OR VIOLATION OF CONTRACTOR'S SPCC PLAN

- A. In event of violation of Contractor's SPCC plan or release of oil attributable to construction or related activities, Contractor shall:
 1. Notifications:
 - a. Immediately issue oral advisories and written notifications in accordance with Laws and Regulations, including 40 CFR 110 and 40 CFR 112.
 - b. When required by Laws and Regulations, report to National Response Center, USEPA, and other authorities having jurisdiction, if any.
 2. Perform spill cleanup promptly and in accordance with Laws and Regulations, Contractor's SPCC plan, and requirements of authorities having jurisdiction.
 3. Pay fines and civil penalties (or responsible portion thereof) imposed on Owner and facility manager (if other than Owner) by authorities having jurisdiction, and pay costs associated with cleanup of spills. If Contractor fails to promptly pay such costs, Owner may withhold such amounts from payments due Contractor, as one or more set-offs.
- B. Should cleanup of spills attributable to Contractor be necessary, Contractor will not be entitled to any associated increase in the Contract Price or Contract Times. Should Contractor share responsibility for spill and cleanup with another entity, changes in Contract Price and Contract Time, if any, will be proportionate to other entity's responsibility.

END OF SECTION

SECTION 01 41 24
PERMIT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements relative to permitting of which Owner and Engineer are aware that apply to the Work.
2. Required municipal permits and licenses of which Owner and Engineer are aware, including Electrical Permit for electric work on-site.
3. Erosion and sediment control permits. County is applying for Erosion and Sediment Control permit to be issued for the project. Contractor shall obtain coverage under the NC Construction General Permit for Stormwater Associated with Construction Activities.

B. Scope:

1. Contractor shall provide labor, materials, equipment, tools, and incidentals shown, specified, and required to obtain required permits and comply with required permits and licenses.
2. Obtain, pay for, and comply with required permits and licenses whether or not indicated in this Specifications section or elsewhere in the Contract Documents.

C. Related Requirements:

1. In addition to permits and licenses required under this Specifications section, obtain and comply with permits required under the following Specifications:
 - a. Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate compliance with permit and license requirements with Work under other Specifications sections and with other contractors, if any, working at the Site.
2. Coordinate with the Progress Schedule the time required to apply for and obtain required permits and licenses and to comply with requirements thereof. Changes in Contract Times or Contract Price will not be authorized because of timing and costs associated with obtaining permits and licenses required for the Work.

1.3 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Copy of each of the following permits, as applicable to the Work:
 - a. Construction General Permit for Stormwater Discharge Associated with Construction Activities.

1.4 MUNICIPAL PERMITS AND LICENSES

A. Permits:

1. Electrical Permit.

B. Building permit is not required for the Project. Licenses:

1. None.

1.5 EROSION AND SEDIMENT CONTROL PERMIT

A. Erosion and Sediment Control Permit – General:

1. Coordinate compliance with erosion and sediment control permit with requirements of Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 41 26

STORMWATER POLLUTION PREVENTION PLAN AND PERMIT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for compliance with the Project's Storm Water Pollution Prevention Plan (SWPPP) and its revisions, Laws and Regulations, and permit(s) applicable to the Project, including:
 - a. Contractor's general responsibilities for storm water discharges associated with construction activity.
 - b. SWPPP Revisions.
 - c. Inspection, during construction, of storm water controls and temporary erosion and sediment controls, and associated repair and maintenance.
2. Administrative forms for documenting compliance with the SWPPP and the Project's storm water permit are attached to this Section.

B. Scope:

1. Contractor shall provide all labor, materials, tools, equipment, services, and incidentals necessary and required to fulfill Contractor's responsibilities under this Section, including complying with the applicable NPDES general permit for storm water discharges associated with construction activity ("storm water permit") administered by the State of North Carolina for the Project.
 - 1) Other prime Contractors shall cooperate and, as applicable to their Work, provide to the contractor responsible for preparing SWPPP Revisions such information necessary to prepare SWPPP Revisions relative to their Work.
 - 2) Other prime Contractors (other than contractor responsible for temporary storm water controls and temporary erosion and sediment controls) engaging in earthwork, including trenching, stockpiling soil or other erodible material, and backfilling, shall be co-permittee with Owner on the Project's storm water permit, and shall comply with the SWPPP and other applicable permits and with requirements for controlling discharges of storm water and erosion and sediment, control requirements associated with their Work. Such other prime Contractors engaging in earthwork shall coordinate their earthwork with contractor responsible for the temporary storm water controls and temporary erosion and sediment controls on a daily basis, and submit to Engineer complete Notice of Termination documents.
2. Requirements of this Section are in addition to, and do not supersede or conflict with, requirements of other Specifications, including:
 - a. Section 01 57 05 - Temporary Controls, including requirements for controlling storm water during construction and temporary erosion and sediment controls.

C. Related Requirements:

1. Include, but are not necessarily limited to:
 - a. Section 01 57 05 - Temporary Controls.

1.2 REFERENCES

A. Relevant Documents:

1. Storm Water Pollution Prevention Plan (SWPPP):
 - a. Initially prepared for the Project by or for Owner, prior to construction, the SWPPP was submitted to authorities having jurisdiction over storm water discharges associated with construction activity.
 - b. The SWPPP is part of the Contract Documents and includes:
 - 1) This Section.
 - 2) Section 01 57 05 – Temporary Controls, relative to temporary storm water controls and temporary provision and sediment controls.
 - 3) Required temporary erosion and sediment controls shown on the Drawings.
 - c. The SWPPP is intended to establish requirements so that the Project's construction complies with the Project's storm water permit and other, related permits (if any).
2. Storm Water Permit for the Project:
 - a. Application for the Project's storm water permit was prepared by or for Owner and, prior to construction, was submitted to the authority having jurisdiction.
 - b. The Project's storm water permit is part of the Contract Documents and is an attachment to this Section.
 - c. Prior to starting Work at the Site that disturbs ground cover, Contractor shall sign Co-Permittee Agreement and become a co-permittee with Owner on the Project's storm water permit.
3. Erosion and Sediment Control Permit:
 - a. Application for the Project's erosion and sediment control permit was prepared by or for Owner and, prior to construction, was submitted to NCDEQ, which is the authority having jurisdiction over erosion and sediment control during construction.
 - b. Erosion and sediment control permit are part of the Contract Documents and is an attachment to this Section.
4. SWPPP Revisions:
 - a. SWPPP Revisions shall be prepared by Contractor or Subcontractor and submitted to Engineer by Contractor.
 - b. Contractor shall submit SWPPP Revision prior to starting Work at the Site, and as required by authorities having jurisdiction.
 - c. SWPPP Revision shall include Contractor's proposed temporary means for storm water control during all phases of the Work and include plans for storm water conveyance and retention, as applicable. Coordinate with Contractor's plans for excavation and filling.
 - d. Should Contractor-propose deviations to the SWPPP included in the Contract Documents, or if Project-specific modifications of the SWPPP are required because of field conditions, Contractor shall prepare and submit additional SWPPP Revisions as necessary, in accordance with requirements of authorities having jurisdiction and applicable permits.
 - e. Comply with this Section's Article titled, "SWPPP Revisions"..
 - f. SWPPP Revisions shall use the SWPPP Revision form included in this Section, with supporting documents attached as necessary and required, or forms available from authorities having jurisdiction.

- g. SWPPP Revisions that do not comply with the Contract Documents and are not required by authorities having jurisdiction will be regarded as substitutions, in accordance with the General Conditions and substitution procedures requested by the Specifications.
- 5. Storm Water Certification Statement:
 - a. To be prepared by Contractor and submitted to Engineer on the form included with this Section, or on appropriate form obtained from authority having jurisdiction.
 - b. Do not perform Work at the Site until the Storm Water Certification Statement has been submitted to and accepted by Engineer.

Notice of Intent (NOI):

- c. Prepared by Owner or Engineer and submitted to authorities having jurisdiction following Engineer's receipt and acceptance of Contractor's SWPPP Revision and preliminary Progress Schedule.
- d. NOI will be submitted to authorities having jurisdiction by Engineer within 10 days of Engineer's acceptance of Contractor's SWPPP Revision and preliminary Progress Schedule.
- e. Do not perform Work at Site until NOI is submitted to authorities having jurisdiction.
- 6. Co-Permittee Agreement:
 - a. Prepared by Contractor using forms included with the SWPPP, and submitted to Engineer within five days of the date the Contract Times commence running, for signature by Owner.
 - b. Engineer will submit co-permittee agreement to authorities having jurisdiction.
 - c. Do not perform Work at the Site until co-permittee agreement is submitted to authorities having jurisdiction.
- 7. Storm Water Inspection Report:

Prepared by Engineer's Resident Project Representative (RPR) using the appropriate form included in this Section, or appropriate form provided by authority having jurisdiction.

- a. Storm water inspection reports will be filed in a log book kept at the Site by RPR. Copy of each storm water inspection report will be furnished to Contractor upon Contractor's request.
- b. Storm water inspection report will be completed for each of the following:
 - 1) Preconstruction: After installation of temporary storm water management measures, including erosion and sediment controls, and temporary field offices and other temporary facilities, prior to starting Work at the Site (other than mobilization and initial establishment of temporary controls).
 - 2) During the Work: Every seven days until Notice of Termination is completed. When the Site is stabilized relative to storm water, erosion, and discharge of sediment, inspection frequency during temporary shutdowns of construction and seasonal shutdowns of construction shall be once per month until Notice of Termination is completed.
 - 3) Final: Final inspection report will be prepared prior to completion of Notice of Termination.
- 8. Notice of Termination (NOT):
 - a. Prepared by Contractor on the form included in the Project's storm water permit and submitted to Engineer for review and signature by Owner.
 - b. Engineer will submit the NOT to authorities having jurisdiction.

- c. Contractor shall submit the NOT following completion of all Work that may result in pollution in storm water discharges, including landscaping Work.
- d. Final payment to Contractor will not be made until the NOT is submitted to authorities having jurisdiction in accordance with this provision and the Project's storm water permit.

1.3 CONTRACTOR'S GENERAL RESPONSIBILITIES UNDER THIS SECTION

- A. The Contract Price includes all labor, material, tools, equipment, services, and incidental costs necessary for:
 - 1. Preparing SWPPP Revisions and other documents that are Contractor's responsibility, in accordance with this Section.
 - 2. Installing and maintaining structural and non-structural items used in complying with the SWPPP and its revisions.
 - 3. Other administrative Work required by this Section.
 - 4. Clean-up, disposal, and repairs following precipitation events or spills caused by Contractor.
 - 5. Implementing and maintaining "best management practices", as defined in applicable permits and Laws or Regulations, to comply with requirements that govern storm water discharges at the Site.
 - 6. Complying with other requirements of this Section.
- B. Storm Water Pollution Prevention and Approval of System Owner:
 - 1. Prevent erosion on the Site and discharge of sediment to surface waters, drainage routes, streets and rights-of-way, and private property, including dewatering operations.
 - 2. Prevent onsite trash, debris, and other pollutants from leaving the Site via storm water runoff.
 - 3. Provide berms, swales, and other appropriate methods of directing storm water around work areas to appropriate drainage routes.
 - 4. Prior to starting the Work associated with such discharge of storm water, construction-related discharges to publicly-owned conveyance or treatment systems shall be approved by owner of system to which the discharge will be directed.
- C. Water Quality:
 - 1. Do not cause or contribute to a violation of water quality standards, Laws or Regulations, or the Project's storm water permit.
 - 2. Notify Engineer of revisions to the SWPPP, update the SWPPP, and implement SWPPP changes necessary to prevent any violations of the stormwater permit.
- D. Liability for Costs Incurred due to Violations:
 - 1. Contractor shall pay civil penalties and other costs incurred by Owner, including additional engineering (including RPR) and inspection services, associated with non-compliance with applicable permits related to storm water discharges associated with construction activity and erosion and sediment controls associated with the Project.
 - 2. Owner may deduct such amounts, as one or more set-offs, from payments due Contractor for the Project.
- E. Inspections and Recordkeeping:

1. Contractor shall perform inspections of storm water, and erosion and sediment controls in accordance with this Section
2. Resident Project Representative (RPR) shall prepare and maintain records of storm water inspections.
3. Contractor shall maintain records of maintenance of storm water controls and temporary erosion and sediment controls, SWPPP Revisions, and other records required by this Section and shall keep these records and copies of all documents that make up the SWPPP at the construction site and available to the inspector and engineer that may need to review them.

F. Coordination:

1. Coordinate requirements of this Section with requirements for earthwork, temporary and permanent erosion and sediment controls, and landscaping in the Contract, applicable permit requirements, and Laws and Regulations.
2. Implement SWPPP controls and practices prior to starting other Work at the Site. Each prime contractor and Subcontractor identified in the SWPPP and SWPPP Revisions shall sign a copy of the storm water certification statement.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with Laws and Regulations, including federal, state, and local, relative to storm water discharges associated with construction activity, and associated restoration. Comply with applicable permits.

1.5 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Submit the following, in accordance with Paragraph 1.2.A and Article 1.6 of this Section. When the Project involves Work at multiple sites, submit each of the following for each Site, as applicable:
 - a. SWPPP Revisions.
 - b. Co-permittee Agreement.
 - c. Storm Water Certification Statement.
2. Approval to Discharge to Publicly-Owned Conveyance or Treatment Works:
 - a. For storm water discharges associated with construction activity that are discharged to a publicly owned conveyance or treatment system, prior to commencing discharges, submit system owner's written approval for such discharges.
3. Storm Water Site Plan Updates:
 - a. Within three days after each storm water inspection, submit updated storm water site plan.

B. Closeout Submittals: Submit the following:

1. Notice of Termination:
2. Submit in accordance with Paragraph 1.2.A and Article 1.6, "SWPPP Revisions", of this Section.
3. When the Project involves Work at multiple sites, submit separate Notice of Termination for each Site, as applicable.

1.6 SWPPP REVISIONS

- A. Contractor shall prepare a SWPPP Revision in accordance with the Project's storm water permit when:
 - 1. There is a significant change in design, construction, operation, or maintenance of the Project that significantly affects the potential for discharging pollutants.
 - 2. SWPPP proves ineffective relative to:
 - a. Eliminating or significantly minimizing discharge of pollutants from sources identified in the SWPPP required by the Project's storm water permit; or
 - b. Achieving general objectives of controlling pollutants in storm water discharged from permitted construction activity.
 - 3. Prepare and submit SWPPP Revisions identifying responsibilities of Contractor, Subcontractors, and other prime contractors (if any) at the Site, relative to implementing part of the SWPPP.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 INSPECTIONS AND REPAIRS

- A. Perform site inspections and assessments of the Site as required by the Project's storm water permit and this Section. Inspections and assessments shall be by Contractor's site superintendent or project manager, together with RPR.
- B. Inspections:
 - 1. After the Effective Date of the Contract, relative to the Project's storm water permit, inspect the Site:
 - a. Preconstruction: After controls required to comply with the SWPPP, including temporary erosion and sediment controls and other temporary controls necessary for mitigating or eliminating pollution in storm water discharged from the Site, are installed and prior to starting other Work at the Site.
 - b. During Construction: At the interval called out within the SWPPP until Notice of Termination is completed and submitted to authority having jurisdiction. When the Site is stabilized relative to storm water and pollution sources that may impair quality of storm water discharged from the Site, temporary shutdowns of construction activity, and during seasonal shutdowns of construction activity, required frequency of inspections shall be at the interval called out within the SWPPP until Notice of Termination is completed.
 - c. Prior to Contractor submitting the Notice of Termination.
 - 2. During each inspection:
 - a. Inspect and verify erosion and sediment control physical controls and practices, and other controls of pollution of storm water discharges associated with construction activity.
 - b. For temporary erosion and sediment controls, record the approximate degree of sediment accumulation as percentage of acceptable sediment storage volume. Where appropriate, obtain measurements of sediment accumulation to support reasonably accurate estimation of sediment accumulation.
 - c. Inspect and record maintenance performed on physical controls for erosion and sedimentation, and for other sources of storm water pollution.
 - d. Inspect (where possible) and verify pollution control management practices performed and practices for managing and maintaining such physical controls.

- e. Record maintenance performed on physical controls for storm water pollution.
- f. Observe and record deficiencies relative to implementation of the SWPPP.
- 3. RPR or Engineer will complete Storm Water Inspection Report (on the form attached to this Section).
- 4. Contractor shall record and submit the following:
 - a. Storm Water Site Plan: On a copy of the Site plan included in the Drawings or other map of the Site acceptable to Engineer, indicate extent of all areas of disturbed ground cover and drainage pathways. Indicate areas expected to undergo initial disturbance of ground cover or significant site work within the next 14 days.
 - b. Indicate on storm water Site plan areas of Site that have undergone temporary or permanent stabilization of ground cover and other erodible materials.
 - c. Indicate on storm water site plan all disturbed areas that have not undergone active site work during the previous 14 days.
- C. Maintain at the Site a copy of storm water Site plans from each storm water inspection and submit each storm water Site plan to Engineer and RPR. RPR will maintain at the Site a log book with a copy of each Storm Water Inspection Report.
- D. Cooperate with representatives of authorities having jurisdiction during their periodic visits to the Site, and promptly furnish information requested by authorities having jurisdiction.
- E. Repair physical controls of storm water pollution, including (but not limited to temporary erosion and sediment controls), in accordance with applicable requirements and to satisfaction of Engineer, within two days of each inspection (unless shorter period is required elsewhere in the Contract Documents).

3.2 ATTACHMENTS

- A. The following, bound after this Section's "End of Section" designation, are part of this Specifications Section:
 - 1. Forms:
 - a. Storm Water Inspection Report form (two pages).
 - b. Storm Water Permit Certification form (one page).
 - c. SWPPP Revision Form (one page).
 - 2. Permits:
 - a. The Project's erosion and sediment control permit.

END OF SECTION

STORM WATER INSPECTION REPORT

Owner: _____
Site: _____
Project: _____
Contractor: _____

Date of Inspection: _____
Day of Week: S M T W T F S
Sheet No. _____ of _____ sheets

If pertinent to the Operation	
Weather:	
Temperature:	

This inspection and maintenance form is to be used when the Work is subject to a Storm Water General Permit for Construction Activity. Inspections shall be performed not less than once every seven calendar days; for sites that are stabilized and temporarily shut down inspections may be reduced to once per month. Each erosion and sediment control measure installed on the Site is to be inspected and the Contractor must complete all required maintenance within two calendar days from the date of inspection.

- Reason for this inspection:**
- ☐ Pre-construction Site assessment
 - ☐ Seven calendar day inspection
 - ☐ Monthly inspection (when Site is stabilized and shut down)
 - ☐ Post-construction inspection prior to Notice of Termination

Key for erosion and sediment control measures to be inspected: [Use the following designations in the table below] (1) mulch, (2) seed and mulch, (3) check dams, (4) hay bale/straw bales, (5) silt fence, (6) sediment trap, (7) turbidity curtains, (8) pipe slope drains, (9) drainage structure inlet protection, (10) rolled erosion control products, (11) soil stabilizers, (12) construction entrances, (13) pipe inlet/outlet protection, (14) water diversion structures, (15) sedimentation basins, (16) cofferdams, (17) Other_.

ID	Location	Disturbance		Measure		Remarks (Evaluate integrity of measure, describe evidence of erosion)	Approximate Sediment Accumulation (%) of Depth)	Maintenance Required? (Y or N) (If Yes, Describe Below)
		Existing? (Y or N)	Next 14 Days? (Y or N)	Code #	Temp or Perm? (T, P or NA)			
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								

ID	Location	Disturbance		Measure		Remarks (Evaluate integrity of measure, describe evidence of erosion)	Approximate Sediment Accumulation (% of Depth)	Maintenance Required? (Y or N) (If Yes, Describe Below)
		Existing? (Y or N)	Next 14 Days? (Y or N)	Code #	Temp or Perm? (T, P or NA)			
12								
13								
14								
15								
16								
17								
18								
19								
20								

DESCRIPTION OF REQUIRED MAINTENANCE AND ANY EXISTING DEFICIENCIES IN THE SWPPP:
Specify for each location using row ID number from the table above.

I certify under penalty of Law that this document and all attachments were prepared under my direction or supervision in accordance with a system to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein may be punishable by Law.

Signature	Prepared	Copy to Contractor
_____	_____	_____
Resident Project Representative	(Date)	(Date)

Qualified Professional Name (w/Firm Name, if Consultant)	_____

STORM WATER PERMIT CERTIFICATION STATEMENT

Contract Number: _____

Project: _____

Owner _____

Each Contractor and Subcontractor identified in the Storm Water Pollution Prevention Plan (SWPPP) must certify that they understand the permit conditions and their responsibilities. Every Contractor and Subcontractor performing an activity that involves soil disturbance shall sign this certification and submit it to the Engineer prior to performing the Work. This certification shall be signed by an owner, principal, president, secretary, or treasurer of the firm.

I certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP for the construction Site identified in such SWPPP as a condition of authorization to discharge storm water. I also understand that my firm and its employees and Subcontractors shall comply with the terms and conditions of Owner's general permit for storm water discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards, Laws, or Regulations.

Firm: _____

Address: _____ **City:** _____ **State:** _____ **Zip:** _____

Name (Print): _____ **Signature:** _____ **Date:** _____

STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REVISION

Owner: _____

Date of Inspection: _____

Site: _____

Sheet No. _____ of _____ sheets

Project: _____

Contractor: _____

This form shall be used when revisions to the current Storm Water Pollution Prevention Plan (SWPPP) are required by the Storm Water General Permit for Construction Activity or the Contract Documents.

Reason for the Revision(s): Revisions were requested by State: ☐ Yes ☐ No

Describe the Revision(s) to the SWPPP:

I certify under penalty of Law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein may be punishable by Law.

Signature: _____ Prepared: _____ Submitted: _____
(Date) (Date)

Copy to: ☐ Engineer ☐ Contractor: _____

This page intentionally left blank.

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Defined terms and terminology.
2. Construction Codes: Indication of applicable building code and other construction codes.
3. Referenced Standard Specifications and Construction Guidelines: Indication of Owner's or third-party specifications and construction standards applicable to one or more parts of the Work.
4. Abbreviations in general use in the Contract Documents.
5. Reference Standards: General requirements regarding reference standards, including a listing of reference standard-issuing organizations (and their acronyms) used in the Contract Documents.

1.2 REFERENCES

A. Contract Language Addressed to Contractor:

1. Unless expressly indicated otherwise, language of the Contract Documents addresses Contractor, and the Contract Documents show and indicate Contractor's obligations.
2. Unless indicated otherwise, expressions such as, "provide", "furnish", "install", "perform", "retain services of", "remove", "demolish", "replace", and the like refer to Contractor's obligations under the Contract.

B. Defined Terms:

1. Defined terms, indicated with initial capital letters or with all-capital letters, used in the Contract Documents, are indicated in the General Conditions, as may be modified by the Supplementary Conditions. Additional defined terms, if any, in general use in the Contract Documents are indicated below. Where used, such defined terms apply to the singular and plural thereof.
 - a. None.
2. Additional defined terms, applicable to the Work of a given Specifications Section, may be indicated in the associated Specifications Section.

C. Terminology:

1. Terminology, indicated without initial capital letters, used in the Contract Documents, are indicated in the General Conditions, as may be modified by the Supplementary Conditions. Additional terminology in general use in the Contract Documents are indicated below. Where used, such terminology applies to the singular and plural thereof.
 - a. "Shown" means information or requirements presented on the Drawings, in schedules, or in other types of graphic instruments.
 - b. "Indicated" means, as applicable: (1) graphic representations, notes, or schedules on the Drawings, or (2) other paragraphs, provisions, tables, or schedules in the Specifications and elsewhere in the Contract Documents.
 - c. "Specified", "noted", "scheduled", and similar terms, have the same meaning as "shown" and "indicated", as applicable, and are used to help the user locate the reference without limitation on the location.
 - d. "Installer", "applicator", or "erector" is Contractor's employees or Subcontractor, engaged to perform a specific construction activity, including installation, erection, application, or similar Work. Installers shall be experienced in the Work that installer is engaged to perform.

- e. "Experienced", when used in conjunction with terms such as "installer", "Subcontractor", "Supplier", "manufacturer", and similar terms means (unless expressly indicated otherwise for the subject Work elsewhere in the Contract Documents) such person or entity, as applicable, has successfully completed not less than five previous projects similar in size, scope, and complexity to such person's or entity's work on this Project; being familiar with the special requirements indicated and required; being familiar with Laws and Regulations; and having complied with requirements of authorities having jurisdiction, and complying with written requirements of the Supplier of the material or equipment being installed.
 - f. "Assigned specialists" and similar terms: Certain Specifications require specific construction activities be performed by specialists with recognized, extensive experience in such operations. Engage said specialists for such activities, and their engagement is a requirement over which Contractor has no option. These requirements do not conflict with enforcement of building codes and other Laws and Regulations. Such requirements are not intended to interfere with local trade union jurisdictional settlements and similar conventions. Such assignments shall not relieve Contractor of responsibility for complying with the requirements of the Contract Documents.
 - g. Trades: Use of terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter", unless otherwise indicated in the Contract Documents or required by Laws or Regulations, or required by an applicable project labor agreement. Such terminology also does not imply that indicated requirements apply exclusively to trade personnel of the corresponding generic name.
2. Additional terminology, applicable to the Work of a given Specifications Section, may be indicated in the associated Specifications Section.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. References in the Contract Documents to local building and construction code(s) means the following:
 - a. 2017 NEC (National Electrical Code with North Carolina Amendments).

1.4 ABBREVIATIONS.

A. Abbreviations - General:

1. Abbreviations commonly used in the Contract Documents are indicated in this Article or on the Drawings, except as further indicated in the following paragraphs, .
2. Additional abbreviations, specific to the Work of a given Specifications section, may be indicated in the associated Specifications.
3. Typical equipment abbreviations are indicated in Section 01 61 03 - Common Work Results for Equipment.

B. Common abbreviations that may be used in the Contract Documents are indicated below, alphabetically by their written-out meaning:.

alternating current	AC
ampere	A, or amp
Americans with Disabilities Act	ADA
Americans with Disabilities Act Accessibility Guidelines	ADAAG
ante meridian	a.m.
Architectural Barriers Act	ABA

average	avg
biochemical oxygen demand	BOD
five-day biochemical oxygen demand	BOD ₅
brake horsepower	Bhp or BHP
British thermal unit	Btu
building information model	BIM
carbonaceous biochemical oxygen demand	CBOD
five-day carbonaceous biochemical oxygen demand	CBOD ₅
chemical oxygen demand	COD
Celsius (or Centigrade)	C
chlorinated polyvinyl chloride	CPVC
chlorofluorocarbons	CFC
Code of Federal Regulations	CFR
computer-aided drafting and design	CADD, or CAD
cubic inch	cu in, or CU IN, or in ³
cubic foot	cu ft, or CU FT, cf, CF, or ft ³
cubic yard	cu yd, or CU YD, or CY, or yd ³
cubic feet per minute	CFM, or cfm
cubic feet per second	CFS, or cfs
decibel	dB, dBA, or dBa
degree Celsius	degrees C, °C, or deg C
degrees Fahrenheit	degrees F, °F, or deg F
diameter	dia
direct current	DC
dollars	\$
each	ea
efficiency	eff
Fahrenheit	F
feet	ft or FT
feet per hour	FPH, or ft/hr
feet per minute	FPM or ft/min
feet per second	fps, or ft/s
figure	fig
flange	flg
foot-pound	ft-lb or FT-LB
gallon	gal or GAL
gallons per hour	GPH, gph, or gal/hr

gallons per minute	GPM, or gpm
gallons per second	GPS, or gps
gram	g
grams per liter	g/L
heating, ventilating, and air conditioning	HVAC
Hertz	Hz
horsepower	hp or HP
hour	hr or HR
human-machine interface	HMI
inch	in. or IN
inches of mercury	in. Hg
inches water gage	in. w.g.
inch-pound	in.-lb
inside diameter	ID
iron pipe size	IPS
thousand pounds	kips
thousand pounds per square inch	ksi or KSI
kilovolt-ampere	kva, or kVA
kilowatt	Kw, or
kilowatt-hour	Kwhr, kWhr, or kwh, kWh
linear foot	lin ft or LF
liter	L
Leadership in Energy and Environmental Design (USGBC)	LEED
maximum	max
mercury	Hg
mile	mi
miles per hour	mph or MPH
milligram	mg
milligrams per liter	mg/l or mg/L
milliliter	ml
millimeter	mm
million gallons per day	MGD or MGD
million gallon	MG
minimum	min
national pipe threads	NPT
net positive suction head	NPSH
net positive suction head available	NPSHA

net positive suction head required	NPSHR
nitrogen oxide (total concentration of mono-nitrogen oxides such as nitric oxide (NO) and nitrogen dioxide (NO ₂))	NOx
nominal pipe size	NPS
number	no. or #.
operator interface terminal	OIT
ounce	oz
ounce-force	ozf
outside diameter	OD
parts per hundred	PPH, or pph
parts per million	PPM, or ppm
parts per billion	PPB, or ppb
polychlorinated biphenyl	PCB
polyvinyl chloride	PVC
post meridian	p.m.
pound	lb, LB, lbs, or LBS
pounds per square inch	PSI, or psi
pounds per square inch absolute	PSIA, or psia
pounds per square inch gauge	PSIG, or psig
pounds per square foot	PSF, or psf
process control system	PCS
programmable logic controller	PLC
revolutions per minute	RPM, or rpm
second	sec, or s
specific gravity	sp gr, or SG
square	sq
square foot	sq ft, or SQ FT, or sf, or ft ²
square inch	sq in., or SQ IN, or in ²
square yard	sq yd, or SY, or yd ²
standard	std
standard cubic feet per minute	SCFM, or scfm
total dynamic head	TDH
totally-enclosed fan-cooled	TEFC, or tefc
volt	V
volts alternating current	VAC, or vac
volts direct current	VDC, or vdc
volatile organic compounds	VOC

1.5 REFERENCE STANDARDS AND ORGANIZATIONAL ACRONYMS

A. Reference Standards - General:

1. Each entity engaged in the Work, including Contractor, Subcontractors, and Suppliers, shall be familiar with reference standards applicable to its portion(s) of the Work. Comply with such reference standards when required by the Contract Documents or appropriate fabrication and construction practice, unless the Contract Documents requirements exceed those of the associated reference standard.
2. Refer to the General Conditions, as may be modified by the Supplementary Conditions, relative to reference standards and resolving discrepancies between reference standards and the Contract Documents.
3. Provisions of reference standards are in effect in accordance with the Specifications and other provisions of the Contract Documents where reference standards are cited.
4. Copies of applicable reference standards are not included in or bound with the Contract Documents. Where reference standards are needed for the Work, obtain such reference standards(s) from the publication source.

B. Organization Names and Acronyms:

1. Where reference standards, specifications, manuals, Laws or Regulations, or other published data of international, national, regional, or local organizations are cited in the Contract Documents, the organization issuing the standard (or other type of document) may be referred to by its acronym only.
2. The following acronyms that may appear in the Contract Documents shall have the meanings indicated below, unless expressly indicated otherwise in that part of the Contract Documents where such standard (or other document) is cited.
3. Listing is alphabetical by acronym.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ABMA	American Bearing Manufacturers Association (formerly Anti-Friction Bearing Manufacturers Association (AFBMA))
ACI	American Concrete Institute
ACS	American Chemical Society
ADSC-IAFD	International Association of Foundation Drilling.
AEIC	Association of Edison Illuminating Companies
AF&PA	American Forest and Paper Association
AGI	American Geosciences Institute
AGMA	American Gear Manufacturers Association
AI	Asphalt Institute
AIA	American Institute of Architects
AIChE	American Institute of Chemical Engineers
AIPG	American Institute of Professional Geologists
AISC	American Institute of Steel Construction

AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standards Committee
AMA	Acoustical Materials Association
AMCA	Air Movement and Control Association
AMP	National Association of Architectural Metal Manufacturers, Architectural Metal Products Division
AMPP	Association for Materials Protection and Performance
ANSI	American National Standards Institute
APA	The Engineered Wood Association
APHA	American Public Health Association
API	American Petroleum Institute
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ARS	American Rail Standard
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society for Non-Destructive Testing
ASQ	American Society for Quality
ASSE	American Society of Safety Engineers
ASTM	ASTM International
AWCI	Association of the Wall and Ceiling Industry
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BAAQMD	Bay Area Air Quality Management District
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association
CASE	Coalition of American Structural Engineers (part of the American Council of Engineering Companies (ACEC))
CBMA	Certified Ballast Manufacturers Association
CBP	United States Customs and Border Protection
CDA	Copper Development Association
CEMA	Conveyor Equipment Manufacturers Association
CGA	Compressed Gas Association

CISCA	Ceilings and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DBIA	Design-Build Institute of America
DHS	United States Department of Homeland Security
DIN	Deutsches Institut für Normung, eV (German Institute for Standardization)u
DIPRA	Ductile Iron Pipe Research Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ETL	Intertek Testing Services, Inc. (formerly ETL Testing Laboratories, Inc.)
FAA	Federal Aviation Administration (US Department of Transportation)
FCC	United States Federal Communications Commission
FEMA	Federal Emergency Management Agency (US Department of Homeland Security)
FHWA	Federal Highway Administration (US Department of Transportation)
FIDIC	International Federation of Consulting Engineers
FM	Factory Mutual (FM Global)
FRPI	Fiberglass Reinforced Plastics Institute
FS	Federal Specification
FTA	Federal Transit Administration, United States Department of Transportation
GA	Gypsum Association
GANA	Glass Association of North America
HEW	United States Department of Health, Education and Welfare
HI	Hydraulic Institute
HMI	Hoist Manufacturers Institute
HUD	United States Department of Housing and Urban Development
IBC	International Building Code
ICC	International Code Council
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IFI	Industrial Fasteners Institute
IRI	Industrial Risk Insurers
ISA	International Society of Automation
ISI	Institute for Sustainable Infrastructure

ISO	Insurance Services Office
ISO	International Organization for Standardization
LPI	Lightning Protection Institute
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
MSS	Manufacturers' Standardization Society
MMA	Monorail Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NAPF	National Association of Pipe Fabricators, Inc.
NARUC	National Association of Regulatory Utilities Commissioners
NAVFAC	Naval Facilities Engineering Command (US Navy)
NBHA	National Builders Hardware Association
NBS	National Bureau of Standards (United States Department of Commerce)
NCMA	National Concrete Masonry Association
NEC	National Electric Code
NELMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NHPMA	Northern Hardwood and Pine Manufacturers Association
NICET	National Institute for Certification in Engineering Technologies
NIST	National Institute of Standards and Technology (United States Department of Commerce)
NLGA	National Lumber Grades Authority
NRC	United States Nuclear Regulatory Commission
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	National Sanitation Foundation
NSPE	National Society of Professional Engineers
NSSGA	National Stone, Sand, and Gravel Association
NTMA	National Terrazzo and Mosaic Association

OSHA	Occupational Safety and Health Administration, United States Department of Labor
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PEI	Porcelain Enamel Institute
PFI	Pipe Fabrication Institute
PPI	Plastics Pipe Institute
PGMC	Primary Glass Manufacturers Council
PS	Product Standards Section, United States Department of Commerce
RCSC	Research Council on Structural Connections (part of AISC)
RMA	Rubber Manufacturers Association
RUS	Rural Utility Service (division of Rural Development of the USDA)
SAE	Society of Automotive Engineers
SCAQMD	Southern California Air Quality Management District
SCPRF	Structural Clay Products Research Foundation
SCTE	Society of Cable Telecommunications Engineers
SDI	Steel Deck Institute
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturing Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
SPI	Society of the Plastics Industry
SPIB	Southern Pine Inspection Bureau
SSPC	Society for Protective Coatings (formerly, Steel Structures Painting Council)
SWI	Steel Window Institute
TCNA	Tile Council of North America
TEMA	Tubular Exchanger Manufacturers Association
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TSA	Transportation Security Administration (United States Department of Homeland Security)
UCC	Uniform Commercial Code
UL	Underwriters Laboratories, Inc.
USAB	United States Access Board
USACE	United States Army Corps of Engineers (also abbreviated as COE or USACOE)
USDA	United States Department of Agriculture
USDOE	United States Department of Energy
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USGBC	United States Green Building Council

USGS	United States Geological Survey
USPHS	United States Public Health Service
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WCMA	Wood Component Manufacturers Association
WDMA	Window and Door Manufacturers Association
WEF	Water Environment Federation (formerly the Water Pollution Control Federation)
WWEMA	Water and Wastewater Equipment Manufacturers Association
WWPA	Western Wood Products Association

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

This page intentionally left blank.

SECTION 01 51 05
TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Temporary electricity.
2. Temporary lighting.
3. Temporary communications.
4. Temporary heating, cooling, ventilating, and temporary enclosures.
5. Temporary water supply.
6. Temporary sanitary facilities.
7. Temporary first-aid facilities.
8. Temporary fire protection.

B. Scope:

1. Contractor shall provide all temporary utilities and temporary facilities required for the Project, including those indicated in this Specifications section.
2. Make all arrangements with utility owners for temporary utilities and with others as appropriate for temporary facilities. Obtain required permits and approvals for temporary utilities and temporary facilities.
3. Pay all service costs for utilities and facilities indicated in this Specifications section as Contractor's responsibility, including cost of electricity, water, fuel, and other utility services and temporary facilities required for the Work.
4. Continuously maintain adequate temporary utilities and temporary facilities for all purposes for the Project, until removal of temporary utilities and temporary facilities. At minimum, provide and maintain temporary utilities and temporary facilities through Substantial Completion and removal of temporary field offices and sheds unless otherwise approved in writing by Engineer.
5. Should Owner occupy part of the Work prior to Substantial Completion of the entire Work, cost of utilities consumed via temporary utilities serving the portion occupied by Owner will be shared proportionately by Owner and Contractor as mutually agreed to by the parties.
6. Maintain, including cleaning, temporary utilities and temporary facilities, and continuously provide consumables as necessary.
7. Temporary utilities and temporary facilities shall be adequate for personnel using the Site and the needs of the Project.
8. Provide temporary utilities and temporary facilities in compliance with Laws and Regulations and requirements of authorities having jurisdiction and, when applicable, requirements of utility owners.

1.2 REQUIREMENTS FOR TEMPORARY UTILITIES AND TEMPORARY FACILITIES

A. Temporary Electricity:

1. Provide temporary electric service necessary for the Work, including continuous power for temporary field offices and sheds. Provide temporary outlets with circuit breaker protection and ground fault protection.

B. Temporary Lighting:

1. Provide temporary lighting at the Site of not less than the greater of (1) Laws and Regulations, and (2) the following:
 - a. Five foot-candles for open areas, 10 foot-candles for shops 25 foot-candles for stairs.

- b. Provide not less than one, 300 W lamp every 15 feet in indoor work areas.
 - c. Where temporary lighting is required in office or laboratory areas occupied by Owner: 40 foot-candles at a height of 2.5 feet above the finished floor.
 - d. Night Security Lighting: Five foot-candles within 50 feet of all parts of the Site during hours of darkness, controlled by photocell.
 - 2. Do not work in areas with insufficient lighting. Where lighting is insufficient for the work activities to be performed, provide additional temporary lighting.
 - 3. Provide temporary lighting sufficient for observation of the Work by Engineer and inspection by Contractor, entities performing code-required tests and special inspections, and authorities having jurisdiction. Where required by Engineer, provide additional temporary lighting.
 - 4. Provide temporary lighting for Engineer's field office in accordance with Section 01 52 11 - Engineer's Field Office.
- C. Temporary Communications:
- 1. Provide temporary telephone service and communications necessary for Contractor's operations at the Site and for summoning emergency medical assistance and other first-responders as necessary.
 - 1. Provide temporary telephone service and communications for Engineer's field office in accordance with Section 01 52 11 - Engineer's Field Office.
- D. Temporary Heating, Cooling, Ventilating, and Enclosures:
- 1. Provide sufficient temporary heating, cooling, and ventilating and temporary enclosures to ensure safe working conditions and prevent damage to existing property and the Work.
 - 2. Except where otherwise specified, temporary heating shall maintain temperature of the space served between 50 degrees F and maximum design temperature of building or facility and its contents.
 - 3. Maintain temperature of areas occupied by Owner's personnel or electronic equipment, including offices, lunch rooms, locker rooms, toilet rooms, and rooms containing computers, microprocessors, and control equipment, between 65 degrees F and 75 DEGF with relative humidity less than 65%.
 - 4. Required temperature range for storage areas and certain elements of the Work, including preparation of materials and surfaces, installation or application, and curing as applicable, shall be in accordance with the Contract Documents for the associated Work and the Supplier's recommended temperature and humidity ranges for storage, application, or installation, as appropriate.
 - 5. Provide temporary ventilation sufficient to prevent accumulation in construction areas and areas occupied by Owner of hazardous and nuisance levels or concentrations of dust and particulates, mist, fumes, vapors, odors, and gases, associated with construction. Similarly, provide temporary ventilation for building or structure spaces temporarily without ventilation due to the Work.
 - 6. Temporary Enclosures:
 - a. Provide temporary enclosures and partitions required to maintain required temperature and humidity.
 - b. Temporary enclosures shall be sufficiently sturdy and durable for the intended use and duration... Maintain and repair temporary enclosures as necessary.
 - 7. Provide temporary heating, cooling, and ventilating for Engineer's field office in accordance with Section 01 52 11 - Engineer's Field Office.
- E. Temporary Water:
- 1. General:
 - a. Provide temporary water service and facilities including piping, valves, meters if not provided by owner of existing waterline, backflow preventers, pressure regulators, and

- other appurtenances. Provide freeze-protection as necessary to prevent freezing of temporary services.
 - b. Continuously maintain adequate water flow and pressure for all purposes during the Project, until removal of temporary water systems.
- 2. Water for Construction Purposes:
 - a. Provide water for Site maintenance and cleaning and, water necessary for construction activities, and water for disinfecting and testing of systems.
 - b. Contractor may use existing hose bibs for short-term wash-downs and intermittent use of water for work areas in existing building and existing structures. Obtain consent of Engineer and Owner if connections to existing hose bibs and similar existing connections will be used for more than one day at a time.
- 3. Water for Human Consumption and Sanitation:
 - a. Provide potable water in accordance with Laws and Regulations for consumption by personnel at the Site, for field offices, and for sanitary facilities.
 - b. When necessary, provide bottled, potable water for use and consumption by personnel at the Site, including Contractor, Engineer, and visitors to the Site.
 - c. Provide temporary water for Engineer's field office in accordance with Section 01 52 11 - Engineer's Field Office.
- F. Temporary Sanitary Facilities:
 - 1. Provide suitably-enclosed chemical or self-contained toilets for Contractor's employees, Subcontractors, Suppliers, Engineer, and visitors to the Site. Location of temporary toilets shall be acceptable to Owner and Engineer.
 - 2. Refer to Paragraph 1.2.E of this Specification Section for requirements for temporary water service intended for human consumption during construction.
 - 3. Provide suitable temporary washing facilities for employees and visitors.
 - 4. Provide temporary sanitary facilities for Engineer's field office in accordance with Section 01 52 11 - Engineer's Field Office.
- G. Temporary First-aid Facilities.
 - 1. Provide temporary first-aid stations at or immediately adjacent to the Site's work areas, and inside Contractor's field office. Locations of temporary first-aid stations shall be determined by Contractor's safety representative. Replenish supplies in first-aid stations as items are used, prior to expiration of items, and as necessary. Monitor and log inventory of supplies in temporary first-aid stations not less than once per week.
 - 2. Provide list of emergency telephone numbers at each hardwired telephone at the Site.
 - 3. Provide temporary first-aid facilities for Engineer's field office in accordance with Section 01 52 11 - Engineer's Field Office.
- H. Temporary Fire Protection.
 - 1. Provide temporary fire protection in accordance with Laws and Regulations and the requirements of this Specifications section.
 - 2. For work areas without standpipe fire protection systems, during construction provide portable fire extinguishers rated not less than 2A or 5B in accordance with NFPA 10 – Portable Fire Extinguishers, for each temporary building and for every 3,000 square feet of floor area under construction.
 - 3. Provide Class A (ordinary combustibles), Class B (combustible liquids and gases), and Class C (electrical equipment) fire extinguishers as necessary.
 - 4. Comply with NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations, and requirements of fire marshals and authorities having jurisdiction at the Site.
 - 5. Provide temporary fire protection for Engineer's field office in accordance with Section 01 52 11 - Engineer's Field Office.

1.3 USE OF OWNER'S SYSTEM

- A. Existing Utility Systems: Do not use systems in existing buildings or structures for temporary utilities without Owner's written permission and mutually acceptable basis agreed upon by the parties for proportionate sharing of costs between Owner and Contractor.
- B. Use of Permanent Utility Systems Provided Under the Project:
 - 1. Permanent electrical, lighting, water, heating, ventilating, and fire protection systems and first-aid facilities may be used to provide temporary utilities and temporary facilities if the following are met:
 - a. Obtain Owner's written permission to use permanent systems.
 - b. Permanent systems to be used for temporary utilities or temporary facilities shall be substantially complete, including complete functionality of all controls. Engineer will not certify Substantial Completion for facilities and systems used solely by Contractor during construction.
 - c. Contractor shall pay all costs while using permanent system, including operation, maintenance, replacement of consumables, and provide replacement parts.
 - 2. Do not use the following permanent facilities:
 - a. Telephone and communication facilities.
 - b. Sanitary facilities.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for temporary utilities and temporary facilities:
 - 1. may be new or used but, if used, shall be in good condition;
 - 2. shall be adequate for purposes intended;
 - 3. shall not create unsafe or unsanitary conditions; and
 - 4. shall comply with Laws and Regulations.
- B. Provide required materials, equipment, and facilities, including piping, cabling, supports, controls, and appurtenances.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install temporary utilities and temporary facilities in neat, orderly, manner, and make structurally, mechanically, and electrically sound throughout.
- B. Location of Temporary Utilities and Temporary Facilities:
 - 1. Locate temporary systems for proper function and service.
 - 2. Temporary systems shall not interfere with or provide hazards or nuisances to: the Work under this and other contracts, movement of personnel, traffic areas, materials handling, hoisting systems, storage areas, finishes, and work of utility owners and others.
 - 3. Do not install temporary utilities on the ground, with the exception of temporary extension cords, hoses, and similar systems in place for short durations.
- C. Modify and extend temporary systems as required by progress of the Work.

3.2 USE

- A. Maintain temporary systems to provide safe, continuous service as necessary and as required.
- B. Properly supervise operation of temporary systems:
 - 1. Enforce compliance with Laws and Regulations.
 - 2. Enforce safe practices.

3. Prevent abuse of services.
 4. Prevent nuisances and hazards caused by temporary systems and their use.
 5. Prevent damage to finishes.
 6. Ensure that temporary systems and equipment do not interrupt continuous progress of construction.
- C. At end of each work day, check temporary systems and verify that sufficient consumables are available to maintain operation until work is resumed at the Site. Provide additional consumables if the supply on hand is insufficient for continuous operation.

3.3 REMOVAL

- A. Completely remove temporary utilities, temporary facilities, equipment, and materials when no longer required. Repair damage caused by temporary systems and their removal and restore the Site to condition required by the Contract Documents; if restoration of damaged areas is not otherwise specified, restore to preconstruction condition.
- B. Where temporary utilities are disconnected from existing utility, provide suitable, watertight or gastight (as applicable) cap or blind flange, as applicable, on service line, in accordance with requirements of utility owner. If utility owner will perform such work, coordinate with and pay utility owner for such work.
- C. Where permanent utilities and systems were used for temporary utilities, upon Substantial Completion replace all consumables such as filters and light bulbs and parts used during the Work.

END OF SECTION

This page intentionally left blank.

SECTION 01 52 11
ENGINEER'S FIELD OFFICE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for Engineer's field office at the Site, provided by Contractor, including:
 - a. Physical requirements for field office and related site improvements.
 - b. Utilities, environmental controls, and similar services for field office.
 - c. Furniture and furnishings for field office.
 - d. Equipment for field office.
 - e. Maintenance, cleaning, and supplies.
 - f. Removal of field office and associated restoration.
- B. Scope:
 - 1. Contractor shall provide temporary field office, with furniture, furnishings, equipment, services, consumables, and other requirements of this Section, for Engineer's sole use during the Project's construction.
 - 2. Engineer's field office shall be complete and fully functional within 30 days of the date the Contract Times start to run.
 - 3. Obtain and pay for required permits and utilities.
- C. Related Requirements:
 - 1. Section 01 14 19 - Use of Site.
 - 2. Section 01 51 05 - Temporary Utilities.
 - 3. Section 01 55 13 - Vehicular Access and Parking.
 - 4. Section 01 71 33 - Protection of the Work and Property.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with Owner, facility manager (if other than Owner), other contractors, and others using the Site, location of Engineer's field office and related temporary facilities.
 - 2. Location of Engineer's field office is addressed in this Section's Article 3.1 ("Installation").

1.3 SUBMITTALS

- A. Action Submittals: Obtain Engineer's approval of the following prior to installing Engineer's field office at the Site and prior to obtaining furniture, furnishings, and equipment required by this Section:
 - 1. Field Office Submittal: Submit all of the following as one Submittal which shall include:
 - a. Site plan indicating proposed location of Engineer's field office, parking for Engineer's field office, facilities related to Engineer's field office, and material of both field office parking and sidewalk or walkway to Engineer's field office.
 - b. Layout and Physical Attributes Shop Drawings of Engineer's Field Office:
 - 1) Information on proposed field office size, construction, exterior appearance, interior finishes, and field office security measures.
 - 2) Proposed layout of interior of Engineer's field office, showing location of offices, common areas, restroom, closet, other areas required (if any), with dimensions indicated for each. Show locations of interior partition walls, doors (including direction of opening), and windows.

- c. Exterior Sign Shop Drawing:
 - 1) Indication of size, material, and thickness of exterior sign for Engineer's field office.
 - 2) Proposed layout of field office exterior sign, showing all text, font, character sizes, colors, and graphics (if any).
- d. Utilities:
 - 1) Proposed type of internet service; name of proposed internet service provider; and product data and technical information on equipment required for internet service.
- e. Furniture and Furnishings: Product data and technical information for:
 - 1) Desks.
 - 2) Chairs (desk chairs, office chairs, folding chairs).
 - 3) Tables.
 - 4) File cabinets and storage cabinet.
 - 5) Racks.
 - 6) Field office safety items and equipment required in this Section.
- f. Equipment: Product data and technical information for:
 - 1) Copier-printer-scanner.
 - 2) Speaker phone for conference area.
 - 3) Coffee maker.
 - 4) Other equipment required in this Section.

PART 2 - PRODUCTS

2.1 FIELD OFFICE CONSTRUCTION AND SITE REQUIREMENTS

- A. Site Requirements at Field Office:
 - 1. Vehicle Parking:
 - a. Allocate total of 2 reserved parking spaces for use by Engineer and Owner in close proximity to Engineer's field office.
 - b. Vehicle parking spaces shall be not less than nine feet wide.
 - c. Parking area shall be paved with crushed stone, asphalt concrete, concrete, or other material approved by Engineer.
 - d. Comply with Section 01 55 13 - Vehicular Access and Parking. Provide reasonably smooth surface for vehicles.
 - e. Provide parking area with safe layout, suitable for vehicle entry to temporary or permanent travelled ways, as applicable, with sufficient space for reasonable vehicle maneuvering.
 - f. Parking area shall be properly drained and free of standing water during wet weather.
 - 2. Walkway or Sidewalk to Field Office Entrance:
 - a. Provide sidewalk or walkway, not less than four feet wide, of crushed stone, asphalt concrete, concrete, or other material approved by Engineer.
 - b. Provide sidewalk or walkway for full distance between parking area and entrance to Engineer's field office.
- B. Minimum Construction for Engineer's Field Office: Provide Engineer's field office in accordance with the following:
 - 1. Structurally sound foundation and superstructure.
 - 2. Size: Floor area of not less than 200 square feet, and not less than 10 feet wide, with clear vertical distance of eight feet between interior floor and ceiling.
 - 3. Completely weathertight and insulated, with not less than R-19 insulation.
 - 4. Exterior finish approved by Engineer.

5. Interior finishes shall be new or in like-new condition, approved by Engineer, including wood paneling (or other acceptable finishing) on walls and resilient flooring in first-class condition.
6. Field Office Ingress and Egress:
 - a. Provide two doors for ingress and egress for each field office unit, each with landing, stairs, and railing complying with applicable building code and other Laws and Regulations in effect at the Site.
 - b. Landing and stairs shall have slip-resistant walking surfaces, and be metal, pressure-treated lumber, fiberglass, or concrete.
 - c. Railing shall be metal, pressure-treated lumber, or fiberglass.
7. Physical Security:
 - a. Doors shall be secure and lockable with cylinder-type locks. Padlocks are unacceptable.
8. Windows:
 - a. Window area equal to not less than 10 percent of floor area.
 - b. Provide each window with insect screen (unless other type of screen is required) and operable sash.
 - c. Provide each window with lock approved by Engineer, in addition to other physical security features required, if any.
9. One lockable closet for storage.
10. Keys:
 - a. Furnish to Engineer two identical sets of keys suitable for operating all keyed locks, including ingress/egress door locks, security bars (when required) for doors and windows, window locks, closet(s), and lockable drawers on office furniture.
 - b. Permanently and legibly label each key to indicate its associated lock.
11. Exterior Sign for Engineer's Field Office:
 - a. Provide exterior sign for Engineer's field office, approved by Engineer. Sign shall be durable, weatherproof, suitable for long-term exposure to sunlight, precipitation, wind, windborne grit, and other local atmospheric elements.
 - b. Exterior sign shall be not less than three feet high by four feet wide, installed at location determined by Engineer at the Site.
 - c. Sign shall be in color, as presented in the layout below.
 - d. Sign layout and general proportions shall be as presented below. Text of first line and last line shall be Arial font. Text size and size of graphic shall be proportionate to the layout below. Engineer will furnish to Contractor Electronic Documents file(s) of Engineer's "third party logo package" for use in preparing the sign, together with Engineer's standard, published instructions on use of Engineer's logo. Contractor shall comply with Engineer's written instructions for using Engineer's logo.



C. Optional Construction for Engineer's Field Office:

1. In lieu of providing Engineer's field office in a fixed structure, provide mobile office trailer(s), either new or used (if used, in good condition), approved by Engineer. Mobile field office

- trailer(s) shall be, specifically designed for use as construction site field office and complying with requirements of this Section.
2. Provide skirting (between bottom of trailer to ground) around perimeter of each mobile field office trailer.
 3. Supplier: Subject to compliance with the Contract Documents, provide Engineer's field office by one of the following:
 - a. Pac-Van division of United Rentals.
 - b. WillScot Modular Space Solutions.
 - c. Or equal.

2.2 UTILITIES AND ENVIRONMENTAL CONTROLS FOR FIELD OFFICE

A. Utilities for Engineer's Field Office – General:

1. Comply with Section 01 51 05 - Temporary Utilities.
2. Should actions of utility owner(s) delay completion of Engineer's field office, Contractor shall provide temporary electricity, heat, water, sanitary facilities, and communications service as necessary at no additional cost to Owner.

B. Provide the following for Engineer's field office:

1. Electrical System and Lighting:
 - a. Electric service as required, including paying all costs. Provide electrical submeter if electric service is obtained from Owner's system.
 - b. Electrical systems shall comply with Laws and Regulations.
 - c. System suitable for 120/240 volt AC, single phase, 60 Hertz service. Provide 120-volt AC, single-phase, 60 Hertz power to convenience receptacles in Engineer's field office. Provide transformers and other materials and equipment as necessary.
 - d. Electrical system components, including circuit breakers, cabling, convenience receptacles, switches, and lighting fixtures and luminaires, shall be Underwriters Laboratories, Inc. (UL) approved.
 - e. Electric circuits shall be protected by circuit breakers. Fuses are unacceptable. Provide circuit breaker on incoming electric service to Engineer's field office.
 - f. Not less than 13 wall-mounted, duplex convenience receptacles on interior of each structure comprising Engineer's field office. Provide four per room plus one in restroom.
 - g. Appropriate strike plate for each wall switch and convenience receptacle.
 - h. Interior lighting of not less than 100 foot-candles at desktop height.
 - i. Exterior, wall-mounted lighting at each entrance to field office, not less than 250 watts (equivalent) each.
 - j. Exterior security lighting for Engineer's field office's parking area. Provide one, 1,000-watt (equivalent), pole-mounted fixture with photocell control.
2. Heating, Ventilating, and Air Conditioning:
 - a. Provide automatic heating to maintain indoor temperature in field office of not less than 70 degrees F in cold weather. Provide fuel and pay utility costs.
 - b. Automatic cooling to maintain indoor temperature in field office of not greater than 75 degrees F in warm weather.
 - c. Provide wall-mounted thermostat for controlling heating and air conditioning.
 - d. Functioning ventilation system for field office with number of air changes in accordance with Laws and Regulations.

2.3 FURNITURE AND FURNISHINGS FOR FIELD OFFICE

A. Furniture: Provide in Engineer's field office at the Site the following furniture:

1. Desks: 1 5-drawer desks, each with desktop surface five feet long by 2.5 feet wide, with not less than one file drawer per desk, suitable for storing 8.5-inch by 11-inch documents. When Engineer's field office is mobile trailer-type structure, built-in desks are acceptable when required drawers are provided.
 2. Chairs:
 - a. Desk Chairs: Two new or used (in good condition) five-point, high backed, cushioned swivel chairs with seat-height adjustment. Chairs without wheels or with torn or holed cushions, backs, or arms are unacceptable.
 - b. Side Chairs: Two side chairs with arm rests and padded seats and backs.
 - c. Folding Chairs: 4 sturdy metal folding chairs without arm rests.
 3. Tables:
 - a. One new or used (in good condition) folding tables, each eight feet long by 2.5 feet wide.
 4. Drawing Racks: One] drawing rack(s), each capable of holding not less than three full-sized paper sets of the Drawings.
 5. File Cabinets: One 4-drawer file cabinets.
 6. Storage Cabinet: One 2-door storage cabinet.
 7. Shelving or Bookcase: Provide not less than 6 feet of shelf length, not less than 12 inches deep.
- B. Furnishings: Provide in Engineer's field office at the Site the following furnishings:
1. Ingress/Egress Furnishings: Provide the following at each ingress/egress to and from Engineer's field office:
 - a. Door mats of suitable size and texture.
 - b. Boot scraper.
 2. Window Coverings: Operable blinds sized for each window in Engineer's field office.
 3. Office Waste Receptacles:
 - a. Two polyethylene waste baskets, each with capacity of not less than seven gallons.
 4. Clock: One electric, wall-mounted clock, not less than 10 inches diameter.
 5. Wall-Mounted Furnishings: Installed by Contractor at locations indicated by Engineer's field office personnel:
 - a. One cork tack-boards, each approximately 2.5 feet by three feet, with thumbtacks.
 - b. One white board for use with dry markers (four colors), approximately six feet by three feet, with marker holding tray. Furnish supply of colored markers and eraser for white board.
 6. Safety Equipment for Field Office:
 - a. Provide for each separate structure comprising Engineer's field office the following, in accordance with Laws and Regulations and manufacturer's published instructions:
 - 1) One wall-mounted, 10-pound ABC dry powder fire extinguisher, upright and fully charged, in an easily accessible location, with signage.
 - 2) Ceiling-mounted smoke detectors with supply of batteries for each.
 - 3) Carbon monoxide detector with power supply.
 - b. Provide the following for Engineer's field office, regardless of the quantity of structures comprising field office:
 - 1) One ANSI/ISEA Z308.1, Class B first aid kit, Type III or Type IV, in weatherproof case, for Engineer's sole use.
 - 2) One OSHA, "Employee Right to Know" Poster, prominently displayed.
 - 3) One weather radio.
 - 4) One automatic external defibrillator (AED) kit, rescue-ready, in appropriate, wall-mounted cabinet (installed by Contractor at location approved by Engineer) with

“AED” signage. Product and Manufacturer: Zoll AED Plus, or equal. Upon removal of Engineer’s field office from the Site, defibrillator and accessories shall remain Contractor’s property.

7. Personal Protective Equipment for Visitors: Furnish the following:
 - a. Hard Hats: Four, each with full brim, of fiberglass or thermoplastic; each with ratchet suspension; white in color.
 - b. Safety Glasses: Four, each with clear lenses, polycarbonate, anti-fog and anti-scratch coating, suitable to fit over personal eyewear.
 - c. Reflective Safety Vest: Four, each of polyester mesh or other material acceptable to Engineer, color to be high-visibility orange, with one-inch-wide reflective tape, one-size-fits-all design.
 - d. Earplugs: Supply of foam, disposable earplugs. Promptly resupply when stock is depleted.
8. Speaker Phone for Conference Area:
 - a. Description: Furnish speaker phone for conference area in Engineer’s field office. Speaker phone shall be suitable for use with computer conferencing platforms such as Zoom, Microsoft Teams, Cisco WebEx, and Google Meetings, without connecting to telephone landline.
 - b. Manufacturer and Product: Jounvo JV801 USB Speakerphone; or equal.
 - c. Equipment:
 - 1) Intelligent noise cancelation.
 - 2) Microphone: 15-foot pickup radius.
 - 3) Speaker: Adjustable volume control.
 - 4) Connection: USB or Bluetooth connection to computer.
 - d. Accessories:
 - 1) Provide with cables necessary for operation.
 - e. Upon removal of Engineer’s field office from the Site, conference area speaker phone shall remain Contractor’s property.
9. Temperature and Humidity Monitor:
 - a. Provide temperature and humidity monitor for Engineer’s field office, with sensor installed outdoors in shade and approximately five feet above ground, and display installed inside Engineer’s field office.
 - b. Manufacturer and Product: Provide Fisher Scientific “Traceable Remote Alarm RH/Temperature Monitor” (Catalog No. 14-649-84); or equal.
 - c. Unit shall display daily minimum and maximum temperature and current temperature, and be capable of displaying daily minimum and maximum relative humidity and current relative humidity, and have audible alarm and adjustable alarm setpoints.
10. Water Cooler and Potable Water Supply:
 - a. Provide five-gallon bottled water with electric cooler dispenser.
 - b. Provide supply of potable, bottled water suitable for dispenser for duration of Project, together with supply of disposable cups.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Location:

1. Locate Engineer’s field office in accordance with Section 01 14 19 - Use of Site, other relevant provisions of the Contract Documents, and decisions made during site mobilization discussions at the preconstruction conference.
2. Provide Engineer’s field office nearby Contractor’s field office.

3. Provide field office with convenient, nearby parking for Engineer, in accordance with Section 01 55 13 - Vehicular Access and Parking.
4. Location of Engineer's field office shall be acceptable to Engineer.

B. Preparation:

1. Prepare the site where Engineer's field office will be installed as necessary and required by the Contract Documents. Minimize extent of site disturbance for Engineer's field office. Where site preparation for Engineer's field office results in disturbance of existing ground cover, comply with Laws and Regulations, required permits, and requirements of the Contract Documents regarding soil disturbances and temporary erosion and sediment controls.
2. Provide firm, compacted subgrade for Engineer's temporary field office.
3. Provide temporary utilities in accordance with Section 01 51 05 - Temporary Utilities, and requirements of utility owner.

C. Installation:

1. Install Engineer's temporary field office and related facilities in accordance with Laws and Regulations. Install Engineer's field office level and in structurally sound manner.
2. Install materials and equipment, including prefabricated structures, in accordance with manufacturer's instructions.
3. Verify operation of all systems, including electrical power supply to lighting and convenience receptacles in field office; proper operation of field office's heating, ventilating, and air conditioning system; proper plumbing with freeze protection (where necessary); and proper operation of all other equipment provided by Contractor for Engineer's field office.
4. Install in Engineer's field office furniture, furnishings, equipment, and appurtenances required in this Section. Install at locations directed by or otherwise acceptable to Engineer.
5. Remove from Engineer's field office packing materials and boxes for furniture, furnishings, and equipment.
6. Where furniture, furnishings, and equipment provided by Contractor will become Owner's property, temporarily store original packaging and boxes for such items and deliver such items to Owner in such boxes and packaging, where appropriate.

3.2 MAINTENANCE, CLEANING, AND SUPPLIES

A. Maintenance Services: Provide the following maintenance services for Engineer's field office, from establishment of field office until its removal:

1. Maintenance and Repairs:
 - a. Immediately and properly remedy malfunctioning, damaged, leaking, or defective field office structure, site improvements, systems, and equipment.
 - b. Provide supplies for Engineer's field office electronic equipment. Arrange and pay for maintenance on Contractor-furnished electronic equipment, including copier.
 - c. Promptly provide snow and ice removal for Engineer's field office, including vehicle parking area, walkways, and stairs and landings.
2. Cleaning:
 - a. Provide continuous maintenance of and janitorial service for Engineer's field office and sanitary facilities.
 - b. Clean only when Engineer's employee or representative is present in Engineer's field office.
 - c. Clean Engineer's field office not less than once per week. During weekly cleaning, clean windows of Engineer's field office inside and out and vacuum clean window blinds. Sweep or vacuum-clean (while minimizing airborne dust) Engineer's field office's floors not less than each weekday, or more frequently when site conditions are such that dirt or mud is frequently tracked into Engineer's field office.
 - d. Clean and wax (as appropriate) flooring every six months.

3. Waste Disposal:
 - a. Properly dispose of trash and waste as needed, not less than twice per week.
 - b. Properly handle and dispose of recyclables. Do not dispose of recyclables as trash.
 - c. Dispose of other waste, if any, as necessary and required, to avoid creation of nuisances and adverse environmental effects. Properly dispose of electronic waste, when necessary, at proper waste receiving facility.
 - d. Dispose of waste from Engineer's field office in accordance with Laws and Regulations.
- B. Consumables: Provide the following consumables as needed:
 1. Toner and ink cartridges for copiers and printers, as required.
 2. Paper supplies for copiers and printers. Always maintain in Engineer's field office not less than one ream of each size of paper for which copiers and printers are capable.
 3. Dry markers in four colors, and white board eraser set. Replace markers when exhausted or misplaced.
 4. Paper towels, anti-bacterial liquid soap, toilet tissue, and cleaning supplies for field office restroom.
 5. Bottled water suitable for water cooler. and disposable cups.
 6. Coffee supplies, including coffee, filters, cups, sugar, alternative sweetener(s), creamer, and stir-sticks.
 7. Batteries for smoke detectors and other battery-powered items furnished by Contractor.
 8. Replace fire extinguishers upon expiration.
 9. Supply of disposable ear plugs for visitors.
 10. Not less-often than monthly, inspect first-aid kit and inventory items consumed or used and remove items at or near their expiration date. Promptly replace and restock consumed and expired items.

3.3 REMOVAL AND RESTORATION

- A. Removal:
 1. Do not remove Engineer's field office until after Substantial Completion of the entire Work, unless otherwise approved by Engineer.
 2. On date acceptable to Engineer, fully remove Engineer's field office and restore areas prior to final inspection.
 3. When required by the Contract Documents to deliver to Owner or facility manager certain equipment provided for Engineer's field office, carefully remove such items, return to original boxes, and deliver to Owner or facility manager (as applicable) at location indicated by Owner or facility manager. Deliver such items complete with all accessories and manufacturer's operation and maintenance instructions.
- B. Restoration:
 1. Restore areas occupied by Engineer's field office and related facilities. Restore areas damaged or disturbed during installation, maintenance, and removal of Engineer's field office and related facilities.
 2. Restore to condition in accordance with the Contract Documents. If not expressly required otherwise, restore to preconstruction condition.
 3. Restore subject to approval of the owner of affected property. Remedy damage in accordance with Section 01 71 33 - Protection of the Work and Property, and other provisions of the Contract Documents.

END OF SECTION

SECTION 01 52 13
CONTRACTOR'S FIELD OFFICE AND SHEDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for:
 - a. Contractor's field office at the Site.
 - b. Contractor's storage and work sheds.
 - c. Maintenance and removal of Contractor's field offices and sheds and associated restoration.
- B. Scope:
 - 1. Contractor shall provide temporary field office for Contractor's use during the Work.
 - 2. Provide required temporary storage and work sheds.
 - 3. Obtain and pay for required permits and utilities.
- C. Related Requirements:
 - 1. Section 01 11 00 - Summary of Work.
 - 2. Section 01 14 19 - Use of Site.
 - 3. Section 01 51 05 - Temporary Utilities.
 - 4. Section 01 66 00 - Product Storage and Handling Requirements.
 - 5. Section 01 71 23 - Field Engineering.
 - 6. Section 01 71 33 - Protection of the Work and Property.
 - 7. Section 01 78 39 - Project Record Documents.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with Owner, facility manager (if other than Owner), other contractors, and others using the Site, location of field offices and sheds, including contracts and projects indicated in Section 01 11 00 – Summary of Work.
- B. Staffing:
 - 1. Not less than one Contractor staff member shall be reasonably present at, or in reasonable proximity to, Contractor's field office during normal working hours when work is in progress.
 - 2. When Contractor's staff are absent from, and not within reasonable proximity to, Contractor's field office, provide clearly legible sign, each entrance to Contractor's field office, indicating specific location onsite of Contractor's site superintendent, together with (a) valid mobile phone number of Contractor's site superintendent, and (b) Contractor's 24-hour emergency contact telephone number.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S FIELD OFFICE

- A. Structure:
 - 1. Provide for Contractor's field office structurally sound, weathertight, temporary structures in good condition, complying with Laws and Regulations, and suitable for the intended purpose and environment.

2. Where field office and sheds will be occupied, whether regularly or on an interim basis, comply with Laws and Regulations governing accessibility, egress, fire detection and prevention, and other Laws and Regulations related to health and safety.
 3. Size and layout of Contractor's temporary field office and sheds to be determined by Contractor and appropriate for Contractor's purposes. .
- B. Temporary Utilities and Related Items – Materials and Equipment:
1. Provide materials and equipment for temporary utilities, temporary lighting, temporary control of temperature and ventilation, temporary fire protection, temporary sanitary facilities, and temporary first-aid facilities, in accordance with Section 01 51 05 – Temporary Utilities.
- C. Furnishings and Equipment:
1. Sign for Field Office:
 - a. Provide on exterior of Contractor's field office, at location plainly visible for visitors, an identification sign displaying Contractor's company name.
 - b. Maximum size of sign shall be four feet by three feet.
 - c. Provide highly-visible, plainly legible, text on contrasting background color.
 - d. Sign shall be suitable for outdoor use for the duration of the Project.
 2. Conference Facilities:
 - a. Provide in Contractor's field office conference area with conference table and chairs sufficient for 12 people, unless Contractor requires greater space and furniture for Contractor's purposes.
 3. Provide other furnishings and equipment deemed necessary and appropriate by Contractor.
 4. Personal Protective Equipment for Use by Visitors:
 - a. Furnish and maintain at Contractor's field office 610 protective helmets ("hard hats" and other, appropriate personal protective equipment deemed necessary by Contractor, for use by visitors to the Site.

2.2 CONTRACTOR'S STORAGE SHEDS AND WORK SHEDS

- A. Storage and Work Sheds – General:
1. Provide storage and work sheds sized, furnished, and equipped to accommodate personnel, materials, and equipment used in the Work, including temporary utility services and facilities necessary for environment and sufficient for personnel, materials, and equipment.
 2. Provide in accordance with Laws and Regulations.
 3. Storage sheds used for storing materials and equipment to be incorporated into the Work shall comply with Section 01 66 00 – Product Storage and Handling Requirements, and other requirements of the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location:
1. Locate Contractor's field office and sheds in accordance with Section 01 14 19 – Use of Site, other relevant provisions of the Contract Documents, and decisions made during site mobilization discussions at the preconstruction conference.
- B. Installation:
1. Install Contractor's temporary field office, sheds, and related facilities in accordance with Laws and Regulations.
 2. Install materials and equipment, including prefabricated structures, in accordance with manufacturer's instructions.

3. Provide temporary utilities in accordance with Section 01 51 05 – Temporary Utilities, and requirements of utility owner.
- C. Provide the following in Contractor's field office at the Site:
 1. Not less than one complete set of the Contract Documents, Submittals approved or accepted (as applicable) by Engineer, Engineer's interpretations and clarifications, copies of Contractor's daily field reports in accordance with Section 01 71 23 - Field Engineering, all necessary and required safety data sheets, copies of documents comprising Contractor's safety program, and copies of applicable permits issued for the Work by authorities having jurisdiction, for ready reference by interested persons,
 2. In addition to the reference set of Contract Documents, comply with Section 01 78 39 – Project Record Documents and provisions of the General Conditions, as may be modified by the Supplementary Conditions, regarding Project record documents.

3.2 MAINTENANCE

- A. Clean and maintain field offices and sheds as necessary.
- B. Provide consumables as necessary.

3.3 REMOVAL AND RESTORATION

- A. Removal:
 1. Do not remove temporary field offices and sheds until after Substantial Completion of the entire Work, unless otherwise approved by Engineer.
 2. Fully remove field offices and sheds and restore areas prior to final inspection.
- B. Restoration:
 1. Restore to preconstruction conditions areas damaged by Contractor while installing and using temporary field offices and sheds, subject to approval of the owner of affected property. Remedy damage in accordance with Section 01 71 33 - Protection of the Work and Property, and other provisions of the Contract Documents.

END OF SECTION

This page intentionally left blank.

SECTION 01 55 13
VEHICULAR ACCESS AND PARKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for:
 - a. Contractor's access to the Site.
 - b. Contractor's use of existing access roads and parking areas.
 - c. Traffic controls for access roads and parking areas.
 - d. Maintenance of vehicle access roads and parking areas.
 - e. Offsite haul routes.
 - f. Removals and restoration.

B. Scope:

1. Contractor shall provide temporary signage on existing access roads, construction roads, walks, parking areas, and appurtenances necessary and required during the Project for use by Contractor, Owner and facility manager (if other than Owner) and entities for which they are responsible, and emergency vehicles.
2. Temporary access roads and parking areas shall be designed and maintained by Contractor and shall be fully passable to vehicles in all weather conditions.
3. After the entire Project is substantially complete, existing access roads and parking areas may be used by Contractor when such use does not impair or restrict operations at the Site by Owner or facility manager.
4. Contractor shall make arrangement for offsite haul routes and shall comply with restrictions on haul routes imposed by authorities having jurisdiction and the Contract Documents.

C. Related Requirements:

1. Include but are not necessarily limited to:
 - a. Section 01 14 19 - Use of Site.
 - b. Section 01 55 26 - Traffic Control.
 - c. Section 01 57 05 - Temporary Controls.
 - d. Section 01 57 33 - Temporary Security.
 - e. Section 01 71 33 - Protection of the Work and Property.
 - f. Section 01 74 00 - Cleaning.

1.2 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Map of proposed offsite haul routes, together with list of right-of-way owner for each roadway proposed as offsite haul routes and indication of other authorities, if any, having jurisdiction over offsite haul routes. Furnish such Submittal, acceptable to Engineer, prior to furnishing the Submittals indicated immediately below this paragraph.
2. Written permit or permission for use of offsite haul routes, issued by authorities having jurisdiction. Furnish such Submittals acceptable to Engineer prior to commencing use of offsite haul routes.

PART 2 - PRODUCTS

2.1 TEMPORARY ACCESS ROADS AND PARKING AREAS

A. Materials:

1. Temporary access roads and parking areas shall be of materials that are either new or of good quality and sufficient for the intended purpose, load-bearing capacity, and frequency and duration of use.
2. Use materials that limit emissions of dust to be consistent with air quality Laws and Regulations and to avoid creating nuisances, inconvenience, and undue additional maintenance requirements onsite, on adjacent properties, and at downwind properties.
3. Where deemed necessary by Contractor, provide temporary geotextile or other appropriate materials to stabilize subgrade and subbase of temporary access roads and parking areas.

2.2 TEMPORARY TRAFFIC CONTROLS FOR ACCESS ROADS AND PARKING AREAS

- A. Traffic controls shall comply with requirements of authorities having jurisdiction. When such authority is Owner or facility manager (if other than Owner), and no other applicable requirements are indicated in the Contract Documents or applicable permits, comply with:
1. Standard specifications of the associated state or provincial (as applicable) department of transportation; and
 2. Manual of Uniform Traffic Control Devices (MUTCD), by the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA).

2.3 TEMPORARY ACCESS GATES

- A. Temporary Access Gates – General:
1. Provide temporary gates appropriate for construction of the Project and passage of necessary construction vehicles, construction equipment and machinery, deliveries of temporary facilities, and deliveries of materials and equipment to be incorporated into the Work.
 2. Temporary Security Fencing: Comply with Section 01 57 33 - Temporary Security.

PART 3 - EXECUTION

3.1 ACCESS TO THE SITE

- A. Site Access – General:
1. Light Vehicles:
 - a. Access to Site for Contractor's workers' personal vehicles and Contractor's light vehicles (including Subcontractors and Suppliers) shall be via the main gate to scale house (referenced herein as, "light vehicle gate"). Post temporary signage at this gate reading, "Project Staff Entrance" or other wording acceptable to Engineer.
 - b. Weight limit for access via the light vehicle gate is a total loaded vehicle weight of five tons.
 2. Heavy Vehicles:
 - a. Contractor's construction equipment and vehicles that exceed the weight limit for or exceed the space available at the light vehicle gate, and deliveries of materials and equipment to be incorporated into the Work, shall be via the locked gate off Rocky Ford Road (referenced herein as, "heavy vehicle gate") Post temporary signage at this gate reading, "Project Truck Deliveries" or similar wording acceptable to Engineer.
 - b. Weight Limit: Access to the Site via the heavy vehicle gate is limited to a maximum weight of 10 tons per axle.

3.2 USE OF EXISTING ACCESS ROADS AND PARKING AREAS

- A. Existing Access Roads and Parking Areas – General:
1. Use of Existing Access Roads:
 - a. Contractor is allowed to use Owner's existing access roads, starting on the Effective Date of the Contract and after complying with other Contract requirements relative to starting the Work at the Site.
 2. Existing Parking Areas for Use by Contractor:

- a. Contractor is allowed use of the existing lots for parking of Contractor's workers' vehicles and construction vehicles, as designated on the Construction Drawings. If designated existing parking area is insufficient for Contractor's purposes, either provide temporary parking at the Site or parking at offsite location. Do not park outside of designated parking areas.
3. Restrictions:
 - a. Prevent interference with traffic on existing access roads and parking areas. Always keep access roads and entrances serving the Site clear and available to Owner, facility manager (if other than Owner), and their respective employees, suppliers, and consultants; emergency vehicles; and other contractors.
 - b. Do not use access roads or Site entrances for parking or storage of materials or equipment.
 - c. Obey posted speed limits. If the Site has no posted speed limit, restrict traffic of Contractor's personnel, construction vehicles and equipment, deliveries, and haul-trucks to maximum speed of 15 miles per hour on access roads at the Site.
 - d. Schedule deliveries to minimize use of existing access roads and Site entrances.
 - e. Use only rubber-tire vehicles on existing roads and parking areas. Do not use tracked (caterpillar-type) vehicles or equipment on existing pavement unless such pavement will be replaced by Contractor. Maintain existing pavement for safe access by Owner, facility manager (if other than Owner), and their respective employees, suppliers, and consultants; emergency vehicles; and other contractors.
 - f. Remedy damage to existing access roads and parking areas caused by Contractor's operations.
4. Contractor shall indemnify and hold harmless Owner, facility manager (if other than Owner), Engineer, and their respective consultants and subcontractors from expenses and losses caused by Contractor's operations over existing access roads and parking areas.

3.3 TEMPORARY ACCESS ROADS AND PARKING AREAS

A. Temporary Access Roads and Parking Areas – General:

1. Show proposed locations of temporary access roads and parking areas on site plan Submittal required in Section 01 14 19 - Use of Site. Indicate number of proposed parking spaces and changes (if any) to site maintenance procedures. Indicate the scheduled dates the temporary access roads and parking areas will be established, in use, and removed. Indicate proposed measures for restoring such areas after removal of temporary access roads and parking areas.
2. Where temporary access roads or parking areas connect to existing public road or highway, obtain approval of right-of-way owner prior to constructing the associated access road or connection to the existing pavement. Comply with Laws and Regulations and requirements of authorities having jurisdiction.
3. Provide temporary lighting of temporary access roads and parking areas in accordance with the Contract Documents.

B. Temporary Access Roads and Parking in Areas Different from Permanent Pavement:

1. Provide temporary access roads and parking areas adequate to support and withstand traffic loads during the Project. Locate temporary access roads and parking areas within the construction limits shown or indicated in the Contract Documents.
2. Perform clearing and grubbing as required and properly dispose of resulting materials. Stockpile at the Site existing topsoil appropriate for use in restoring disturbed areas.
3. Provide reasonably-level, graded, well-drained subgrade of satisfactory soil material, compacted to not less than 95% of maximum dry density in the upper 6 inches.
4. To support loads and provide separation between subgrade and subbase materials, provide geosynthetic separation fabric for all temporary access roads and parking areas outside of locations of permanent pavement.
5. Subbase:

- a. Provide crushed stone subbase material not less than 6 inches thick, roller-compacted to a level, smooth, dense surface.
 - b. Subbase for temporary access roads and parking areas traveled by construction vehicles shall be adequate for loads and traffic served.
- C. Temporary Access Roads and Parking in Same Areas as Permanent Pavement:
 - 1. Provide temporary access roads and parking areas adequate to support and withstand traffic and construction loads during the Project. Locate temporary access roads and parking areas in same locations as permanent access roads and parking areas. Extend temporary access roads and parking areas, within construction limits shown or indicated in the Contract Documents, as necessary for construction operations.
 - 2. Coordinate elevations of temporary access roads and parking areas with permanent roads and parking areas.
 - 3. Prepare subgrade, subbase, and base for temporary access roads and parking areas in accordance with the Contract Documents' requirements for areas of permanent pavement.
 - 4. Provide geosynthetic separation fabric on compacted subgrade for subbase support and separation of subbase and subgrade materials.
 - 5. Re-condition granular subbase of temporary access roads and parking areas, including removing and properly disposing of granular material that has become intermixed with soil, re-grading, proof-rolling, compacting, and testing.

3.4 TRAFFIC CONTROLS FOR ACCESS ROADS AND PARKING AREAS

- A. Onsite Traffic Controls – General:
 - 1. Provide temporary traffic controls at intersections of temporary access roads and parking areas with each other, including intersections with other temporary access roads, intersections with public roads, and intersections with permanent access roads at the Site.
 - 2. Provide temporary warning signs on permanent access roads, and provide temporary stop signs for traffic on temporary access roads where required and at entrances to permanent pavement.
 - 3. Comply with requirements of authorities having jurisdiction. When such authority is the Owner or facility manager (if other than Owner), and no other requirements are indicated in the Contract Documents or applicable permits, comply with the standard specifications of the applicable state or provincial (as applicable) department of transportation and the MUTCD.
 - 4. Provide temporary signs indicated maximum allowable speed limit on temporary access roads.
 - 5. Comply with Section 01 55 26 - Traffic Control.

3.5 MAINTENANCE OF VEHICLE ACCESS AND PARKING AREAS

- A. Maintenance of Vehicle Access and Parking Areas – General:
 - 1. Maintain temporary access roads and parking areas to continuously provide at the Site access for construction vehicles and trucks, Owner and facility manager's (if other than Owner) vehicles, deliveries for Owner and facility manager, emergency vehicles, and parking areas for Owner's and facility manager's personnel.
 - 2. Public roads shall be passable at all times unless a road closure is allowed in writing by authority having jurisdiction.
 - 3. Refer to cleaning and dust control provisions of this Article.
- B. Maintenance of Existing Access Roads and Parking Areas Used by Contractor:
 - 1. Unless otherwise indicated in the Contract Documents, Owner or facility manager (if other than Owner) will perform routine maintenance of access roads and parking areas, existing prior to the start of construction, during the Project. Contractor is responsible for dust control and cleaning existing paved areas used by Contractor.

C. Maintenance of Temporary Access Roads and Parking Areas:

1. Contractor is fully responsible for maintaining temporary access roads and parking areas until either; (a) temporary access roads and parking areas are removed, or (b) when Owner has indicated in writing that temporary access roads and parking areas may remain following final payment, Contractor shall maintain such areas until final payment becomes due under the Contract.
2. When temporary access roads or parking areas become muddy, remove the mud and soil material down to hard, competent surface as often as necessary. Avoid nuisances and unnecessary tracking of mud and dirt onto permanent pavement.
3. When granular material of temporary access roads and parking areas without hard surfacing becomes intermixed with soil, or when temporary access roads otherwise create a nuisance, remove intermixed granular-and-soil material and replace with clean granular material as necessary and required.
4. Provide snow and ice removal for temporary access roads and parking areas. Properly dispose of such materials, in accordance with Laws and Regulations. Do not create traffic hazards, such as areas of reduced visibility, caused or exacerbated by locations of displaced snow and ice. Dispose of such materials off of existing pavement and off of temporary access roads and parking areas.

D. Cleaning and Dust Control – All Vehicle Access and Parking Used by Contractor:

1. Cleaning:
 - a. Clean paved surfaces over which construction vehicles, construction equipment, and construction machinery travel. Perform cleaning not less-often than indicated in Section 01 74 00 - Cleaning, or more frequently as directed by Engineer, by mechanical sweeping or other means acceptable to Engineer.
 - b. Clean paved areas using vacuum powered street sweeper, when visible soil materials are tracked onto pavement.
 - c. Clean the following surfaces:
 - 1) Roads within limits of the Project.
 - 2) Permanent roads at the Site between the Site entrance and work areas, and between the Site entrance and construction parking and areas used for staging, storage, and laydown.
 - 3) Public roads that require sweeping and cleaning due to construction operations.
2. Dust Control:
 - a. Control dust resulting from construction activities to prevent nuisances, violations of air quality Laws or Regulations, and adverse health effects at and adjacent to the Site and in downwind areas.
 - b. Comply with Section 01 57 05 - Temporary Controls.

E. Protection of Underground Facilities:

1. Regarding construction traffic, vehicles, construction equipment and machinery, and parking and protection of Underground Facilities, comply with the General Conditions, as may be modified by the Supplementary Conditions, Section 01 71 33 - Protection of the Work and Property, and other requirements of the Contract Documents.
2. Where existing Underground Facilities are close to the ground surface over which construction equipment or machinery, other construction vehicles, or traffic will pass, protect the Underground Facilities, including providing temporary bridging, as necessary.

3.6 OFFSITE HAUL ROUTES

A. Offsite Haul Routes – General:

1. Where required by Laws or Regulations, or by one or more authorities having jurisdiction, obtain, pay for, and comply with permits and orders of authorities having jurisdiction

regarding use of offsite haul routes. Submit to Engineer copy of each permit or written permission necessary for use of offsite haul routes.

2. Unless expressly allowed otherwise by authorities having jurisdiction or the express provisions of the Contract Documents, to the extent practicable, avoid routing construction traffic through residential areas and other areas sensitive to noise, vibration and vehicle exhaust emissions.
3. Restrict use of offsite haul routes to days and hours of construction allowed in the General Conditions and Supplementary Conditions.
4. Comply with requests of authorities having jurisdiction relative to coordinating construction traffic on haul routes with community events. When such events are held on a recurring basis or are otherwise reasonably foreseeable at the time of the opening of Bids (or, if there were no Bids, on the Effective Date of the Contract), Contractor is not eligible for increases in Contract Price or Contract Time for delays or other inconvenience to the Work associated with this provision.
5. In transporting spoil and waste materials from the Site and transporting materials and equipment to the Site, avoid creating or contributing to potential Hazardous Environmental Conditions. Properly secure loads to prevent airborne particulates, liquids, slurries, and solid matter from discharging from Contractor's vehicles along haul routes. Contractor's responsibilities for Hazardous Environmental Condition caused by Contractor are set forth in the General Conditions, as may be modified by the Supplementary Conditions, and may be further augmented elsewhere in the Contract Documents.

B. Remedy of Damaged Existing Paving:

1. Comply with Section 01 71 33 - Protection of the Work and Property, and other applicable provisions of the Contract Documents.
2. Contractor shall indemnify and hold harmless Owner, facility manager (if other than Owner), Engineer, and their respective consultants and subcontractors from expenses and losses caused by Contractor's operations on offsite haul routes.

C. Project-Specific Haul Routes:

1. Contractor shall arrange offsite haul routes.

3.7 REMOVAL AND RESTORATION

A. Removals: When no longer needed for the Project and prior to eligibility for final inspection:

1. Remove temporary access roads, walks, and parking areas that are not intended for, or acceptable for, integration into permanent pavement. Return areas of temporary access roads, walks, and parking to preconstruction condition unless otherwise required by the Contract Documents.
2. Remove temporary gates, fencing, and traffic controls associated with Contractor's vehicular access and parking areas.
3. Where areas of temporary access roads and parking will be permanently landscaped, remove pavement, granular subbase, geosynthetic materials, soil, and other materials that do not comply with the Contract Documents regarding fill, subsoil, and landscaping.
4. Remove and properly dispose of all materials contaminated with oil, bitumen, or other petrochemical compounds resulting from Contractor's operations, and other substances. These substances are considered contaminants may impair growth of plants and lawns or quality of soil or groundwater.

B. Restoration:

1. Restore to preconstruction conditions existing roads, walks, and parking areas damaged by Contractor, subject to approval of the owner of affected roads, walks, and parking areas. Remedy damage in accordance with Section 01 71 33 - Protection of the Work and Property, and other provisions of the Contract Documents.

END OF SECTION

This page intentionally left blank.

SECTION 01 55 26
TRAFFIC CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for traffic control during construction, including:
 - a. Coordination with owners of streets, highways, and other travelled ways affected by the Project and coordination with owners of properties at or adjacent to the Site regarding traffic control.
 - b. Traffic controls for general vehicular traffic affected by the Work.
 - c. Traffic controls for pedestrians and other non-vehicular traffic affected by the Work.
 - d. Temporary bridging over excavations in travelled ways.
 - e. Traffic control personnel.
 - f. Maintenance of traffic controls.
 - g. Removal of traffic controls.

B. Scope:

1. Contractor shall provide all labor, materials, tools, equipment, services, incidentals, and pay all expenses necessary and required to keep all streets, highways, and other travelled ways open for passage of traffic and pedestrians during the Project, unless: (1) otherwise approved by owner of the street, highway, or travelled way, and Engineer, or (2) as expressly allowed by the Contract Documents.

C. Related Requirements:

1. Include but are not necessarily limited to:
 - a. Section 01 55 13 - Vehicular Access and Parking.
 - b. Section 01 57 05 - Temporary Controls.
 - c. Section 01 71 33 - Protection of the Work and Property.
 - d. Section 01 74 00 - Cleaning.

1.2 REFERENCES

A. Terminology:

1. The following terminology, although not indicated with initial capital letters, has the following meaning in this Section:
 - a. "Maintenance and protection of traffic" and "traffic control":
 - 1) "Maintenance and protection of traffic" and "traffic control", whether singular or plural, have the same meaning and, unless expressly indicated otherwise, refer to temporary measures provided by Contractor to control, maintain, and safeguard vehicular traffic, pedestrians, bicycles, and other traffic during construction.
 - 2) "Traffic controls" are signage, barriers, barricades, signal and warning lights, and other measures provided by Contractor for controlling other than routine use of existing and temporary access roads and parking areas by construction traffic.
 - 3) "Traffic control" includes, but is not necessarily limited to, traffic controls for: (a) excavations, (b) construction vehicle parking areas, (c) storage and laydown areas for materials and equipment to be incorporated in the Work, and (d) other work-related areas; in, opening into, or adjacent to streets, highways, or other travelled ways.
 - b. "Traffic" means any and all users of the subject street, highway, or other travelled way, including sidewalks, bicycle paths, and similar facilities. "Traffic" includes motor

vehicles of all types, including automobiles, motorcycles and similar vehicles, trucks, busses, light rail, mobile equipment, and others; pedestrians; bicyclists; and others using the travelled way or right-of-way.

- B. Reference Standards: Standards referenced in this Section include, but are not necessarily limited to, the following:
1. Unless otherwise shown or indicated in the Contract Documents, traffic controls shall be in accordance with:
 - a. Part 6 ("Temporary Traffic Control") of the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), by the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA).
 2. In the event of conflict between the standard specifications referenced above and the MUTCD, the referenced standard specifications will govern.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Owner of Street, Highway, or Travelled Way:
 - a. Coordinate with owner of each street, highway, and other travelled way affected by the Work and the Project and obtain from such owner requirements for traffic control during construction.
 - b. Obtain and pay for work permits, street opening permits, and other permits required by the owner of the street, highway, or other travelled way.
 - c. Give written notices required by the owner of the street, highway, or other travelled way.
2. Notice to Emergency Services:
 - a. Give required advance, oral and written notices to fire departments, police departments having jurisdiction, ambulance services, and other emergency services as applicable, of proposed construction operations that may impact or affect emergency services' ability to perform their respective functions.
 - b. Give such notices as indicated immediately below for notice to adjacent properties.
3. Notice to Adjacent Properties:
 - a. Give reasonable advance, written notice to owners and occupants of private property directly affected by construction operations, including properties adjacent to the Site where such property's vehicular or pedestrian access will be affected by the Project.
 - b. Give such notice not less than five days prior to when such property will or may be affected by construction operations and again not less than 24 hours prior to such property being affected by construction operations.
 - c. Such notices to properties shall clearly indicate the intended dates the property will be affected and the scheduled end-date of such activity, and a brief summary of the ways the property will be affected during the Project's construction. Such notices shall be on Contractor's letterhead and shall indicate the Project name, Owner, Owner's project or contract number (if any), and Contractor's contact person with telephone number and office hours.
4. Coordinate traffic controls with requirements of the following:
 - a. Section 01 55 13 - Vehicular Access and Parking.
 - b. Section 01 71 33 - Protection of the Work and Property, regarding temporary barriers.
 - c. Section 01 74 00 - Cleaning.

1.4 QUALITY ASSURANCE

1.5 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Traffic Control Plan: Detailed plan, procedures, and sequencing for traffic control during construction.

- a. The Submittal shall clearly indicate the following:
 - 1) Traffic staging plan, and construction sequencing as applicable to traffic control during construction. Coordinate with the Progress Schedule accepted by Engineer.
 - 2) Product data, including Supplier's catalog information, standard detail drawings, and specifications, for temporary barriers, barricades, signs, signals and warning lights, illumination devices, and other items used for traffic control during construction.
 - 3) Materials and procedures for providing access to properties along the route of the proposed traffic controls.
 - 4) Identity and pertinent qualifications of the entity, such as Subcontractor or Contractor, that will select, install, maintain, and remove traffic controls.
 - 5) Number and types of personnel dedicated to traffic control during construction, including flaggers. Include documentation of flaggers' training and qualifications. Indicate where number of personnel will vary by work shift or during certain hours.
 - 6) Evidence of plan acceptance from authorities having jurisdiction, including owner of each street, highway, and other travelled ways that will have traffic controls during construction.
 - 7) Proposed signage, including layout, colors, text, quantity, and locations, for advising the public in advance of implementing traffic controls.
- b. Unless expressly allowed otherwise by the Contract Documents, traffic control plan Submittal shall cover all traffic control during construction for the entire Project. Do not furnish separate, staged traffic control plan Submittals.
- c. Furnish acceptable traffic control plan Submittal not less than 28 days prior to installing traffic controls.
- d. Submit updates to the traffic control plan as necessary.
- e. Engineer's or Owner's comments on or acceptance of traffic control plan Submittal is only for the limited purpose of endeavoring to verify compliance with the Contract Documents and in no way imposes on Owner, Engineer, or any of their respective consultants or subcontractors, any responsibility for construction means, methods, procedures, techniques, or sequences, or the safety and protection measures and programs incident thereto, or any of Contractor's other responsibilities under the Contract. Engineer's and Owner's review is in no way for benefit of Contractor or anyone for whom Contractor is responsible.

1.6 FIELD CONDITIONS

A. Existing Conditions:

1. As shown on Construction Drawings

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT FOR TRAFFIC CONTROL DURING CONSTRUCTION

A. Materials and Equipment Used for Traffic Control:

1. Materials and equipment used for traffic control during construction shall comply with the reference specifications indicated in Paragraph 1.2.B of this Section and the MUTCD.
2. Materials and equipment used for traffic control shall include easily legible, weather-resistant text indicating contact information, including telephone number, for entity providing and maintaining traffic controls, for alerts of damage, mislocation, or apparent unsafe traffic control items.

PART 3 - EXECUTION

3.1 TRAFFIC CONTROL – GENERAL

A. General Provisions for Traffic Control:

1. Provide traffic controls, as necessary and required, prior to commencing work in, or adjacent to, streets, highways, and other travelled ways.
 2. Provide traffic controls in accordance with the Contract Documents, applicable permits, requirements of authorities having jurisdiction, referenced standard specifications indicated in Paragraph 1.2.B of this Section, and the MUTCD.
 3. Not less than once per month, check and ensure legibility of contract information on each traffic control device or item, as required in Article 2.1 of this Section.
 4. Traffic controls such as temporary barriers and barricades; channelizing devices such as delineators, traffic cones, traffic barrels, temporary bollards, vertical panels, and similar items; signs (including reflective signs, mobile changeable-message signs, and temporary LED-illuminated signs), temporary signals; warning lights; and temporary illumination shall be prominently but safely positioned and located, be highly visible to traffic and pedestrians, and include provisions for visibility during periods of darkness, reduced light, and reduced visibility such as smoke and fog.
 5. Supplement temporary traffic barriers and barricades with standard delineation pavement markings or channelizing devices for improved daytime and nighttime visibility, when traffic controls channel vehicular traffic.
 6. Keep accessible for use permanent facilities such as hydrants, utility valves, fire alarm boxes, postal boxes, delivery service boxes, existing permanent traffic controls (including signs and signals) as appropriate, and other facilities that may require access or use during construction.
 7. Do not block access to essential facilities including hospitals, emergency services, and the like, and public facilities such as public buildings, public schools, public event venues, recreational facilities open during construction, and similar facilities.
 8. Coordinate traffic controls for commercial and residential access with their respective owners and occupants.
 9. Provide traffic controls suitable for pedestrians and bicyclists with disabilities. Comply with the MUTCD, referenced specifications indicated in Paragraph 1.2.B of this Section, and Laws and Regulations, including the Americans with Disabilities Act (ADA).
- B. Temporary Obstructions of Streets, Highways, and Other Travelled Ways:
1. Do not store materials or equipment to be incorporated into the Work; construction equipment, machinery, or tools; Contractor's vehicles, vehicles owned by construction workers and personnel; or other items, whether on short-term, infrequent basis or on a more-frequent basis, in streets, highways, and other travelled ways. Do not store or locate materials and equipment in rights-of-way or adjacent areas in positions that reduce traffic visibility or otherwise create or exacerbate traffic hazards.
 2. When construction activities necessitate a short-term obstruction of traffic, provide adequate traffic controls, flaggers, and other measures as appropriate. Have such obstructions in place for the shortest duration possible and do not leave such obstructions in place at the end of the work day.
 3. When construction activities necessitate a longer-duration obstruction or partial closure to traffic, provide appropriate temporary barriers and barricades, signage, warning devices, and other appropriate measures for traffic control.
 4. Obstruction of public parking shall be in accordance with requirements of authorities having jurisdiction.
- C. Temporary Closures of Streets, Highways, and Other Travelled Ways:
1. This provision applies to full closure of all traffic or partial closure.
 2. Do not close passage to traffic or pedestrians without approval of authorities having jurisdiction and obtaining necessary permits.
 3. Provide appropriate temporary signage, signals and warning devices, temporary barriers and barricades, detours, and temporary facilities (such as temporary bridges or covered walkways, and other temporary facilities) as necessary.

4. Detours shall be as short as practicable but should generally avoid, when feasible, routing traffic through residential areas and other sensitive areas. Provide appropriate temporary signage to mark detours.
5. Detours and temporary facilities shall be appropriate for the types of traffic (which may include heavy truck traffic or construction equipment), traffic volume, loading, and hours of the day.
6. Closures shall be for shortest duration practical, and passage shall be restored immediately after completion of filling and temporary paving, bridging, or other Work.
7. Obtain approvals and permits needed for full and partial lane closures.
8. Provide all required temporary signage, signals, and warning devices prior to implementing each closure.

3.2 TRAFFIC SIGNS, SIGNALS, AND LIGHTS

- A. Provide and operate temporary traffic signs, signals, and warning lights necessary and required to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by the Project's construction.
- B. Provide temporary traffic signs, signals, and warning lights mounted on temporary barriers, barricades, or standard posts, at the following locations:
 1. Each change of direction of a roadway and at each crossroad.
 2. Detours and areas of hazard.
 3. Parking areas.
 4. Vehicular entrance and exit from each of the Project's construction work areas and construction vehicle and machinery parking and storage areas.
- C. Lighting and Flares: During periods of low visibility provide temporary lights and, where appropriate, flares for the following:
 1. To clearly delineate traffic lanes, to guide traffic, and to warn of hazardous areas.
 2. For use by traffic control personnel directing traffic.
 3. Provide adequate illumination of critical traffic and parking areas.
- D. Power and Fuel:
 1. Provide appropriate power supply for temporary lighting and illuminated devices, whether battery-powered, solar-powered, or temporary generators.
 2. At the end of each work day, check power supplies and fuel supplies and ensure sufficient power and fuel is in place and available for proper traffic control until Contractor's personnel return to the Site
 3. Comply with noise control and air quality control Laws and Regulations and Section 01 57 05 – Temporary Controls.
 4. Locate and position temporary generators to avoid nuisances, such as noticeable emissions, odors, noise, and vibration, and other nuisances, and hazards to traffic, pedestrians, adjacent occupants of buildings and structures, and the public.

3.3 TEMPORARY BRIDGING OVER EXCAVATIONS

- A. Areas of Vehicular Access:
 1. When necessary or requested by owner of the street, highway, or other travelled way, when other traffic controls are removed while excavations remain open, provide temporary bridging over excavations by providing steel plates to allow unobstructed traffic flow.
 2. Size:
 - a. Cover entire length of trench or excavation unless suitable temporary barriers are provided. Each driving lane shall be 15 feet wide unless otherwise acceptable to the owner of the street, highway, or other travelled way.

- b. Width: Plate shall extend for not less than one trench-width onto competent pavement on each side of the trench or excavation.
 - c. Thickness: Suitable for the traffic load.
- 3. Anchorage:
 - a. Mechanically anchor each plate to competent pavement using appropriate quantity of railroad spikes or other suitable anchors.
 - b. Anchor not less than each corner of each plate.
 - c. Head of anchors shall not protrude above top surface of the plate.
 - d. Provide appropriate material to level each plate so that plate is not displaced, and does not wobble or rattle, under traffic loads. Provide additional anchors where necessary.
- 4. Transition to and from Plates:
 - a. Provide asphalt concrete "cutback" placed around edges of plates as ramps for smooth transition from pavement to the plate. Ramps' angle of approach shall be not greater than 1 inch vertical to 12 inches horizontal.
- 5. Excavation Support at Temporary Bridging:
 - a. Provide temporary support of excavations, as necessary for proper support of temporary bridging and traffic loads. Excavation support shall be adequate for excavation depth, soils, groundwater conditions, vibration, and other pertinent considerations.
 - b. Obtain recommendation on type and extent of necessary excavation support from a qualified, experienced professional engineer licensed and registered in the same jurisdiction as the Site. Comply with recommendations of Contractor-hired professional engineer and requirements of owner of the street, highway, or other travelled way.
- B. Sidewalks, Bike Paths, and Other Pedestrian Areas:
 - 1. In sidewalks, bike paths, and other pedestrian areas, provide temporary bridging over excavations of either 1/2 inches thick steel plate or plywood 1-1/8 inches thick.
 - 2. Length and Width: Same as required in this Article for steel plates for vehicle passage.
 - 3. Excavation Support: Same as required in this Article's provision for steel plates for vehicles.
 - 4. Transitions: Provide asphalt concrete "cutback" or other non-displaceable material as ramp for pedestrians and wheeled items such as handcarts, bicycles, and wheelchairs. Angle of ramps shall comply with requirements in this Article for ramps for steel plates for vehicles.
 - 5. If plate is subject to displacement, wobbling, or rattling during use, provide suitable temporary mechanical anchors that do not extend above top surface of the plate.
- C. Vehicular travel over backfilled but unpaved excavations is not allowed, unless Contractor provides temporary surface suitable for vehicles, consisting of not less than 2 inches thick plant mix asphalt concrete paving over not less than 6 inches thick layer of either compacted [select fill subbase or flowable fill (also known as "controlled low-strength material") completely cured, or plates installed over the excavation.
- D. Upon removal of temporary bridging plates, remove all anchors, ramps, and leveling material and completely fill, with non-shrink grout (or other material acceptable to Engineer and owner of street, highway, or other travelled way), all penetrations made for plate anchorages.

3.4 TRAFFIC CONTROL PERSONNEL

- A. Traffic Control Personnel – General:
 - 1. When the Project's construction operations encroach on traffic lanes, furnish qualified, trained, suitably-equipped traffic control personnel as necessary and required for controlling traffic, in accordance with: requirements of authorities having jurisdiction, the referenced specifications indicated in Paragraph 1.2.B of this Section, and Section 6E of the MUTCD.
 - 2. Traffic control personnel shall use appropriate flags, hand signs or mobile signs.
 - 3. Equip traffic control personnel with appropriate personal protection equipment and appropriate communications devices. Traffic control personnel attire shall be highly-visible,

suitable, and shall not create nuisances or distractions to vehicle occupants and pedestrians, and shall not give offense to vehicle occupants, pedestrians, and the public.

4. Conduct of traffic control personnel shall be professional, appropriate, and courteous to vehicle occupants, pedestrians, and the public.

3.5 PARKING CONTROL

A. Parking Control – General:

1. Comply with Section 01 55 13 - Vehicular Access and Parking.
2. Provide appropriate temporary parking for the public, as necessary and required because of the Project's construction operations.

B. Control parking of construction and private vehicles at the Site as follows:

1. Maintain free vehicular access to and through public and private parking areas.
2. Prohibit parking on or adjacent to access roads, and in non-designated areas.
3. Construction vehicles shall possess current vehicle registration and licensure. Do not park or store unregistered vehicles at or adjacent to the Site.

3.6 MAINTENANCE OF TRAFFIC CONTROLS

A. Maintenance of Traffic Controls – General:

1. Properly maintain traffic controls until removal.
2. Relocate traffic controls as the Work progresses.
3. Promptly replace or repair, as appropriate, damaged traffic controls.
4. Ensure adequate power supplies and fuel supplies for traffic controls.
5. Perform manufacturer's recommended routine and preventative maintenance on equipment used for temporary traffic control.
6. Where traffic controls have reduced efficacy or reduced visibility due to accumulations of dirt or foreign matter (including graffiti and vandalism), or exposure to the elements, promptly replace or remedy the subject traffic controls.
7. Maintain traffic controls in operation during adverse weather and climate conditions.

3.7 REMOVAL OF TRAFFIC CONTROLS

A. Duration of Traffic Controls:

1. Prior to Substantial Completion, provide traffic controls at the Site until no longer necessary or required due to the progress of the Work and the Project.
2. After Substantial Completion, provide appropriate traffic controls when Contractor is onsite to perform punch list Work, correction period work, or warranty work.

B. Prior to reopening to traffic, clean streets, highways, and travelled ways in accordance with Section 01 74 00 - Cleaning.

C. When traffic controls are no longer necessary or required, completely remove traffic controls and restore the Site to condition required by the Contract Documents or, when not indicated in the Contract Documents, restore the Site to pre-construction conditions.

D. Store unused traffic control items at an appropriate location that does not adversely affect public or private property or transportation.

E. Completely remove all traffic control items from the Site and adjacent areas prior to final inspection.

END OF SECTION

This page intentionally left blank.

SECTION 01 57 05
TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for temporary controls during construction, including:
 - a. Noise control.
 - b. Dust control.
 - c. Temporary pest and rodent controls.
 - d. Pollution control, including solid waste, water pollution, atmospheric pollution, and other types of pollution.
 - e. Odor control.

B. Scope:

1. Contractor shall provide and maintain materials, equipment, labor, services, and temporary construction as necessary and required to control environmental conditions at the Site and adjacent areas during construction.
2. Contractor shall pay all costs, including fines and civil penalties, if any, for failure to implement and maintain temporary controls in accordance with the Contract Documents and Laws and Regulations. Contractor is not eligible for increase in Contract Price or Contract Times due to failure to comply with requirements for temporary controls.
3. Maintain temporary controls until no longer necessary or required. Provide temporary controls at all times when Contractor is working at the Site.

C. Related Requirements:

1. Include, but are not necessarily limited to, the following:
2. Section 01 14 17 - Mitigation of Construction on the Public.
3. Section 01 35 44 - Spill Prevention Control and Countermeasures Plan.
4. Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit.
5. Section 01 57 33 - Temporary Security.
6. Section 01 74 00 - Cleaning.
7. Section 31 23 00 - Earthwork.
8. Section 31 23 33 – Utilities Trenching and Backfilling.

1.2 SECTION 31 37 00 - STONE REVETMENT (RIPRAP).SUBMITTALS

A. Action Submittals:

1. Submit the following:
 - a. Shop Drawings:
 - 1) Plan for construction staging and maintenance of the Site relative to erosion and sediment controls. Indicate on a site plan approximate areas of planned disturbance of soils and soil cover over time during the Project. For areas not indicated in the Contract Documents as being disturbed and that Contractor proposes to disturb, Shop Drawing shall include proposed erosion and sediment control measures for the additional areas.
 - 2) Location and details of each temporary settlement basin.
 - b. Product Data:
 - 1) Silt fencing materials.

- 2) Other materials proposed for temporary erosion and sediment controls, when requested by Engineer.
- B. Informational Submittals:
1. Submit the following:
 - a. Procedural Submittals:
 - 1) Proposed dust control measure, when Submittal is requested by Engineer.
 - b. Field Quality Control:
 - 1) When requested by Engineer, promptly obtain and submit results of field measurements and field test data substantiating compliance of Contractor's temporary controls with the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS FOR TEMPORARY EROSION AND SEDIMENT CONTROLS

- A. Temporary Erosion and Sediment Control Materials – General:
1. Materials utilized for temporary erosion and sediment controls shall be in accordance with applicable regulatory requirements indicated in this Section's "Quality Assurance" Article, unless otherwise shown or indicated in the Contract Documents.
- B. Silt Fencing Materials:
1. Filter Cloth:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Atlantic Construction Fabrics (ACF) Environmental "Silt Fence".
 - 2) Cherokee Manufacturing "Silt Fence".
 - 3) Hanes Geo Components "Silt Fence".
 - 4) Or equal.
 - b. Height: Not less than two feet.
 - c. Securely fasten filter cloth to wire mesh using ties spaced at maximum intervals of 2 feet on centers, at top and mid-height of wire mesh.
 2. Wire Mesh: Support filter cloth with wire mesh complying with the following:
 - a. Woven wire mesh, 14-gage steel wire, maximum mesh 6 inches x 6 inches.
 - b. Height: Same as filter cloth height.
 - c. Fasten wire mesh to fence supports with wire ties or staples.
 - d. In lieu of wire mesh, Contractor may propose using purpose-manufactured silt fence system with appropriate reinforcing other than wire mesh.
 3. Fence Support Posts:
 - a. Length: Not less than 3 feet each.
 - b. Material: Metal or other acceptable, reasonably durable material with "U", "T", or "I" cross section, or hardwood measuring not less than 1.25 inches by 1.25 inches in cross-section.
- C. Mulch Materials and Soil Stabilization Materials:
1. Mulch shall be non-rotted straw or salt hay.
 2. Soil stabilization emulsions, when used, shall be an inert, eco-friendly chemical manufactured for the specific purpose of erosion control and soil stabilization, applied with mulch or stabilization fibers.
 3. Wood-fiber or paper-fiber, when used, shall be 100% natural and biodegradable.
 4. Erosion control mat or netting shall be biodegradable. Acceptable materials include jute, excelsior, straw, or coconut fiber, and cotton.

D. Materials for Protection of Storm Water Drainage Inlets and Catch Basins Temporary Settlement Basin Materials:

1. Embankment Material: Comply with requirements for general fill in Division 31 Specifications sections on earthwork, excavation, and fill.
2. Provide outfall structure consisting of overflow weir and discharge pipe, and provide emergency spillway, all appropriately sized for storm water discharges.
3. Overflow Weir and Discharge Pipe: Suitably-sized piping of corrugated metal, high-density polyethylene, or other suitable material. Pipe may be new or used; if used, pipe shall be in good condition.
4. Crushed Stone and Riprap:
 - a. Crushed stone shall be NCDOT #57 Stone in accordance with Section 31 23 00 – Earthwork.
 - b. Riprap shall be Class B in accordance with Section 31 37 00 - Stone Revetment (Riprap).

E. Temporary Stone Construction Entrance Materials:

1. Stone:
 - a. Tough, hard, durable stone complying with the following gradation:

Gradation for Temporary Stone Construction Entrance	
Sieve Size	Total Percent Passing
4-IN (100 mm)	100
3.5-IN (90 mm)	90 to 100
2.5-IN (65 mm)	25 to 60
1.5-IN (37.5 mm)	Zero to 15

2. Geotextile Separation Fabric Material:
 - a. Geotextile fabric specifically manufactured for use in separating roadway materials from subgrade, sufficiently durable for the Project.
 - b. As recommended by geotextile manufacturer for separating stone from subgrade, for the vehicle weight and traffic frequency anticipated for the construction entrance.

PART 3 - EXECUTION

3.1 NOISE CONTROL

A. Noise Control – General:

1. Contractor's vehicles, construction equipment, and machinery shall minimize noise emissions to greatest degree practicable. When necessary, provide mufflers and silencers on construction equipment, machinery, and vehicles, and provide temporary sound barriers sound-absorbing blankets, sound-reducing enclosures, modified backup alarms, and other mitigation measures when necessary.
2. Noise threshold levels shall comply with Laws and Regulations, including (a) OSHA requirements and recommendations, and (b) local ordinances or other Laws or Regulations.
3. Noise emissions shall not interfere with the work of Owner, facility manager (if other than Owner), or others. The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning and emergency purposes only.
4. Music or entertainment systems, including personal and vehicle radios, media players, and the like, when used, shall not be audible at the property line and shall not disturb others at the Site.

5. Field Quality Control of Noise:
 - a. If Owner or Engineer believes potential exists that allowable noise levels are being exceeded, Contractor will be required to, and shall promptly perform, appropriate noise monitoring in presence of Owner or Engineer and shall submit written results to Engineer.
 - b. Owner and Engineer reserve the right to perform independent noise monitoring at any time during the Work.
6. If noise level exceeds allowable maximum, Contractor shall immediately cease the activity emitting the excessive noise and promptly implement noise-mitigating measures to comply with noise limitations.

3.2 DUST CONTROL

A. Dust Control – General:

1. Control objectionable dust caused by Contractor's operation of vehicles and construction equipment and machinery, site clearing, demolition, cleaning, and other actions. To minimize airborne dust, apply water or use other methods subject to acceptance of Engineer and approval of authorities having jurisdiction.
2. Contractor shall prevent blowing and movement of dust from exposed soil surfaces and access roads to reduce onsite and off-Site damage, inconvenience, nuisances, and health hazards associated with dust emissions from Contractor's activities.

B. Dust Control Methods:

1. Dust control may be accomplished by irrigation in which the dust-prone work activity or area of the Site is sprinkled with water until the surface is moist.
2. Apply dust controls as frequently as necessary or required without creating inconveniences, nuisances, or hazards, such as excessive mud and ponding of water at or adjacent to the Site. Do not use water for dust control when water will cause hazardous or objectionable conditions such as ice, mud, ponds, and pollution.
3. Provide dust control that is non-polluting and does not contribute to tracking-out of dirt, mud, and dust onto pavement.
4. Do not allow water used for dust control to discharge to storm water drainage system or surface waters.
5. Where appropriate, reduce travel speed of construction vehicles and construction equipment to reduce the potential for dust emissions arising from vehicle and equipment passage.
6. Where appropriate, apply gravel or other appropriate binder to access roads and parking areas.

C. Removal of Dust and Dirt from Pavement and Other Travelled Ways:

1. Remove dust, mud, and dirt from roads, parking areas, and other travelled ways not less than the frequency indicated in Section 01 74 00 - Cleaning.
2. Perform dust and dirt removal from travelled ways by mechanical wet vacuum sweeping or other method acceptable to Engineer.
3. Remove mud from roads, parking areas, and other travelled ways by appropriate means, including scraping. Avoid damaging surface of travelled way. Remedy damage to roads, parking areas, and travelled ways resulting from mud removal activities.

D. Removal of Dust and Dirt from Buildings and Structures:

1. When dust and dirt from Contractor's activities has accumulated to a noticeable or objectionable extent (compared with preconstruction conditions) on buildings or structures, remove the dust and dirt caused by Contractor's operations by appropriate methods, including power-washing using mild detergent. Remedy damage caused by dust, dirt, and power-washing.

2. Dust in sensitive equipment, such as electrical and control panels, instruments, HVAC systems and other equipment shall be cleaned by a Subcontractor specializing in cleaning such items.
3. During the Project, remove objectionable and noticeable dust, dirt, and mud in areas occupied by Owner or facility manager, and Contractor's work areas, resulting from Contractor's activities. Owner and facility manager will take reasonable measures to avoid tracking dust, dirt, and mud into their occupied areas.
4. Comply with Section 01 74 00 - Cleaning.

3.3 PEST AND RODENT CONTROL

A. Pest and Rodent Control – General:

1. Provide pest and rodent controls as necessary to prevent infestation of the Site, storage areas, and adjacent areas.
2. Pests and rodents include, but are not limited to: flies, mosquitoes, gnats, midges, stinging insects, other insects and the like, worms, rats, mice, moles, voles, and similar animals, raccoons, skunks, objectionable numbers and species of birds, and others.
3. Implement appropriate pest and rodent controls when pests, rodents, or both are apparent at the Site or offsite storage, staging, or laydown areas.
4. Control or remove pests and rodents from adjacent properties when Contractor's activities have fostered or exacerbated pest or rodent problems. For example, ground vibration, such as that associated with horizontal directional drilling, may cause migrations of subterranean animals such as moles and voles. Coordinate with affected property owners regarding appropriate control methods, materials, equipment, and disposal techniques.

B. Methods, Materials, and Equipment for Pest and Rodent Control during Construction:

1. Employ methods and use materials and equipment for pest and rodent control that do not adversely affect conditions at the Site or on adjacent and nearby properties.
2. Do not use control methods or poisons injurious to household pets or animals other than targeted pests and rodents.
3. Avoid control methods that present hazards to humans, including children.
4. Refer to Section 01 57 33 - Temporary Security, for restricted and prohibited activities, such as use of firearms at and adjacent to the Site.

C. Disposal of Pests and Rodents:

1. In accordance with Laws and Regulations, promptly and properly dispose of pests and rodents trapped or otherwise controlled. Do not bury or dispose of deceased animals at the Site or in adjacent areas.

3.4 WATER CONTROL

A. Water Control – General:

1. During the Project, provide methods to appropriately control storm water, surface water, water from excavations and structures, groundwater flows altered by Contractor's activities, and groundwater discharges from the Site, to prevent damage to the Work, the Site, adjacent properties, and downstream properties.
2. Control trenching, filling, and grading to direct water away from excavations, pits, tunnels and other construction areas, and prevent water from entering existing buildings and structures.
3. Properly manage and control storm water, surface water, and groundwater entering the Site from upstream, where such flows or discharges have potential to affect the Work or to be exacerbated by Contractor's activities.
4. Avoid ponding of water onsite, except in specially-designated, temporary settlement basins. Where water ponding occurs during construction, perform rough grading to eliminate ponding.

5. Prevent water from discharging onto roads, parking areas, paved or finished areas, and other travelled ways. Prevent storm water runoff from discharging across access roads and parking areas.
- B. Materials, Equipment, and Facilities for Water Control:
1. Provide, operate, and maintain materials, equipment, and facilities of adequate size, materials, and capacity to control storm water, surface water, groundwater, and discharges from tanks.
- C. Discharge and Disposal of Water during Construction:
1. Discharge storm water, surface water, and groundwater from the Site, and discharges of clean water from tanks, to proper discharge locations, in accordance with Laws and Regulations and the Contract Documents.
 2. Prevent damage and nuisances arising from water discharges on the Site and discharges from the Site.
 3. Dispose of water in manner that avoids flooding, erosion, sediment transport, and other damage, in accordance with Laws and Regulations.
 4. Avoid overland discharges from the Site and construction activities to adjacent properties.
 5. Water discharges from the Site and construction activities shall be via a storm water drainage route or conduit with sufficient capacity for the flow under associated weather and flow conditions and in accordance with requirements of authorities having jurisdiction
 6. Do not discharge storm water, surface water, groundwater, or clean water from tanks, into sanitary sewers. Obtain consent of sewerage system owner before discharging such flows into existing combined sewers.
 7. Obtain sewerage system owner's consent and approval before discharging polluted water to sewerage system.

3.5 POLLUTION CONTROL

- A. Pollution Control – General:
1. Provide means, methods, and facilities necessary and required to prevent contamination of soil, water, and atmosphere caused by accumulation or discharge of substances and materials that are either noxious, polluting, or both, from or caused by construction and related activities.
 2. Construction equipment and machinery shall comply with Laws and Regulations.
- B. Spills and Contamination:
1. Perform emergency containment, cleanup, and remedy of spills and contamination resulting from construction and related activities. Promptly remove and properly dispose of contaminated soils and liquids.
 2. Excavate contaminated material and properly dispose of off-Site, and replace with suitable compacted fill and appropriate cover.
 3. Comply with Section 01 35 44 - Spill Prevention Control and Countermeasures Plan, and Owner's and facility manager's (if other than Owner) hazard control procedures as indicated in the Supplementary Conditions.
- C. Protection of Surface Water and Groundwater:
1. Provide and maintain appropriate, temporary measures to prevent harmful substances from entering surface water, groundwater, and drinking water. Prevent disposal of wastes, effluents, chemicals, and the like into or adjacent to groundwater, surface water, drainage routes (including swales, ditches, and storm sewers) and drinking water.
 2. Obtain sewerage system owner's consent and approval prior to discharging into sanitary sewers or combined sewers. Do not discharge pollutants not in accordance with Laws and Regulations into combined sewers, or sewers tributary to combined sewers, when wet weather overflows to receiving waters may occur.

D. Atmospheric Pollutants:

1. Provide and maintain temporary controls for atmospheric pollutants resulting from construction and related activities, whether to outdoor or indoor atmospheres.
2. Prevent harmful dispersal of pollutants into atmosphere.
3. Do not discharge exhaust from internal combustion engines or combustion operations into buildings, structures, or near ventilation intakes for buildings or structures.
4. Prevent toxic and noxious concentrations of chemicals, fumes, and vapors.

E. Solid Waste:

1. Provide and maintain temporary controls for managing solid waste related to the Work.
2. Prevent solid waste from:
 - a. Becoming airborne or blowing in the wind.
 - b. Being inadvertently transmitted to adjacent, offsite properties, and areas of the Site not part of the Project.
 - c. Being deposited in or discharging to surface waters, and drainage routes..
3. Properly handle and dispose of solid waste. Burning or burying solid waste, including unused materials, at the Site or adjacent areas is prohibited.
4. Cleaning and Disposal of Debris: Comply with applicable requirements of the General Conditions, as may be modified by the Supplementary Conditions, and Section 01 74 00 - Cleaning.
5. Do not mix or store in the same container solid waste containing Constituents of Concern (and constitutes, or may constitute, a Hazardous Environmental Condition) with solid waste that does not contain Constituents of Concern.
6. Store solid waste in appropriate, covered, containers.
7. Promptly, and at regular intervals, remove solid waste from the Site for transport and disposal in accordance with Laws and Regulations.

3.6 ODOR CONTROL DURING CONSTRUCTION

A. Odors – General:

1. Avoid discharges of unpleasant or noxious odors from construction and related activities. Whether nature of the Work is such that odor generation is unavoidable, provide appropriate temporary controls for odors.
2. Give priority to avoiding odor generation, followed by:
 - a. Counteracting (treating the cause of) odors.
 - b. Containing odors.
 - c. Odor masking as the last resort for odor control.

3.7 EROSION AND SEDIMENT CONTROLS

A. Installation and Maintenance of Temporary Erosion and Sediment Controls – General:

1. General Provisions:
 - a. Provide temporary erosion and sediment controls as shown and indicated on the Drawings and as indicated in this Section and elsewhere in the Contract Documents, and as necessary for compliance with Laws and Regulations.
 - b. Provide erosion and sediment controls as the Work progresses into areas where ground cover was previously undisturbed.
 - c. Use necessary and required methods to appropriately control erosion and sediment transport in storm water runoff, including using soil conservation-oriented construction practices (including scheduling and sequencing), vegetative measures, and temporary physical controls.
 - d. Use best management practices (BMP) in accordance with Laws and Regulations, and regulatory requirements indicated in this Section's "Quality Assurance" Article (unless

- more-stringent requirement are shown or indicated in the Contract Documents), to control erosion and sediment transport in storm water runoff during the Project.
- e. Plan and execute disturbances of soils and soil cover, and earthwork by methods to control storm water runoff from exposed soil (including stockpiles, borrow areas, and spoil disposal areas), banks of surface waters affected by the Work, and discharges of groundwater, to prevent erosion and sediment transport.
 - f. Where areas must be cleared for storage of materials or equipment, or for temporary facilities, provide measures for regulating storm water discharges and controlling erosion and sediment transport. Where Owner is a co-permittee with Contractor for applicable permits, or when plans for temporary erosion and sediment controls were sealed and signed by Engineer, such methods are subject to Engineer's approval or acceptance, as applicable.
 - g. Provide erosion and sediment controls, including stabilization of soils, at the end of each workday.
- 2. Coordination:
 - a. Coordinate temporary erosion and sediment controls with this Section's requirements on water control and Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit.
 - b. Coordinate temporary erosion and sediment controls with construction of permanent drainage facilities, permanent erosion controls and soil stabilization (if any), and other Work, to the extent necessary for effective and continuous erosion and sediment controls.
 - 3. Before commencing activities that will disturb soil or soil cover at the Site or other areas to be occupied by Contractor during the Project, provide all appropriate temporary erosion and sediment controls required by the Contract Documents for the areas where soil or soil cover will be disturbed.
 - 4. Vegetation Removal and Disturbance:
 - a. Remove only those shrubs, grasses, trees, and other vegetation that must be removed for construction.
 - b. Protect undisturbed vegetation. Do not wantonly or unnecessarily drive construction vehicles and equipment over undisturbed vegetation and soil cover.
 - c. Promptly stabilize exposed soil where vegetation or soil cover was unnecessarily disturbed. Fill and restore ruts and damage to vegetation and soil cover caused by wanton or unnecessary passage of construction vehicles and equipment.
 - 5. Access Roads and Parking Areas:
 - a. When possible, locate and construct temporary access roads and parking areas to avoid adverse effects on the environment.
 - b. Provide measures to regulate drainage, avoid erosion and sediment transport in storm water runoff, and minimize damage to vegetation and soil cover.
 - 6. Earthwork and Temporary Controls:
 - a. Perform excavation, fill, and related activities in accordance with Section 31 23 00 - Earthwork 31 23 33 - Trenching, Backfilling, and Compacting for Utilities.
 - b. Temporary erosion and sediment control measures may include, but are not limited to, using berms, swales and ditches, silt fencing, straw bale sediment barriers, gravel or crushed stone, mulching and soil stabilization, slope drains, and other methods. Apply such temporary measures to erodible soils and other erodible materials exposed by construction activities.
 - c. Minimize areas of bare soil exposed at one time. Provide fills and spoil areas by selectively placing fill and spoil materials to reduce or eliminate exposed erodible soils.
 - d. Exercise special care on and above steep slopes, where disturbance of vegetation and soil cover shall be minimized to greatest extent reasonably practicable.

- e. Protect stockpile storage not in active use by providing suitable, durable covering prevent sediment transport in storm water runoff and windblown transport. Covering shall be suitable for outdoor exposure.
- 7. Inspection and Maintenance:
 - a. Periodically inspect areas of non-stabilized, erodible soils, including all areas of soil cover disturbance and stockpiles, for evidence of start of erosion and sediment transport. Promptly implement corrective action as necessary and appropriate to control erosion and sediment transport. Continue inspections and corrective action until soils are permanently stabilized and permanent vegetation has been appropriately established.
 - b. Inspect not less often than the frequency indicated in Section 01 41 26 - Storm Water Pollution Prevention Plan and Permit once per week and after each precipitation event of 0.5 inches of water or greater.
 - c. Repair or replace damaged erosion and sediment controls within 24 hours of Contractor becoming aware of such damage.
 - d. Periodically remove sediment that has accumulated in or behind sediment and erosion controls. Remove sediment not less often than when sediment is at approximately one-half of storage capacity of associated control element, unless more-frequent interval is indicated elsewhere in the Contract Documents Properly dispose of sediment.
- 8. Duration of Temporary Erosion and Sediment Controls:
 - a. Maintain temporary erosion and sediment controls in effective, working condition until soil cover of the associated storm water drainage area has been permanently stabilized.
- 9. Work Stoppage:
 - a. If the Work is temporarily stopped or suspended for any reason, Contractor shall provide additional temporary controls necessary to prevent environmental damage to the Site and adjacent areas while the Work is stopped or suspended.
 - b. When temporary erosion and sediment controls remain in place during periods of stopped or suspended Work, continue to perform Contractor's obligations relative to periodic inspection and maintenance of temporary erosion and sediment controls, including removal of accumulated sediment.
- 10. Failure to Provide Adequate Temporary Erosion and Sediment Controls:
 - a. If Contractor repeatedly fails to satisfactorily control erosion and sediment transport in storm water runoff, Owner reserves the right to use Owner's own forces or employ a third-party contractors for temporary erosion and sediment control. Owner's costs for such work, including engineering and inspection costs, will be deducted from amounts due Contractor, as set-offs in accordance with the Contract Documents.
- B. Erosion and Sediment Control Permit:
 - 1. Comply with permit requirements indicated in Section 01 41 24 - Permit Requirements.
- C. Silt Fencing:
 - 1. Provide and maintain silt fencing in a vertical plane, at the locations shown or indicated in the Contract Documents and where necessary or required.
 - 2. Locations of Temporary Silt Fencing:
 - a. Where possible, provide silt fencing along contour lines, so each run of silt fencing is at the same elevation.
 - b. On slopes, provide temporary silt fencing at intervals that do not exceed the maximum indicated in the following table:

Silt Fence Spacing on Slopes	
Slope (percent)	Maxim Allowable Length of Slope Above Each Silt Fence (feet)
2 and less	150
2.1 to 5	100
5.1 to 10	50
10.1 to 20	25
20.1 to 25	20
25.1 to 40	15
40.1 to 50	10

- c. Provide temporary silt fencing around perimeter of each stockpile of topsoil, general fill material, and excavated spoil material. Install silt fencing before expected soil is subject to precipitation. Maintain until stockpile is removed.
- d. Do not install temporary silt fencing at the following types of locations:
 - 1) Area of concentrated storm water flows such as ditches, swales, or channels.
 - 2) Where rock or rocky soils prevent full and uniform anchoring of silt fencing.
 - 3) Across upstream or discharge ends of storm water conduits.
- 3. Installation:
 - a. Securely fasten wire mesh to posts, and securely fasten filter cloth to wire mesh.
 - b. When two sections of filter cloth are adjacent to each other, fold over edges and overlap by not less than 6 inches and securely fasten to wire mesh.
 - c. Embed posts in the ground to the depth necessary for proper controls; embed posts to not less than 16 inches below ground.
 - d. Filter cloth and wire mesh shall extend not less than 8 inches below ground and not less than 16 inches above ground.
 - e. Remove accumulated sediment from behind silt fencing as necessary or required. Repair and reinstall silt fencing as necessary or required.
- 4. Maintenance:
 - a. Do not allow formation of concentrated storm water flows on slopes above temporary silt fencing unless so shown or indicated in the Contract Documents. If unauthorized concentrated storm water flows occur, stabilize the slope via other appropriate stabilization methods as necessary and required to prevent flow of concentrated storm water flows toward temporary silt fencing.
- D. Mulching and Soil Stabilization:
 - 1. Use mulching to temporarily stabilize exposed soil, including spoil and fill materials.
 - a. Immediately following final grading, provide mulch and stabilize with mats or netting, or sprayed soil stabilization emulsion with fiber additive.
 - b. Application of mulching for soil stabilization shall be as follows.
 - 1) Non-Rotted Straw or Salt Hay: Provide 1.5 to two tons per acre.
 - 2) Soil stabilization emulsions, when used, shall be applied in accordance with manufacturer's instructions, and shall be applied with mulch or stabilization fibers.
 - 3) Wood-Fiber or Paper-Fiber Application: Provide 1,500 pounds per acre, installed by hydroseeding.
 - c. Where mats or netting are used:
 - 1) Cover entire area to be stabilized with mats or netting.

- 2) Provide anchoring trenches at the top and bottom of slopes to receive mats or netting. Bury at least the top and bottom ends of mat or netting, 4 inches or more wide, at top and bottom of slope. Ensure that mesh or netting is secure and will not wash out over time. Tamp trench full of soil. 4 inches from trench, secure mat or netting with appropriate staples at intervals of 10 inches.
 - 3) Overlap adjacent strips of mat or netting by not less than 4 inches.
- E. Protection of Storm Water Drainage Inlets and Catch Basins:
1. Protect each drainage inlet and catch basin that has potential to receive storm water runoff from exposed soils and does not discharge into a storm water settlement basin.
 2. Provide temporary inlet filter bags inside of drainage inlet or catch basin in accordance with inlet filter bag manufacturer's instructions. Secure inlet filter bag with the structure's grate or by other acceptable means.
 3. Inlet filter bags shall not pose any obstruction, above the preconstruction elevation of the drainage inlet or catch basin grate that would necessitate or require temporary barricades or warning lights.
 4. When removing sediment from inlet filter bags, do not dump filter bag's contents into the drainage inlet or catch basin. Promptly remove from drainage inlets and catch basins sediment accidentally dumped into the structure.
 5. Remove sediment from inlet filter bags, or replace inlet filter bags, when inlet filter bag is not more than half-full.
- F. Temporary Settlement Basin:
1. For constructing embankments comply with requirements in Division 31 Specifications on embankments, excavation, and fill.
 2. Overflow Weir and Discharge Pipe:
 - a. Provide piping in accordance with manufacturer's instructions. Where permanent piping will be used for temporary settlement basin, provide piping in accordance with the Contract Documents and fully clean piping prior to Substantial Completion.
 - b. Provide overflow weirs at elevation(s) shown or indicated on the Drawings. When not shown or indicated in the Contract Documents, discharge weir elevation(s) shall be in accordance with design by licensed, professional civil engineer retained by Contractor or Subcontractor. Such design and temporary construction shall avoid overtopping and overfilling of settlement basin without short-circuiting the settlement basin's hydraulic performance.
 - c. Wrap and secure geotextile material specified for temporary silt fencing around discharge structures of temporary settlement basins
 3. Crushed Stone and Riprap: Provide in accordance with Division 31 Specifications on excavation, fill, and riprap. Provide in areas of temporary settlement basin subject to erosion, and at upstream and downstream ends of each settlement basin's discharge piping.
 4. Remove sediment when necessary or required, based on accumulation of material.
 5. When temporary settlement basin is no longer required, remove the temporary settlement basin discharge weir, discharge piping, and spillway, fill the temporary settlement basin to required grade in accordance with requirements of Division 31 Specifications on excavation and fill, and provide landscaping in accordance with the Contract Documents.
- G. Filter Bag on Dewatering Pump Discharge:
1. Provide dewatering of excavations in compliance with Section 31 23 00 - Earthwork 31 23 33 – Utilities – Trenching and Backfilling, and Section 31 23 19 - Dewatering.
 2. Locate filter bags and temporary pump discharge lines to avoid interfering with the public, use of private and public property, and Owner's and facility manager's operations. Relocate filter bags and appurtenances when necessary or required.

3. Filter bag discharge shall be directed to appropriate storm water drainage route. Do not discharge into roads, driveways, access roads, parking areas, other travelled ways, or overland. When temporary settlement basin is used, locate filter bags to discharge to temporary settlement basin when practicable.
4. Provide filter bag on discharge of each dewatering pump drawing from an excavation or other area with exposed soil.
5. Securely attach filter bag to pump discharge pipe or hose.
6. Maintain, clean out, and replace filter bags as necessary or required.

H. Temporary Stone Construction Entrance:

1. Where shown on the Drawings, and where construction vehicles will regularly transition to paved surfaces from unstabilized surfaces, provide temporary stone construction entrance. Contractor vehicles and mobile construction equipment and machinery shall use temporary stone construction entrances.
2. Provide temporary stone construction entrances of the width, length, and thickness shown or indicated on the Drawings. When not shown or indicated on the Drawings, temporary stone construction entrance shall be not less than 50 feet long, by 20 feet wide, by 8 inches deep.
3. Installation:
 - a. Ensure that subgrade under each temporary stone construction entrance is suitably dense for the intended purpose and dry. Suitably prepare subgrade as necessary for temporary stone construction entrance.
 - b. Provide on subgrade a layer of geotextile separation fabric, installed in accordance with geotextile separation fabric manufacturer's recommendations for separation.
 - c. Provide stone on installed geotextile separation fabric. Grade the stone for passage of vehicles.
4. Maintenance:
 - a. Maintain temporary stone construction entrance at not less than the minimum required thickness. Add stone as required to maintain thickness.
 - b. When upper layer of temporary stone construction entrance becomes contaminated with soil, mud, or other material, remove the contaminated material and replace with clean stone.
 - c. Using water to wash down temporary construction entrance or paved areas onto which soil material has been tracked is unacceptable.

3.8 REMOVAL OF TEMPORARY CONTROLS

A. Removals – General:

1. Unless otherwise indicated elsewhere in this Section in requirements for respective temporary controls, upon completion of the associated Work and when temporary controls are no longer necessary, remove temporary controls and restore the Site to condition in accordance with the Contract Documents; if condition is not shown or indicated, restore the Site to pre-construction condition.
2. After soils are permanently stabilized, remove from the Site temporary erosion and sediment controls.

END OF SECTION

SECTION 01 57 33
TEMPORARY SECURITY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for security during the Project.
 - 2. Restrictions on possessing and using weapons, intoxicants, fireworks, and other items and activities at the Site and adjacent areas.
 - 3. Site access security procedures.
 - 4. Personnel and vehicle identification requirements.
 - 5. Temporary security fencing.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required to comply with requirements of this Section.
 - 2. Contractor is solely responsible for delays and costs incurred to comply with requirements of this Section and security procedures at the Site.
 - 3. Comply with Section 01 71 33 - Protection of the Work and Property.
- C. Related Requirements:
 - 1. Include, but are not limited to:
 - a. Section 01 14 19 - Use of Site.
 - b. Section 01 71 33 - Protection of the Work and Property.

1.2 GENERAL PROVISIONS FOR SECURITY DURING THE PROJECT

- A. Security – General:
 - 1. Prior to Substantial Completion:
 - a. Contractor shall safely guard all the Work, the Project, materials, equipment, and property from loss, theft, damage, and vandalism by any and all persons and cause, until Substantial Completion, unless otherwise agreed upon by Owner and Contractor.
 - 2. After Substantial Completion:
 - a. Contractor's responsibility for security of the Work resumes after Substantial Completion when Contractor is at the Site performing punch list Work, correction of defective Work, or warranty Work. Such security responsibility is in effect only for the subject Work being performed, Contractor's construction equipment and machinery, tools, and property immediately adjacent to the active work areas.
 - 3. Contractor's duty includes safely guarding Owner's property in vicinity of the Work and Project, and other private property in the vicinity of the Project, from injury and loss in connection with performance of the Project, theft, vandalism, and other causes.
 - 4. Employ security personnel as necessary to provide required security and prevent unauthorized entry to the Site and work areas.
 - 5. Costs for security required under this Section are Contractor's responsibility.
 - 6. Contractor is not eligible for additional Contract Time or additional compensation due to delays or unanticipated costs incurred by Contractor due to compliance with security requirements in effect at the time Bids were submitted or, if there were no Bids, as of the Effective Date of the Contract.
 - 7. Responsibility for Losses:

- a. Make no claim against Owner, facility manager (if other than Owner), Engineer, or their respective consultants and subcontractors for damage resulting from trespass, theft, vandalism, or other failure of Contractor's security obligations under the Contract.
 - b. Remedy damage to property of Owner and others arising from failure to furnish adequate security.
 8. Provide temporary fencing in accordance with the Contract Documents.
 9. Contractor's security measures shall be at least equal to those usually provided by Owner or facility manager (if other than Owner) to protect existing facilities during normal operation.
- B. Existing Security at the Site:
1. Locked gates when facility is closed
 2. Perimeter security fence.
- C. Restrictions:
1. At all times when Contractor's workers and personnel are at the Site or adjacent areas, the following are prohibited:
 - a. Weapons:
 - 1) Firearms and ballistic weapons of any sort, including rifles, shotguns, handguns, automatic and semi-automatic weapons (whether or not of historical vintage or non-firing), air rifles, muskets, black-powder weapons, and similar items; heavier, military-type ordnance; crossbows; bows with arrows; and slings are prohibited, except as otherwise expressly allowed in writing by Owner in accordance with Laws and Regulations.
 - 2) Use of firearms and other ballistic weapons, including crossbows, bows with arrows, slings, and other such items, is prohibited.
 - 3) Possession or use of weapons such as swords, medieval-type weapons (whether or not of historical vintage, reproduction, homemade, or improvised), long knives, tomahawks and similar items, brass knuckles, nunchucks, other martial arts-type weapons, and the like are prohibited.
 - b. Explosives and Similar Items:
 - 1) Explosives and similar items, including fireworks, firecrackers, rockets, grenades and artillery shells (whether or not of historical vintage, and regardless of whether live, inert, reproduction, or non-functional), and similar items, are prohibited.
 - 2) Plastic explosives are prohibited unless used in the Work; no personnel except magazine keeper and appropriate personnel shall possess such substances at or adjacent to the Site.
 - 3) All explosives required for the Work, when use of explosives is allowed by the Contract and by authorities having jurisdiction, shall be kept in an appropriate, secured, locked, managed magazine.
 - c. Drugs and Alcohol:
 - 1) Use of alcohol, cannabis, illegal narcotics, illicit or inappropriate use of prescription drugs, and similar substances is prohibited. Do not employ on the Work personnel under the influence of such substances. Do not tolerate such personnel at or adjacent to the Site.
 - d. Stolen and Illicit Items and Criminal Activity:
 - 1) Do not bring to the Site stolen property of any sort or any property resulting from actions that would constitute a misdemeanor or felony under Laws or Regulations. Sale or resale at the Site and adjacent areas of stolen or illicitly obtained property is prohibited.
 - 2) Personnel shall not engage in criminal activity at or adjacent to the Site.
 2. Contractor's personnel shall not access the Site outside normal working hours without express knowledge of and consent of Site security personnel and Contractor.

1.3 SUBMITTALS

A. Action Submittals:

1. Submit the following:
 - a. Shop Drawings:
 - 1) Temporary Fencing: Submit site plan drawings showing proposed locations and extent of temporary site security fencing and each opening therein.
 - b. Product Data:
 - 1) Temporary Fencing: Manufacturer's literature, specifications, and installation instructions for temporary site security fencing proposed.

B. Informational Submittals:

1. Submit the following:
 - a. Employee Information:
 - 1) Submit to Owner the following; do not submit to Engineer:
 - a) Format of employee background data and proposed approach for performing employee background checks.
 - b) Background data for employees to whom identification badges will be issued.
 - c) Updated listing of personnel to whom identification badges have been issued. Submit updated listing within 24 hours of a change in the list or change in an employee's Site access status.

1.4 CONTRACTOR'S SITE ACCESS AND SECURITY PROCEDURES

A. Comply with Section 01 55 13 - Vehicular Access and Parking.

B. Comply with Owner's security procedures and access restrictions at the Site throughout the Project. Comply with the following:

1. Personnel Identification:
 - a. All Contractor personnel, including Subcontractors, Suppliers, and others associated with the Project, shall wear, at a visible location on outer attire, at all times at the Site a durable, waterproof badge bearing Contractor's name, employer (if other than Contractor), employee's name and, as applicable, employee number.
2. General Provisions Regarding Personnel Identification:
 - a. Prerequisites to Issuance of Personnel Identification Badges:
 - 1) Do not issue personnel identification badge until the person receiving the badge is documented by Contractor as:
 - a) Being eligible to perform work in the jurisdiction where the Site is located.
 - b) Has received all necessary safety instructions, training, and personal protection equipment required by Laws and Regulations, Owner's (or facility manager's) safety programs, and Contractor's Site-specific health and safety plan.
 - c) Is known to Contractor as being qualified to perform the Work to which the person will be assigned.
 - b. Listing of Personnel to Whom Badges are Issued:
 - 1) Maintain and continuously update a listing or log of all personnel to whom personnel identification badges have been issued.
 - 2) Listing or log shall indicate each person's full name, home address, personal telephone number, employer name, and employer address and telephone number.
 - 3) Submit copy of listing or log to Owner in accordance with this Section's "Submittals" Article.
3. Vehicle Identification:

- a. While at the Site, all Contractor, Subcontractor, and Supplier vehicles, including workers' personal vehicles and all mobile construction equipment, shall display vehicle identification tag in clearly visible location on vehicle's dashboard.
 - b. Vehicle tag shall be issued by Owner.
 - c. Vehicle tag shall include the following information: Site name, Contractor name, contract designation, vehicle license plate number and state of registration, name and employer of vehicle owner, and vehicle owner mobile telephone number.
4. Parking:
- a. Do not park outside of designated Contractor parking area, which is shown on the Drawings.
 - b. Personal vehicles are not allowed outside the contractor parking area.

PART 2 - PRODUCTS

2.1 TEMPORARY FENCING

- A. When security fencing or barriers are breached or temporarily removed for the Project, provide temporary security fencing equal to existing, unless otherwise indicated, in manner satisfactory to Engineer and Owner.
- B. Material Requirements:
 - 1. Temporary fencing shall not be damaged or have breaches.
- C. Provide other security fencing deemed necessary by Contractor, such as for Contractor's material and equipment storage areas. Such fencing, when not protecting Owner's or facility manager's property, shall be as deemed appropriate by Contractor for Contractor's purposes.

PART 3 - EXECUTION

3.1 TEMPORARY FENCING

- A. Installation:
 - 1. Provide temporary security fencing for site security so that integrity of site security is maintained throughout the Project.
 - 2. Install temporary security fencing in accordance with the Contract Documents and fence Supplier's instructions.
- B. Maintenance:
 - 1. Maintain temporary security fencing throughout the Project, until removal.
 - 2. Promptly repair damage to temporary security fencing and replace fencing when necessary to preserve Site security.
- C. Removal:
 - 1. Remove temporary security fencing when permanent site security fencing is in place and fully functional, or when otherwise acceptable to Engineer.
 - 2. Remove required temporary security fencing at Site perimeter and other temporary security fencing required by the Contract prior to inspection for Substantial Completion.

END OF SECTION

SECTION 01 58 13
TEMPORARY PROJECT SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for:
 - a. Temporary signs, installed outdoors, indicating the Project's name and principal participants..
- B. Scope:
 - 1. Contractor shall furnish, install, maintain, and remove temporary, outdoor signage in accordance with this Section. Provide labor, materials, tools, equipment, and other services and incidentals necessary and required for temporary Project signage
 - 2. Obtain and pay for required permits and approvals from authorities having jurisdiction.
 - 3. Requirements for permanent signage are in the Contract Documents.
 - 4. Do not erect or display any other temporary signage at the Site or adjacent areas without Owner's approval.
- C. Related Requirements:
 - 1. Section 01 55 13 - Vehicular Access and Parking.
 - 2. Section 01 57 05 - Traffic Control.
 - 3. Section 01 71 33 - Protection of the Work and Property.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Logos: Where temporary Project signage requires logos of Owner, funding or financing entity (if any), Engineer, or other consultants retained by Owner, obtain Electronic Document file of such graphic(s) from Engineer.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Sign Painter/Preparer:
 - a. Shall be a professional in the type of Work required, regularly engaged in work similar to that required.
 - b. Responsible for:
 - 1) Preparing layout Shop Drawings for temporary Project signage.
 - 2) Furnishing temporary Project signage layout, graphics, color, text, and overall appearance of temporary project signage.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Layout of each temporary sign required under this Section:
 - 1) Show and indicate layout, text, font, text size, colors, graphics (if any).
 - 2) Such Shop Drawings shall be in color accurately representing scale and colors of proposed temporary Project signage.
 - 3) Specifically indicate font(s), text size, and colors.
 - b. Construction and erection details for temporary Project signage:

- 1) Show and indicate type and grade of materials, including temporary signage panel, trim, principal supports, foundation, and bracing.
 - 2) Show and indicate installation details, including depth of embedment in ground and attachment hardware.
 - 3) Engineer's approval of Shop Drawings for temporary Project signs will not address construction or erection means and methods or temporary sign's structural viability or ability to withstand required forces.
2. Product Data:
 - a. Product data and specifications for finishes proposed for use, when requested by Engineer.
 3. Samples:
 - a. Submit color Samples when requested by Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS AND CONSTRUCTION

- A. Performance and Design Criteria:
 1. Temporary signs, including sign panels, supports, bracing, and foundations, shall withstand sustained winds of 75 miles per hour.
- B. Temporary Signage Required: Provide the following temporary signs:
 1. Sign Designation:
 - a. Temporary sign, including size, colors, text, fonts, and graphics, shall be submitted to Engineer and Owner for review.
 2. Site Informational Temporary Signage:
 - a. Provide temporary signage as necessary and required for construction site operations and controlling traffic at the Site.
 - b. Requirements for temporary, onsite signage for construction vehicular traffic and parking are in Section 01 55 13 – Vehicular Access and Parking.
 - c. Requirements for temporary signage related to safety and protection are in Section 01 71 33 – Protection of the Work and Property.
- C. Materials and Fabrication:
 1. Sign Panel:
 - a. Temporary signs shall be 3/4-inch thick, new A-B Grade, exterior type, APA MDO plywood both sides, unless otherwise shown or indicated in the Contract Documents.
 - b. Provide temporary signs with trim, mitered on edges.
 2. Supports and Bracing:
 - a. Provide supports and bracing as necessary and required to adequately support and brace temporary signs to comply with this Section's performance and design criteria.
 - b. Unless otherwise shown or indicated in the Contract Documents, principal upright supports for temporary signage shall be not less than 4-inch by 4-inch pressure-treated lumber.
 - c. When not shown or indicated in the Contract Documents, embed principal upright supports for temporary signage not less than 4 feet in ground.
- D. Finishing:
 1. Paint all surfaces of temporary signage, including panels, supports, bracing, and other surfaces, with material suitable for long-term exposure to sunlight and weather without fading for duration of the Project.
 2. At minimum, provide prime coat and finish coat: exterior, semi-gloss, enamel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation:

1. Location:

- a. Location of temporary signage shall be as shown or indicated on the Contract Documents, or as directed by Engineer. Temporary signage shall be plainly visible to vehicular traffic.
- b. Unless expressly shown or indicated otherwise in the Contract Documents, Contractor shall select locations for temporary signage for: construction vehicular traffic and parking, traffic control for public and non-construction vehicles, safety and protection, and others.

2. Install temporary signage in a neat, professional manner, straight, level, plumb, consistent with the performance and design criteria indicated in this Section.

3.2 MAINTENANCE AND REMOVAL

A. Maintenance:

1. Maintain temporary signage so that signs are clean, legible, upright, plumb, and level.
2. Cut grass, weeds, and other plants so that temporary signage is not covered or obscured.
3. Promptly repair and repaint damaged, faded, or marred temporary signage.
4. Relocate temporary signage as necessitated by progress of the Work.
5. Maintain required temporary signage through Substantial Completion of the entire Project.

B. Removal:

1. Remove temporary signage prior to final inspection of the Work, or when directed by Engineer.
2. Entirely remove all elements of temporary signage, including supports, foundations, bracing, and other elements.
3. After removal, restore the area at and adjacent to temporary signage as required by the Contract Documents. When the Contract Documents do not expressly show or indicate the required restoration, restore to preconstruction conditions or better.

END OF SECTION

This page intentionally left blank.

SECTION 01 61 03
COMMON WORK RESULTS FOR EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements of this Specification Section apply to all equipment provided on the Project including those found in other Divisions even if not specifically referenced in individual "Equipment" Articles of those Specification Sections.

B. Related Sections include but are not necessarily limited to:

1. Section 40 05 00 – Pipe and Fittings – Basic Requirements

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Bearing Manufacturers Association (ABMA).
2. American Gear Manufacturers Association (AGMA).
3. American Petroleum Institute
 - a. API 686 - Recommended Practice for Machinery Installation and Installation Design
4. ASTM International (ASTM):
 - a. E1934, Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography.
 - b. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
5. Hydraulic Institute (HI):
 - a. 9.6.4, Rotodynamic Pumps for Vibration Measurements and Allowable Values .
6. International Electrotechnical Commission (IEC).
7. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
8. International Organization for Standardization (ISO):
 - a. 1940, Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State - Part 1: Specification and Verification of Balance Tolerances.
 - b. 21940-11, Mechanical Vibration - Rotor Balancing - Part 11: Procedures and Tolerances for Rotors with Rigid Behavior.
9. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ICS 6, Enclosures for Industrial Control and System.
 - c. MG 1, Motors and Generators.
10. InterNational Electrical Testing Association (NETA):
 - a. ATS, Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems.
11. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC):
12. National Institute for Certification in Engineering Technologies (NICET).

13. National Institute of Standards and Technology (NIST).
 14. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
 15. Underwriters Laboratories, Inc. (UL).
 - a. 508, Standard for Safety Industrial Control Equipment.
 - b. 508A, Standard for Safety Industrial Control Panels.
 - c. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.
 16. Vibration Institute.
- B. Supplier's Vibration Analyst:
1. Supplier's vibration analyst shall prepare pre-Shop Drawing vibration analysis of equipment.
 2. Where required, Supplier's vibration analyst shall be either equipment manufacturer's qualified employee or independent business entity whose sole business, or principal part of its business, is evaluating and determining natural frequencies of rotating equipment.
 3. Shall possess not less than 10 years' relevant experience.
 4. Supplier's Vibration Analyst's Professional Engineer:
 - a. Vibration analysis shall be performed by, or under the direct, personal supervision of, professional engineer licensed and registered [in the same jurisdiction as the Site experienced in preparing finite element analyses, rotordynamic analyses, and experimental modal analysis similar to that required for the Work.
 - b. Professional engineer shall possess not less than five years' combined experience in field testing and data analysis for vibration analysis.
 - c. Vibration analysis professional engineer's seal and signature, with indication of date seal and signature were applied to the subject document, shall clearly appear on all results and reports furnished as Submittals.
- C. Field Vibration Testing Subcontractor:
1. Field vibration testing Subcontractor shall, where required by the Contract Documents, perform vibration testing of equipment installed at the Site and perform associated vibration analyses.
 2. Vibration testing Subcontractor shall be an independent entity that has performed as its sole business, or principal part of its business, for not less than 10 years, inspection, testing, calibrating, adjusting equipment and systems, and performing vibration testing of equipment.
 3. Entities whose principal business is one or more of the following are not considered independent vibration testing entities and, therefore, shall not be field vibration testing Subcontractor:
 - a. Motor sales, service, or repairs.
 - b. Process equipment sales, service, or repairs.
 4. Acceptable entities include, but are not necessarily limited to:
 - a. AVS Engineering: <https://www.avsengineering.net/>
 - b. Engineering Testing Services: <https://etestinc.com/>
 - c. Maritech, LLC: <http://www.maritech-llc.com/contact.html>

- d. Mechanical Solution, Inc. (MSI) www.mechsol.com
- e. Or equal
- 5. Field vibration testing Subcontractor must have an established program for monitoring and testing equipment calibration, with accuracy traceable in an unbroken chain, in accordance with NIST requirements.
- 6. Field Personnel: Each person employed for field vibration testing on the Work shall possess not less than the following qualifications:
 - a. Three years' field experience covering all phases of field vibration testing and data gathering.
 - b. Current, valid Vibration Category II certification from Vibration Institute or a licensed, registered professional engineer who need not be licensed and registered in the same jurisdiction as the Site.
- 7. Analysis Personnel: Personnel performing analysis for field vibration testing Subcontractor shall possess not less than the following qualifications:
 - a. Five years' combined field testing and data analysis experience.
 - b. Current, valid Vibration Category III certification from the Vibration Institute or a professional engineer licensed and registered in the same jurisdiction as the Site. Where required by Laws and Regulations, field vibration analysis report shall be sealed, signed, and dated by professional engineer who personally prepared, or exercised personal, supervisory control over subordinates in preparing, the field vibration analysis report.
- 8. Analysis Equipment: Field vibration testing Subcontractor shall have access to and use, where appropriate, the following testing equipment, properly maintained and calibrated:
 - a. Impact Hammer:
 - 1) Frequency Range: 1 kHz.
 - 2) Range (5v output) 5,000 pounds-force (22,200 newtons).
 - 3) Hammer sensitivity (approx.) 1mV/lbf (0.23 mV/N)
 - b. Analyzer:
 - 1) Frequency Range: 1 Hz to 10,000Hz.
 - 2) Frequency Accuracy: 0.02 percent.
 - 3) Non-Integrated Spectral Amplitude Accuracy: 5 percent, 3 Hz to 65 Hz.
 - 4) Single Integrated Spectral Amplitude Accuracy: 5 percent, 10 Hz to 20 Hz.
 - 5) Supports measurements of acceleration, velocity, and displacement.
 - c. Vibration Sensor:
 - 1) Sensitivity: ± 5 percent = 100 mV/g
 - 2) Acceleration Range: ± 5 g.
 - 3) Amplitude Nonlinearity: ± 1 percent
 - 4) Frequency Response: ± 10 Hz to 7kHz (± 3 dB)
 - d. Data logging equipment for simultaneous recording of the following data points:
 - 1) Vibration in the X, Y, and axial planes (for all pumps pursuant to ANSI/HI Standard).
 - 2) Digital tachometer recording RPM.
 - 3) Discharge Pressure Transmitter
 - a) Accuracy: 0.3 percent of range
 - b) Fluid Temperature Range: 32 to 100 DegF

- 4) Suction Pressure Transmitter (when other than submersible pump or vertical turbine (suspended) pump).
 - a) Accuracy 0.35 percent of range.
 - b) Fluid Temperature Range: 32 to 100 DegF.
 - c) For submersible pumps and vertical turbine (suspended) type pumps, suction liquid surface level signal from Site's monitoring and control system (e.g., plant PLC/SCADA system).
- 5) For pumps, pumping rate (flow) signal from Site's monitoring and control system (e.g., plant PLC/SCADA system)
- 6) Equipment/motor bearing temperature signal from Site's monitoring and control system (e.g., plant PLC/SCADA system)).
- 7) Pump/motor vibration signal from Site's monitoring and control system (e.g., plant PLC/SCADA system).

D. Infrared Thermography Testing Program:

1. Testing firm:
 - a. An independent firm performing, as the sole or principal part of its business for a minimum of 10 years, the inspection, testing, calibration, and adjusting of systems.
 - b. Must have an established monitoring and testing equipment calibration program with accuracy traceable in an unbroken chain, according to NIST.
2. Field personnel:
 - a. Minimum of one year field experience covering all phases of field thermography testing and data gathering.
 - b. Supervisor certified by NETA or NICET.
3. Analysis personnel:
 - a. Minimum three years combined field testing and data analysis experience.
 - b. Supervisor certified by NETA or NICET.

E. Miscellaneous:

1. A single manufacturer of a "product" shall be selected and utilized uniformly throughout Project even if:
 - a. More than one manufacturer is listed for a given "product" in Specifications.
 - b. No manufacturer is listed.
2. Equipment, electrical assemblies, related electrical wiring, instrumentation, controls, and system components shall fully comply with specific NEC requirements related to area classification and to NEMA 250 and NEMA ICS 6 designations shown on Electrical Power Drawings and defined in the Electrical specifications.
3. Variable speed equipment applications: The driven equipment manufacturer shall have single source responsibility for coordination of the equipment and VFD system and verify their compatibility.

1.3 DEFINITIONS

- A. Product: Manufactured materials and equipment.
- B. Major Equipment Supports - Supports for Equipment:
 1. Located on or suspended from elevated slabs with supported equipment weighing 2000 pounds or greater, or;

2. Located on or suspended from roofs with supported equipment weighing 500 pounds or greater, or;
 3. Located on slab-on-grade or earth with supported equipment weighing 5000 pounds or more.
- C. Equipment:
1. One or more assemblies capable of performing a complete function.
 2. Mechanical, electrical, instrumentation or other devices requiring an electrical, pneumatic, electronic or hydraulic connection.
 3. Not limited to items specifically referenced in "Equipment" articles within individual Specifications.
- D. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 2. Installer and applicator are synonymous.
- E. Baseplate or equipment base plate or machine base
1. Are fabricated frames of structural shapes and plates with enough strength and sturdiness to serve as the surface to which other equipment is attached to and supported by. Baseplates can be directly mounted and grouted to concrete equipment support bases or machined and bolted to a sole plate.
- F. Sole plate
1. A thick steel machined plate that is attached to and grouted to a concrete equipment support base.
 2. Base plates are bolted to a sole plate when a sole plate is specified and/or provide.

1.4 SUBMITTALS

- A. Shop Drawings:
1. General for all equipment:
 - a. Data sheets that include manufacturer's name and complete product model number.
 - 1) Clearly identify all optional accessories that are included.
 - b. Acknowledgement that products submitted comply with the requirements of the standards referenced.
 - c. Manufacturer's delivery, storage, handling, and installation instructions.
 - d. Equipment identification utilizing numbering system and name utilized in Drawings.
 - e. Equipment installation details:
 - 1) Location of anchorage.
 - 2) Anchorage setting templates.
 - 3) Manufacturer's installation instructions.
 - f. Equipment area classification rating.
 - g. Shipping and operating weight.
 - h. Equipment physical characteristics:
 - 1) Dimensions (both horizontal and vertical).
 - 2) Materials of construction and construction details.

- i. Equipment factory primer and paint data.
 - j. Manufacturer's recommended spare parts list.
 - k. Equipment lining and coatings.
 - l. Equipment utility requirements include air, natural gas, electricity, and water.
 - m. Ladders and platforms provided with equipment:
 - 1) Certification that all components comply fully with OSHA requirements.
 - 2) Full details of construction/fabrication.
 - 3) Scaled plan and sections showing relationship to equipment.
2. Mechanical and process equipment:
- a. Operating characteristics:
 - 1) Technical information including applicable performance curves showing specified equipment capacity, rangeability, and efficiencies.
 - 2) Brake horsepower requirements.
 - 3) Copies of equipment data plates.
 - b. Piping and duct connection size, type and location.
 - c. Equipment bearing life certification.
 - d. Equipment foundation data:
 - 1) Equipment center of gravity.
 - 2) Criteria for designing vibration, special or unbalanced forces resulting from equipment operation.
 - 3) Type, size, and materials of construction of anchorage.
 - 4) Data required by for anchor rod design.
3. Electric motor:
- a. Motor manufacturer and model number.
 - b. Complete motor nameplate data.
 - c. Weight.
 - d. NEMA design type.
 - e. Enclosure type.
 - f. Frame size.
 - g. Winding insulation class and temperature rise.
 - h. Starts per hour.
 - i. Performance data:
 - 1) Motor speed-torque curve superimposed over driven machine speed-torque curve during start-up acceleration and at rated terminal voltage a minimum permissible or specified terminal voltage for all motors over 5 HP.
 - 2) Time-current plots with acceleration versus current and thermal damage curves at the operating and ambient temperatures and at rated terminal voltage and minimum permissible or specified terminal voltage for all motors over 5 HP.
 - 3) Guaranteed minimum efficiencies at 100 percent, 75 percent, and 50 percent of full load.
 - 4) Guaranteed minimum power factor at 100 percent, 75 percent, and 50 percent of full load.
 - 5) Locked rotor and full load current at rated terminal voltage and minimum permissible or specified terminal voltage.

- 6) Starting, full load, and breakdown torque at rated terminal voltage and minimum permissible or specified terminal voltage.
- j. Bearing data and lubrication system.
- k. Natural frequency calculations for:
 - 1) Completed assembly including but not limited to the equipment base, rotating piece of equipment, and the rotating piece of equipment driver.
 - 2) Individual piece of rotating equipment.
 - 3) Equipment driver and connected gear reducer, if applicable.
- l. Thermal protection system including recommended alarm and trip settings for winding and bearing RTD's.
- m. Maximum permissible capacitor (kVAC) that can be connected to the motor.
- n. Recommended size of power factor correction capacitors to improve power factor to 0.95 lagging when operated at full load.
- o. Fabrication and/or layout drawings:
 - 1) Dimensioned outlined drawing.
 - 2) Connection diagrams including accessories (strip heaters, thermal protection, etc.).
- p. Certifications:
 - 1) When utilized with a reduced voltage starter, certify that motor and driven equipment are compatible.
 - 2) When utilized with a variable frequency controller, certify motor is inverter duty and the controller and motor are compatible.
 - a) Include minimum speed at which the motor may be operated for the driven machinery.
- q. Electrical gear:
 - 1) Unless specified in a narrow-scope Specification Section, provide the following:
 - a) Equipment ratings: Voltage, continuous current, kVa, watts, short circuit with stand, etc., as applicable.
 - 2) Control panels:
 - a) Panel construction.
 - b) Point-to-point ladder diagrams.
 - c) Scaled panel face and subpanel layout.
 - d) Technical product data on panel components.
 - e) Panel and subpanel dimensions and weights.
 - f) Panel access openings.
 - g) Nameplate schedule.
 - h) Panel anchorage.
 - i) Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70. Include any required calculations.
- 4. Systems schematics and data:
 - a. Provide system schematics where required in system specifications.
 - 1) Acknowledge all system components being supplied as part of the system.
 - 2) Utilize equipment, instrument and valving tag numbers defined in the Contract Documents for all components.

- 3) Provide technical data for each system component showing compliance with the Contract Document requirements.
 - 4) For piping components, identify all utility connections, vents and drains which will be included as part of the system.
 5. Qualifications for:
 - a. Natural frequency analysis firm and personnel.
 - b. Vibration testing firm and personnel.
 - c. Infrared thermography testing firm and personnel.
 - d. Electrical equipment and connections testing firm and personnel.
 6. Equipment Monitoring and Testing plans, in accordance with PART 3 of this Specification Section:
 - a. Natural frequency analysis and calculations.
 - b. Vibration testing.
 - c. Thermography testing.
 - d. Electrical equipment and connection testing.
- B. Factory Test Reports:
1. Natural frequency bump test reports where required for rotating equipment.
 - a. Minimum characteristics of impact hammer.
 - 1) Frequency Range 1 kHz.
 - 2) Range (5v output) 5,000 pounds-force (22,200 N).
 - 3) Hammer Sensitivity (7pprox.) 1 mV/lbf (0.23 mV/N).
 - 4) Resonant Frequency 12 kHz
 2. Motor, equipment and final assembled equipment including motor.
 - a. Determine natural frequency of assembled motor prior to shipping to equipment manufacturer or job site.
 - 1) Individual motor fastened to an "infinitely rigid" mass at the same bolt circle as the final assembled equipment.
 - b. Determine natural frequency of the pump.
 - 1) Pump fastened to an "infinitely rigid" mass at the same bolt circle as the final assembled equipment.
 - c. Determine natural frequency of the pump/motor assembly.
 - 1) Pump/motor assembly fastened to an "infinitely rigid" mass at the same bolt circle as the final field assembled equipment.
 - d. For this use, the "infinitely rigid" mass shall be at least 10 times the weight of the equipment being tested.
 3. Submit natural frequency report(s) for approval prior to shipment.
 4. Equipment performance tests.
 - a. As listed in individual equipment specifications.
- C. Contract Closeout Information:
1. Operation and Maintenance Data:
 - a. See Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- D. Informational Submittals:
1. Notification, at least one week in advance, that testing will be conducted at factory.

2. Certification from equipment manufacturer that all manufacturer-supplied control panels that interface in any way with other controls or panels have been submitted to and coordinated with the supplier/installer of those interfacing systems.
3. Submit sample Manufacturer's Field Service Report (MFSR). Report shall use manufacturer's standard report or use the form in the Exhibits and have at least the following information:
 - a. Certification that equipment has been installed properly, has been initially started up, has been calibrated and/or adjusted as required, and is ready for operation.
 - b. Certification for major equipment supports that equipment foundation design loads shown on the Drawings or specified have been compared to actual loads exhibited by equipment provided for this Project and that said design loadings are equal to or greater than the loads produced by the equipment provided.
 - c. Motor test reports.
 - d. Field noise testing reports if such testing is specified.
 - e. Preliminary field quality control testing format to be used as a basis for final field quality control reporting.
 - f. Provide three bound final written reports documenting natural frequency testing, vibration monitoring and testing for specified equipment.
 - 1) Include the acceptance criteria of all equipment tested.
 - 2) Provide individual tabbed sections for information associated with each piece of tested equipment.
 - g. Certification prior to Project closeout that electrical panel drawings for manufacturer-supplied control panels truly represent panel wiring including any field-made modifications.
 - h. Testing and monitoring reports in accordance with PART 3 of this Specification Section.
 - i. Certification that driven equipment and VFD are compatible.
4. Submit completed Manufacturer's Field Service Report (MFSR) for each piece of equipment supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. Motors:
 - a. ABB Baldor-Reliance.
 - b. General Electric.
 - c. Hyundai Heavy Industries.
 - d. Marathon Electric.
 - e. Siemens.
 - f. TECO-Westinghouse.
 - g. Toshiba U.S.
 - h. U.S. Motors, Nidec Motor Corporation.
 - i. WEG.
 2. Mechanical variable speed drives:

- a. Reeves.
- b. U.S. Motors (VariDrive).

2.2 MANUFACTURED UNITS

A. Electric Motors:

1. Where used in conjunction with adjustable speed AC or DC drives, provide motors that are fully compatible with the speed controllers.
2. Design for frequent starting duty equivalent to duty service required by driven equipment.
3. Design for full voltage starting.
4. Design bearing life based upon actual operating load conditions imposed by driven equipment.
5. Size for altitude of Project.
6. Furnish with stainless steel nameplates which include all data required by NEC Article 430.
7. For vertical pump motors provide solid shaft (VSS) unless a hollow shaft (VHS) is specifically required in the narrow scope pump specifications.
8. Use of manufacturer's standard motor will be permitted on integrally constructed motor driven equipment specified by model number in which a redesign of the complete unit would be required in order to provide a motor with features specified.
9. AC electric motors less than 1/3 hp:
 - a. Single phase, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.
 - c. Built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element with stainless steel enclosure.
10. AC electric motors 1/3 to 1 hp:
 - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.
 - 1) For single phase motors, provide built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element.
11. AC electric motors 1-1/2 to 10 hp:
 - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.
 - c. For vertical motors provide 15 year, average-life thrust bearings conforming to ABMA standards.
12. AC electric motors greater than 10 hp:
 - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Oil or grease lubricated antifriction bearings conforming to ABMA standards.
 - 1) Design bearing life for 90 percent survival rating at 50,000 hours of operation for motors up to and including 100 hp.
 - 2) For motors greater than 100 hp, design bearing life for 90 percent survival rating at 100,000 HRS of operation.
 - c. For vertical motors provide 15 year, average-life thrust bearings conforming to ABMA standards.
 - 1) Provide steady bushing when a vertical hollow shaft (VHS) motor is specified in the narrow scope specifications.

- d. Thermal protection:
 - 1) For motors 50 hp and above controlled from a variable frequency drive and for all other motors 100 hp and above, provide one of the following:
 - a) Integral thermal detectors (thermostat) per phase with normally closed contacts wired in series that will open on overtemperature
 - b) Resistance type temperature detector (RTD) complete with monitor and alarm panel having a normally closed contact that will open on overtemperature.
 - (1) Two thermal sensing devices per phase in each phase hot-spot location.
 - (2) Monitor and alarm panel:
 - (a) For constant speed motors, install panel in and energize from the motor starter equipment.
 - (b) For variable speed motors, install panel in and energize from the variable speed drive equipment.
- 13. Severe duty motor to have the following minimum features:
 - a. All cast iron construction.
 - b. Gasketed conduit box.
 - c. Epoxy finish for corrosion protection.
 - d. Hydrosopic varnish on windings for corrosion protection.
 - e. Drain plug and breather.

B. NEMA Design Squirrel Cage Induction Motors:

- 1. Provide motors designed and applied in compliance with NEMA and IEEE for the specific duty imposed by the driven equipment.
- 2. Motors to meet NEMA MG 1 (NEMA Premium) local jurisdiction efficiencies.
- 3. Do not provide motors having a locked rotor kVA per HP exceeding the NEMA standard for the assigned NEMA code letter.
- 4. For use on variable frequency type adjustable speed drives, provide:
 - a. Induction motors that are in compliance with NEMA MG 1, Part 31.
 - b. Nameplate identification meeting NEMA MG 1 Part 31 requirements.
 - c. Insulated drive end bearing on all motors.
 - d. Insulated non-drive end bearings, at a minimum, on all motors with horizontal shaft 100 hp and larger.
 - e. An insulated bearing carrier on the non-drive end for vertical shaft motors 100 hp and larger.
 - f. Shaft grounding ring on all motors:
 - 1) Factory installed, maintenance free, circumferential, bearing protection ring with conductive microfiber shaft contacting material.
 - 2) Electro Static Technology AEGIS SGR Bearing Protection Ring or approved equal.
 - g. Have the following minimum turndown ratio without the use of additional cooling, such as a blower, to provide continuous supply of cooling air over the motor.
 - 1) Variable torque: 10:1.
 - 2) Constant torque: 6:1.

5. Design motor insulation in accordance with NEMA standards for Class F insulation with Class B temperature rise above a 40 degrees C ambient.
6. Design motors for continuous duty.
7. Size motors having a 1.0 service factor so that nameplate HP is a minimum of 15 percent greater than the maximum HP requirements of the driven equipment over its entire operating range.
 - a. As an alternative, furnish motors with a 1.15 service factor and size so that nameplate HP is at least equal to the maximum HP requirements of the driven equipment over its entire operating range.
8. Motor enclosure and winding insulation application:
 - a. The following shall apply unless modified by specific Specification Sections:

MOTOR LOCATION	MOTOR ENCLOSURE / WINDING INSULATION
Unclassified Indoor Areas	DPFG (for horizontal motors), WP-I (for vertical motors) Standard Insulation,
Wet indoor Areas	TEFC, Standard Insulation [] [WP-II (for vertical motors)]
Wet outdoor Areas	TEFC, Extra Dip and Bake for Moisture] WP-II (for vertical motors)
Corrosive Areas	TEFC, Severe/ Chemical Duty
Class I, Division 1 Areas	Explosion Proof, Approved for Class I Division 1 Locations
Class II, Division 1 Areas	Explosion Proof, Approved for Class II Division 1 Locations
Class I or Class II, Division 2 Areas	Explosion Proof, Approved for Division 1 Locations or TEFC with maximum external frame temperature compatible with the gas or dust in the area, [Extra Dip and Bake for moisture] [Encapsulated Windings]

NOTE: Provide TENV motors in the smaller horsepower ratings where TEFC is not available.

9. Provide oversize conduit box complete with clamp type grounding terminals inside the conduit box.
 10. Balance motors to ISO G2.5 level.
 - a. Submit prior to shipping to equipment manufacturer or job site.
- C. Submersible Motors: Refer to individual narrow-scope Specification Sections for submersible motor requirements.
- D. V-Belt Drive:
1. Provide each V-belt drive with sliding base or other suitable tension adjustment.
 2. Provide V-belt drives with a service factor of at least 1.6 at maximum speed.
 3. Provide staticproof belts.
- E. Mechanical Variable Speed Drives:
1. Oil-lubricated shaft-mounted reduction gear drive capable of 300 percent shock load and providing a 1.5 service factor in accordance with AGMA.
 2. Assure infinite speed adjustment over a 10:1 range.
 3. Secure drive to equipment base.
 4. Flexible coupling between drive shaft and equipment shaft.
- F. Vibration Isolators:

1. Provide all equipment subject to vibration with restrained spring type vibration isolators or pads according to the manufacturer's written recommendation.

G. Space Heaters:

1. Silicone rubber strip type, 120 V rated.
2. Provided on:
 - a. All motors 10 hp and larger mounted outdoors.
 - b. Indoor motors in humid environments as indicated.

2.3 COMPONENTS

A. Gear Drives and Drive Components:

1. Size drive equipment capable of supporting full load including losses in speed reducers and power transmission.
2. Provide nominal input horsepower rating of each gear or speed reducer at least equal to nameplate horsepower of drive motor.
3. Design drive units for 24 hour continuous service, constructed so oil leakage around shafts is precluded.
4. Utilize gears, gear lubrication systems, gear drives, speed reducers, speed increasers and flexible couplings meeting applicable standards of AGMA.
5. Gear reducers:
 - a. Provide gear reducer totally enclosed and oil lubricated.
 - b. Utilize antifriction bearings throughout.
 - c. Provide worm gear reducers having a service factor of at least 1.20.
 - d. Furnish other helical, spiral bevel, and combination bevel-helical gear reducers with a service factor of at least 1.50.

2.4 ACCESSORIES

A. Guards:

1. Provide each piece of equipment having exposed moving parts with full length, easily removable guards, meeting OSHA requirements.
2. Interior applications:
 - a. Construct from expanded galvanized steel rolled to conform to shaft or coupling surface.
 - b. Utilize non-flattened type 16 GA galvanized steel with nominal 1/2 inches spacing.
 - c. Connect to equipment frame with hot-dip galvanized bolts and wing nuts.
3. Exterior applications:
 - a. Construct from 16 GA stainless steel or aluminum.
 - b. Construct to preclude entrance of rain, snow, or moisture.
 - c. Roll to conform to shaft or coupling surface.
 - d. Connect to equipment frame with stainless steel bolts and wing nuts.

B. Anchorage:

1. Cast-in-place anchorage:
 - a. Provide ASTM F593, Type 316 stainless steel anchorage for all equipment.
 - b. Configuration and number of anchor bolts shall be per manufacturer's recommendations.

- c. Provide two nuts for each bolt.
- 2. Drilled anchorage:
 - a. Adhesive anchors.
 - b. Epoxy grout
 - c. Threaded rods same as cast-in-place.
- C. Data Plate:
 - 1. Attach a stainless steel data plate to each piece of rotary or reciprocating equipment.
 - 2. Permanently stamp information on data plate including manufacturer's name, equipment operating parameters, serial number and speed.
- D. Gages:
 - 1. Provide gages.
 - 2. Provide at the following locations:
 - a. Inlet and outlet of all reciprocating, centrifugal and positive displacement mechanical and process equipment.
 - b. At locations identified on Drawings.
 - 3. Utilize tapping sleeves for mounting.
- E. Lifting Eye Bolts or Lugs:
 - 1. Provide on all equipment 50 pounds or greater.
 - 2. Provide on other equipment or products as specified in the narrow-scope Specification Sections.

2.5 FABRICATION

- A. Design, fabricate, and assemble equipment in accordance with modern engineering and shop practices.
- B. Manufacture individual parts to standard sizes and gages so that repair parts, furnished at any time, can be installed in field.
- C. Furnish like parts of duplicate units to be interchangeable.
- D. Ensure that equipment has not been in service at any time prior to delivery, except as required by tests.
- E. Furnish equipment which requires periodic internal inspection or adjustment with access panels which will not require disassembly of guards, dismantling of piping or equipment or similar major efforts.
 - 1. Quick opening but sound, securable access ports or windows shall be provided for inspection of chains, belts, or similar items.
- F. Provide common, lipped base plate mounting for equipment and equipment motor where said mounting is a manufacturer's standard option.
 - 1. Provide drain connection for 3/4 inches PVC tubing.
- G. Machine the mounting feet of rotating equipment.
- H. Fabricate equipment which will be subject to Corrosive Environment in such a way as to avoid back to back placement of surfaces that cannot be properly prepared and painted.

1. When such back to back fabrication cannot be avoided, provide continuous welds to seal such surfaces from contact with corrosive environment.
 2. Where continuous welds are not practical, after painting seal the back to back surfaces from the environment.
- I. Natural frequency/critical Speed:
1. All rotating parts accurately machined and in as near perfect rotational balance as practicable.
 2. Excessive vibration is sufficient cause for equipment rejection.
 3. Ratio of all rotative speeds to natural frequency/critical speed of a unit or components: Greater than 1.2.
- J. Equipment Base
1. Adequate grout and vent openings to allow grout to flow under entire base.
- K. Control Panels Engineered and Provided with the Equipment by the Manufacturer:
1. Manufacturer's standard design for components and control logic unless specific requirements are specified in the specific equipment Specification Section.
 2. NEMA or IEC rated components are acceptable, whichever is used in the manufacturer's standard engineered design, unless specific requirements are required in the specific equipment Specification Section.
 3. Affix entire assembly with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to delivery.
 - a. Control panels without an affixed UL 508A or UL 698A label shall be rejected.
 4. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
 - a. Determine the SCCR rating by one of the following methods:
 - 1) Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
 - 2) Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
 - 3) Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
 - b. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the control panel circuit originates.
 - c. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

2.6 SHOP OR FACTORY PAINT FINISHES

- A. Electrical Equipment:
1. Provide factory-applied paint coating system(s) for all electrical equipment components except those specified to receive field painting.

2.7 SOURCE QUALITY CONTROL

- A. Motor Tests:
1. Test motors in accordance with NEMA and IEEE standards.
 2. Provide routine test for all motors.
 3. The Owner reserves the right to select and have tested, either routine or complete, any motor included in the project.

- a. The Owner will pay all costs, including shipping and handling, for all motors successfully passing the tests.
- b. Pay all costs, including shipping and handling, for all motors failing the tests.
- c. If two successive motors of the same manufacturer fail testing, the Owner has the right to reject all motors from that manufacturer.

B. Balance:

1. Unless specified otherwise, for all equipment 10 hp or greater, all rotating elements in motors, pumps, blowers, and centrifugal compressors shall be fully assembled, including coupling hubs, before being statically and dynamically balanced. Balance all rotating elements to the following criteria, per ISO 21940-11:

$$U_{per} = \frac{G \times 6.015 \times W/2}{N}$$

Where:

U_{per} = Permissible residual unbalance for each correction plane in ounce-inches (OZ-IN). See ISO 21940-11 for acceptable values.

G = ISO Balance Quality Grade Number, per ISO 21940-11

W = Rotor weight in pounds

N = Maximum continuous operating RPM

- a. Where specified, balancing reports, demonstrating compliance with this requirement, shall be submitted as product data.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install equipment as shown on the Drawings and other Contract Documents, in accordance with manufacturer's written instructions, and in accordance with Laws and Regulations. Where the Contract Documents, manufacturer's written instructions, or Laws and Regulations conflict, obtain interpretation or clarification from Engineer before proceeding.
- B. Utilize appropriate templates for anchorage placement for equipment installed on concrete.
- C. Equipment Drainage Discharges:
 1. For equipment having drainage requirements, such as seal water, provide 3/4-inch copper, PVC, or clear plastic tubing from drainage discharge at equipment base to nearest floor drain or equipment drain. Do not discharge liquid across floors.
 2. Furnish and install bell up at each equipment base.
 3. Route equipment drainage piping clear of major traffic areas, to discharge to locations approved by Engineer. To extent practical, avoid creating tripping hazards.
- D. Coordination of Equipment Supports and Bases with Structures:
 1. Do not construct foundations until major equipment supports are approved by Engineer.
- E. Equipment Lubrication Points:

1. Extend all non-accessible or difficult-to-access lubrication fittings to reasonably accessible locations to facility operation and maintenance personnel without use of ladders or elevating devices, by providing stainless steel tubing (of appropriate wall thickness for the service and application) to a location which allows easy access of fittings from closest operating floor level.
- F. Concrete Equipment Support Bases:
1. Install level in both directions, with acceptable vertical tolerance of 1/4-inch±.
 2. At anchorage locations, install bases flat and level.
- G. Machine Bases / Sole Plates:
1. Grease or tape anchorages and jack screws to inhibit grout from adhering to bolts and other anchors.
 - a. Jack screws number and size by equipment manufacturer.
 - 1) Jack screw
 - a) 304 Stainless Steel minimum
 - b) 0.5 inches diameter minimum
 - 2) Jack Screw Pad
 - a) 2 inch diameter minimum
 - b) Anchored in place with a structural epoxy adhesive.
 2. Install machine base of rotating equipment on equipment base.
 3. Level in both directions using jack screws, with a machinist level, according to machined surfaces on base. Base shall be level within vertical tolerance of the lesser of (a) 0.005 inch per foot with no more than 0.0005 inches difference between any two points, or (b) equipment manufacturer's written instructions.
 4. Level machine base on equipment base and align couplings between driver and driven equipment.
- H. Couplings for Rotating Equipment:
1. Align in annular and parallel positions.
 - a. For equipment rotating at 1200 rpm or less, align both annular and parallel within 0.001 inch tolerance for couplings four-inch size and smaller.
 - b. Couplings larger than four-inch size: Increase tolerance 0.0005 inch per inch of coupling diameter above four-inch; for example: for six-inch coupling, tolerance is 0.002 inch. For 10 inch coupling, required tolerance is 0.004 inch.
 - c. For equipment rotating at speeds greater than 1200 rpm, tolerance for both annular and parallel positions shall be rate of 0.00025 inch (or less) per inch of coupling diameter.
 2. If equipment is furnished by manufacturer as mounted unit, verify factory alignment after installation at the Site. Realign if as necessary, in accordance with equipment manufacturers' written instructions, to provide required factory tolerance..
 3. Inspect surfaces for runout before attempting to trim or align units.
- I. Grouting:
1. Level onto equipment base with jack screws in accordance with the Contract Documents, provide a dam or formwork around base to contain grout between equipment base and equipment support pad.
 2. Preparation:
 - a. Extend dam or formwork to cover leveling shims and blocks.

- b. Anchor sleeves:
 - 1) Required for equipment (Pumps, Mixers, Blowers) greater than 50 hp
 - 2) If anchor sleeves were used, fill voids in anchor sleeves with foam or room temperature vulcanizing (RTV) silicone to keep grout from filling sleeves.
- c. Do not use nuts below the machine base to level the unit.
- d. Saturate top of roughened concrete surface with water before grouting.
- 3. Grout Installation:
 - a. Install grout until entire space under machine base is completely filled to underside of base. Voids are unacceptable.
 - b. Puddle grout by working a stiff wire through the grout and vent holes, to ensure grout is installed properly and to release air entrained in grout or base cavity.
- 4. After Grout Installation:
 - a. When grout is sufficiently hardened, remove dam or formwork and finish exposed grout surface to fine, smooth surface.
 - b. Completely cover exposed grout surfaces with wet burlap and keep covering sufficiently wet to prevent too-rapid evaporation of water from grout.
 - c. Check for voids by tapping along the top deck of the mounting plate. A solid thud indicates grout-filled areas while a drum-like hollow sound indicates a void requiring filling.
 - 1) Void areas are to be filled by drilling 1/8 inches NPT holes in opposite corners of each void area. Grout to be pumped into one void with a grout gun until grout emerges from the other vent hole.
 - d. When grout is fully hardened (after not less than seven days), remove jack screws, and tighten nuts on anchor bolts and similar anchors to required torque.
 - e. Inspect and verify levelness of machine base and, if not in accordance with requirements, remedy by removing base and reinstalling in accordance with the Contract Documents.
 - f. Inspect driver-driven equipment for proper alignment. When not in accordance with requirements, remedy so that the Work is not defective.

3.2 INSTALLATION CHECKS

- A. For all equipment specifically required in detailed specifications, secure services of experienced, competent, and authorized representative(s) of equipment manufacturer to visit site of work and inspect, check, adjust and approve equipment installation.
 - 1. In each case, representative(s) shall be present during placement and start-up of equipment and as often as necessary to resolve any operational issues which may arise.
- B. Secure from equipment manufacturer's representative(s) a written report certifying that equipment:
 - 1. Has been properly installed and lubricated.
 - 2. Is in accurate alignment.
 - 3. Is free from any undue stress imposed by connecting piping or anchor bolts.
 - 4. Has been operated under full load conditions and that it operated satisfactorily.
 - a. Secure and deliver a field written report to Owner immediately prior to leaving jobsite.
- C. No separate payment shall be made for installation checks.

1. All or any time expended during installation check does not qualify as Operation and Maintenance training or instruction time when specified.

3.3 IDENTIFICATION OF EQUIPMENT AND HAZARD WARNING SIGNS

- A. Identify equipment and install hazard warning signs.

3.4 FIELD PAINTING AND PROTECTIVE COATINGS

- A. For required field painting and protective coatings, comply with manufacturer's requirements.

3.5 WIRING CONNECTIONS AND TERMINATION

- A. Clean wires before installing lugs and connectors.
- B. Coat connection with oxidation eliminating compound for aluminum wire.
- C. Terminate motor circuit conductors with copper lugs bolted to motor leads.
- D. Tape stripped ends of conductors and associated connectors with electrical tape.
 1. Wrapping thickness shall be 150 percent of the conductor insulation thickness.
- E. Connections to carry full ampacity of conductors without temperature rise.
- F. Terminate spare conductors with electrical tape.

3.6 FIELD QUALITY CONTROL

- A. General:
 1. Furnish equipment manufacturer's field quality control services and testing as specified in the individual equipment Specification Sections.
 2. Perform and report on all tests required by the equipment manufacturer's Operation and Maintenance Manual.
 3. Provide testing for all equipment furnished or installed as part of the Work.
 4. Repair or replace equipment shown to be out of range of the acceptable tolerance until the equipment meets or exceeds acceptable standards.
 5. Equip testing and analysis personnel with all appropriate project related reference material required to perform tests, analyze results, and provide documentation including, but not limited to:
 - a. Contract Drawings and Specifications.
 - b. Related construction change documentation.
 - c. Approved Shop Drawings.
 - d. Approved Operation and Maintenance Manuals.
 - e. Other pertinent information as required.
- B. Equipment Monitoring and Testing Plans:
 1. Approved in accordance with Shop Drawing submittal schedule.
 2. Included as a minimum:
 - a. Qualifications of firm, field personnel, and analysis personnel doing the Work.
 - b. List and description of testing and analysis equipment to be utilized.
 - c. List of all equipment to be testing, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,

- C. Instruments Used in Equipment and Connections Quality Control Testing:
1. Minimum calibration frequency:
 - a. Field analog instruments: Not more than 6 months.
 - b. Field digital instruments: Not more than 12 months.
 - c. Laboratory instruments: Not more than 12 months.
 - d. If instrument manufacturer's calibration requirements are more stringent, those requirements shall govern.
 2. Carry current calibration status and labels on all testing instruments.
 3. See individual testing programs for additional instrumentation compliance requirements.
- D. Testing and Monitoring Program Documentation:
1. Provide reports with tabbed sections for each piece of equipment tested.
 2. Include all testing results associated with each piece of equipment under that equipment's tabbed section.
 - a. Include legible copies of all forms used to record field test information.
 3. Prior to start of testing, submit one copy of preliminary report format for Engineer review and comment
 - a. Include data gathering and sample test report forms that will be utilized.
 4. In the final report, include as a minimum, the following information for all equipment tested:
 - a. Equipment identification, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,
 - b. Date and time of each test.
 - c. Ambient conditions including temperature, humidity, and precipitation.
 - d. Visual inspection report.
 - e. Description of test and referenced standards, if any, followed while conducting tests.
 - f. Results of initial and all retesting.
 - g. Acceptance criteria.
 - h. "As found" and "as left" conditions.
 - i. Corrective action, if required, taken to meet acceptance.
 - j. Verification of corrective action signed by the Contractor, equipment supplier, and Owner's representative.
 - k. Instrument calibration dates of all instruments used in testing.
 5. Provide three (3) bound final reports prior to Project final completion.
- E. Other Testing:
1. Perform tests and inspections not specifically listed but required to assure equipment is safe to energize and operate.
 2. Subbase that supports the equipment base and that is made in the form of a cast iron or steel structure that has supporting beams, legs, and cross members that are cast, welded, or bolted shall be tested for a natural frequency of vibration after equipment is mounted.

- a. The ratio of the natural frequency of the structure to the frequency of the disturbing force shall not be between 0.5 and 1.5.

F. Infrared Thermography Testing Program:

1. Perform infrared thermography testing for equipment specified in other Divisions during the Equipment Demonstration Period.
 - a. Perform on all rotating and reciprocating equipment having drivers 25 hp or greater.
2. Additional requirements for infrared thermography monitoring and testing equipment:
 - a. Temperature range: -10 to 350 degrees C.
 - b. Accuracy: ± 2 percent or 2 degrees C, whichever is greater.
 - c. Repeatability: ± 1 percent or 1 degree C, whichever is greater.
 - d. Temperature indication resolution: 0.1 degrees C.
 - e. Minimum focus distance: 0.3 meters.
 - f. Output in color palettes: JPEG, BMP, or other digital format compatible with Windows.
3. Perform inspection per ASTM E1934.
 - a. Operate VFD driven equipment at 100 percent speed during thermographic inspection.
4. Acceptability of electrical connections and components based on temperature comparison between components and ambient air temperatures not greater than 10 degrees C per ASTM E1934.
5. Acceptability of motors and equipment bearings based on temperature rise not greater than 5 DEGC above the equipment and/or bearing manufacturers published criteria.

G. Equipment Field Vibration Monitoring and Testing Program:

1. Perform vibration monitoring and testing for equipment specified in other Divisions during the Equipment Demonstration Period.
2. Perform field vibration testing on each item of rotating and reciprocating equipment having driver 50 HP and greater
3. Acceptability of equipment conditions, except pumps, based on ISO 1940-1 Balance Quality Grade G6.3 criteria.
4. Acceptability of pumping equipment to be based on current ANSI/HI criteria:
 - a. ANSI/HI 11.6-2012 for Submersible Pumps in a Wet-pit or Dry-pit configuration.
 - b. ANSI/HI 9.6.4-2016 for all other centrifugal pumps.
5. Utilize an Engineer approved 3rd party testing agency to perform vibration monitoring and testing on equipment.
6. For variable speed equipment provide vibration testing at no more than 3 percent increments of maximum speed throughout entire operating range.
7. Provide machinery condition diagnosis based on an acceptable machinery vibration severity guide or machinery fault guide analysis provided by the testing agency.
8. Tolerances for pumping equipment shall be per HI published standards.
9. Repair or replace equipment shown to be out of range of the specified tolerance until the equipment meets the specified normal operation range required in the machinery fault guide analysis.
10. Document testing with written report.

- a. Report to include initial testing results, acceptance criteria, corrective action taken to meet acceptance, verification of corrective action and acceptance report and baseline.
- b. Natural frequency of installed equipment utilizing an impact hammer.
- c. Report to include graphical plots of vibration signature for each test point at a scale which illustrates all vibration levels greater than 0.025 ips RMS.

3.7 ABBREVIATION TABLE

- A. As indicated on the Drawings.

END OF SECTION

EXHIBIT A
MANUFACTURER FIELD SERVICE REPORT

This field service report is generic in nature. An electronic copy of this form will be furnished upon request from the Engineer. This report is to reflect that all requirements of the Operations and Maintenance Manual and the individual equipment specification requirements have been performed for the installation and operation and also to provide a baseline for amperage draw for each phase, vibration readings, rotation, alignment and all other applicable tests required to insure that the equipment has been installed properly. A MFSR will be required for each individual piece of equipment requiring a MFSR.

Definitions of Reports:

Initial service report: Required for construction preparations. Equipment delivered to site is in good condition and conforms to specification requirements. Anchor bolts, hardware and ancillary items (piping, flanges, conduits, fuel/power supply) are compatible with equipment.

Interim service report: Required for equipment installation onto base or foundation. Piping connections, electrical and control connections or structural attachment are complete. For equipment stored on site over four weeks, interim service report will document that manufacturer's long-term storage procedures have been incorporated and equipment has not been damaged, nor coatings deteriorated.

Final service report is to be completed when equipment can be started, electrical amperage and voltage draw measured, cold and hot alignments performed, vibration testing and monitoring performed and the equipment is found to be in compliance with Manufacturer's operating parameters and the requirements of the individual equipment specifications.

PROJECT: _____

Report Status:

Initial Service Report completed and submitted on _____

Interim Service Report completed and submitted on _____

Final Service Report completed and submitted on _____

Commencement of Warranty _____

I Description

A. Equipment Name and Identification: _____

B. Serial Number: _____

C. Specification Section Number: _____

D. Manufacturer: _____

E. Representative: _____

F. Type of Service: Initial ☐ Interim ☐ Final ☐

II General Review

A. The above referenced equipment/material/supplies have been inspected, checked, and adjusted. Yes ☐ No ☐

Summary: _____

B. The above referenced equipment/material/supplies were placed upon properly prepared or suitable substrate. N/A ☐ Yes ☐ No ☐

Summary: _____

C. The above referenced equipment/material/supplies are free from any undue stress imposed by any connected piping, anchor bolts or any other load. N/A ☐ Yes ☐ No ☐

Summary: _____

- D. The above referenced equipment/material/supplies have operated under design conditions. N/A ☐ Yes ☐ No ☐

Summary: _____

- E. The above referenced equipment/material/supplies have been installed in accordance with the manufacturer's recommendations and the Procurement Documents, require no corrective work, and are hereby approved. Yes ☐ No ☐

Summary: _____

- F. The above referenced equipment/material/supplies are acceptable to the manufacturer as installed providing the following corrective action(s) are performed:

1. _____

2. _____

3. _____

4. _____

5. _____

III Inspection Checklist

Item	Acceptable (Yes/No)	Readings/Comments
Bearings (1)		
Belts (tension reading)		
Lubrication Levels		
Vibration (1) (2) (MILS/SEC)		
Infrared Thermography (1) (2)		
Starting AMPS		
Full Load AMPS		
Volts		
Rotation		
Jacket Temperature (DEGF)		
Seal Water Flow Rate (GPH or GPM)		
Seal Water Pressure (PSI)		
O-rings/Packing		
Alignment (1)		

Item	Acceptable (Yes/No)	Readings/Comments
Anchor Bolts		
Anchor Bolt Torque		
Grout		
Substrate Approval		
Sound level (4 feet from unit) (1) (dB)		
Other		

(1) Inspection or testing reports must be attached.

(2) Provide vibration testing and monitoring procedures for Engineer's review and approval prior to testing.

IV O&M Manuals

- A. The O&M manual as presented contains all information required for proper operation, maintenance, and instruction of this system. N/A ☐ Yes ☐ No ☐

Summary: _____

V Preventive Maintenance

- A. The preventive maintenance summary outlined in the O&M manual is acceptable for operation of the system throughout the warranty period. N/A ☐ Yes ☐ No ☐

Summary: _____

VI Operator Training/Classroom Instruction

- A. Training and instruction have been performed in accordance with the requirements of the Procurement Documents. N/A ☐ Yes ☐ No ☐

- B. Final Training/Classroom Instruction Completed on: _____

Summary: _____

VII Remarks

VIII Certification

I hereby certify, that I, [____], am a duly authorized representative of the manufacturer, that I am empowered by the manufacturer to inspect, approve, and operate his equipment, and that I am authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as modified herein. I also certify that all information contained herein is true and accurate.

By: _____
(Authorized Representative)

For: _____

Date: _____

IX Acknowledgments

By: _____

For: _____
(Contractor)

Date: _____

By: _____

For: _____
(Engineer)

Date: _____

SECTION 01 65 00
PRODUCT DELIVERY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for:
 - a. Coordination of deliveries.
 - b. Preparing materials and equipment for shipping from the production or fabrication facility, including packaging.
 - c. Shipment.
 - d. Delivery of materials and equipment to the Site.
 - e. Inspection upon delivery and remedy of damaged, deteriorated, or otherwise defective items, and remedy of missing or lost items.
- B. Scope:
 - 1. Contractor shall make all arrangements for packaging, shipping, delivering, inspecting upon delivery, and unloading upon delivery materials and equipment necessary and required for the Work.
 - 2. Contractor shall provide all labor, materials, equipment, tools, incidentals, and services necessary to have materials and equipment properly packaged, shipped, and delivered to the Site, and all related Work required by the Contract Documents.
- C. Related Requirements: Include but are not limited to:
 - 1. Section 01 29 76 - Progress Payment Procedures.
 - 2. .
 - 3. Section 01 66 00 - Product Storage and Handling Requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. To extent practicable, coordinate shipping and delivery of materials and equipment with anticipated shipping requirements, such as allowing sufficient time for customs inspections on international shipments, availability of shipping services and facilities, and seasonal concerns (such as shipments that may be influenced by major tropical storms and predictable, typical weather).
 - 2. Coordinate shipping and delivery of materials and equipment to the Site and other locations where such items may be stored prior to delivery to the Site. Coordinate such shipments and deliveries with the progress of the Work and status of adequate facilities, whether temporary storage or permanent installation locations, necessary to properly store and safeguard materials and equipment to be incorporated into the Work.
 - 3. Where possible, deliver to the Site materials and equipment as close as possible to when such items will be incorporated into appropriately protected, permanent installation location.

1.3 PREPARATION FOR SHIPMENT

- A. Factory Assembly:
 - 1. When practical, factory-assemble materials and equipment. Mark or tag separate parts and assemblies to facilitate field assembly.
- B. Temporary Protection:

1. Appropriately cover, with strippable, protective coating or other material, machined parts and unpainted, uncoated, or unprotected surfaces subject to damage or deterioration caused by weather elements or environment,
 2. To extent practical, strippable, removable, disposable protective materials shall be recyclable.
 3. To extent practical, strippable, removable, and disposable protective items shall be type resulting in minimum waste and cleanup upon removal.
 4. Protection of Electrical Equipment, Instrumentation and Controls, Items with Computer Chips Solid-State Devices, and Other Electronics:
 - a. Provide appropriate temporary protection of electrical equipment, microprocessors, and other electronics from humidity, moisture, and corrosion by appropriate packaging, protection, desiccants, and volatile corrosion inhibitor (VCI) blocks.
 - b. Immediately prior to shipment, provide new, fresh desiccants and ensure integrity of other protective materials.
- C. Packaging:
1. Package materials and equipment to facilitate handling, and protect materials and equipment from damage during shipping, handling, and storage.
 2. Mark, label, or tag, on outside of each package, crate, and container, to indicate associated:
 - a. Purchase order number.
 - b. Bill of lading number.
 - c. Delivery address (including facility name, where applicable).
 - d. Owner's contract designation or Project name.
 - e. Contractor name.
 - f. Purchasing Subcontractor's name (as applicable).
 - g. Contents by name and designation within the Work (for example, "Influent Pump No. 1"),
 - h. Approximate weight of container, crate, package, including packaging.
 - i. Special instructions for handling and protection during shipment and unloading.
 3. The Site may be listed as the "ship to" or "delivery" address; but Owner or facility manager shall not be listed as recipient of shipment unless otherwise directed in writing by Engineer.
 4. Truthfully and accurately mark, label, or tag items for shipment and delivery.
 5. Include complete packing lists and bills of materials with each shipment.
 6. Protect materials and equipment with appropriate, temporary packaging or protection when such items may rotate or move during shipment.
 7. Protect materials and equipment from exposure to weather elements, adverse environments, and keep thoroughly dry and dust-free. Protect painted surfaces against impact, abrasion, discoloration, and other damage and deterioration.
 8. Lubricate bearings and other items requiring lubrication, in accordance with manufacturer's written instructions.

1.4 SHIPPING

A. Notification of Shipments:

1. Keep Engineer and Owner, informed of delivery of all materials and equipment to be incorporated into the Work.
2. Upon receipt of Supplier's advance notice of shipment, not less than seven days prior to delivery of materials and equipment at the Site or Contractor's storage location, furnish Engineer written notice of anticipated delivery date and specific location (at the Site or Contractor's storage location, as applicable) of the following:
 - a. HDPE Pipe and CMP Pipe
 - b. HDPE Manholes

- c. Concrete Manholes
 - d. Conduit.
- B. Do not ship materials and equipment until:
 1. Related Shop Drawings, product data, Samples, shop testing plan Submittals, and other Submittals required by the Contract Documents are approved by Engineer, including, but not necessarily limited to, all Action Submittals associated with the materials and equipment being delivered.
 2. Manufacturer's written instructions for handling, storing, and installing the associated materials and equipment have been submitted to and accepted by Engineer, in accordance with the Specifications.
 3. Results of source quality control activities (factory testing and inspections), when required by the Contract Documents for the subject materials or equipment, have been submitted to and accepted by Engineer.
 4. Facilities required for handling materials and equipment, in accordance with the Contract Documents and manufacturer's instructions, are in place and available at the delivery location.
 5. Required storage facilities and protection measures have been provided.
- C. Loss or Damage During Shipment:
 1. Unless otherwise indicated in the Contract Documents (whether expressly or in provisions regarding builder's risk insurance), Contractor is responsible for all loss, damage, and deterioration to materials and equipment incurred during shipment and delivery.
 2. Contractor is not eligible for additional Contract Times or increase in the Contract Price due to delays or costs incurred due to loss, damage, or deterioration during shipment, unless Owner was responsible for shipping the subject materials or equipment to the Site or other delivery location.

1.5 DELIVERY

- A. Scheduling and Timing of Deliveries:
 1. Arrange deliveries of materials and equipment in accordance with the Progress Schedule accepted by Engineer and in ample time to facilitate inspection and observation prior to installation.
 2. Schedule deliveries to minimize space required for, and duration of, storage of materials and equipment at the Site or other delivery location, as applicable.
 3. Coordinate deliveries to avoid conflicting with the Work and conditions at the Site, and to accommodate the following:
 - a. Work of other contractors at or adjacent to the Site, Owner, , and others.
 - b. Storage space limitations.
 - c. Availability of appropriate construction equipment and machinery, tools, and qualified personnel for inspecting, unloading, and handling materials and equipment.
 - d. Owner's use of premises.
 4. Deliver materials and equipment to the Site during regular working hours.
 5. Deliver materials and equipment to avoid delaying the Work and the Project.
- B. Deliveries:
 1. Provide Contractor's telephone number to shipper; do not provide Owner's [telephone number to shipper or carrier.
 2. Arrange for deliveries while Contractor's personnel are at the Site. Contractor shall receive and coordinate shipments upon delivery. Shipments delivered to the Site when Contractor is not present will be refused by Owner, and Contractor shall be responsible for the associated delays and costs, including demurrage.
- C. Containers and Marking:

1. Have materials and equipment delivered in manufacturer's original, unopened, labeled containers.
 2. Clearly mark partial deliveries of component parts of materials and equipment to identify materials and equipment, to allow easy accumulation of parts, and to facilitate assembly.
- D. Inspection of Materials and Equipment Upon Delivery:
1. Immediately upon delivery, visually but critically inspect shipment to verify that:
 - a. Materials and equipment comply with the Contract Documents and approved or accepted (as applicable) Submittals.
 - b. Quantities are correct.
 - c. Materials and equipment are undamaged and of required quality.
 - d. Containers and packages are intact and labels are complete and legible.
 2. Eligibility for Payment:
 - a. Materials and equipment are not eligible for payment until duly inspected and determined to be in accordance with the Contract Documents and Engineer-approved Submittals, without damage or deterioration.
 - b. No payment can be made for damaged, deteriorated, or otherwise defective items.
 - c. No payment can be made for missing or lost items.
 - d. Other provisions of the Contract Documents may establish other preconditions for payment for delivered material and equipment, including Section 01 29 76 – Progress Payment Procedures.
 3. Damaged, Deteriorated, and Otherwise Defective Items:
 - a. Promptly remove from the Site damaged, deteriorated, or defective materials and equipment and expedite delivery of new, undamaged materials and equipment.
 - b. Promptly remedy incomplete or lost materials and equipment.
 - c. Furnish materials and equipment in accordance with the Contract Documents, to avoid delaying progress of the Work.
 - d. Promptly advise Engineer in writing: (1) when damaged, deteriorated, incomplete, or otherwise defective materials and equipment are delivered, and (2) associated impact on the Progress Schedule.
- E. Handling of Materials and Equipment Upon Delivery:
1. Provide construction equipment and machinery, tools, and qualified personnel necessary to unload and handle materials and equipment, [including those furnished by Owner, by methods that prevent damaging, defacing, and soiling materials and equipment and packaging.
 2. Comply with Section 01 66 00 – Product Storage and Handling Requirements.
 3. Provide additional protection during unloading and handling as necessary to prevent scraping, marring, and otherwise damaging materials and equipment and adjacent surfaces.
 4. Unload and handle materials and equipment by methods that prevent bending, warping, and overstressing.
 5. Lift heavy components only at designated lifting points.
 6. Unload and handle materials and equipment in safe manner and as recommended by manufacturer to prevent damage. Do not drop, roll, or skid materials and equipment off delivery vehicles or at other times during unloading and handling.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

This page intentionally left blank.

SECTION 01 66 00
PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for:
 - a. Payment considerations for stored materials and equipment.
 - b. Handling of materials and equipment.
 - c. Storage of materials and equipment, including:
 - 1) General provisions for storage.
 - 2) Storage locations.
 - 3) Protection of stored items.
 - 4) Storage of items containing Constituents of Concern.
 - 5) Outdoor, uncovered storage.
 - 6) Outdoor, covered storage.
 - 7) Fully-protected storage.
 - 8) Removal of temporary storage facilities and restoration of storage areas.
 - d. Maintenance of storage.

B. Scope:

1. Contractor shall provide all labor, materials, equipment, tools, services, lands, and incidentals necessary and required to store and handle materials and equipment to be incorporated into the Work, and other materials and equipment at the Site, adjacent areas, and offsite storage areas.
2. Comply with Section 01 71 33 - Protection of the Work and Property, relative to handling and storing materials and equipment.

C. Related Requirements: Include but are not limited to:

1. Section 01 29 76 - Progress Payment Procedures.
2. Section 01 55 13 - Vehicular Access and Parking.
3. Section 01 57 05 - Temporary Controls.
4. Section 01 65 00 - Product Delivery Requirements.
5. Section 01 71 33 - Protection of the Work and Property.

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment:

1. Materials and equipment delivered but not suitably stored and protected will not be eligible for payment.
2. Engineer may recommend reduction in payment, and Owner may reduce payments to Contractor ("set-offs") by an appropriate amount when stored items are subsequently revealed to be improperly stored or protected.
3. Payment for Suitably Stored Items:
 - a. Requirements for payment for materials and equipment delivered and suitably stored, but not yet incorporated into the Work, are in the General Conditions, as may be modified by the Supplementary Conditions, and Section 01 29 76 - Progress Payment Procedures.
 - b. Materials and equipment delivered and suitably stored, but not yet incorporated into the Work, will not be eligible for payment until the inspection upon delivery, required in

Section 01 65 00 - Product Delivery Requirements, is completed and Engineer concurs that such items generally appear to be in good condition, in accordance with the Contract Documents, and are of the required quality and quantity.

1.3 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Affidavits of Inspection and Maintenance Performed on Mechanical and Electrical Equipment in Long-Term Storage:
 - a. Submit in accordance with requirements of Article 3.1 of this Section.
2. Other Records of Inspection and Maintenance of Stored Materials and Equipment:
 - a. Establish and maintain such records as required by this Section.
 - b. Submit to Engineer or Owner (as applicable) within three days of Contractor's receipt of such request.

1.4 HANDLING

A. Handling of Materials and Equipment – General:

1. Handle materials and equipment to be incorporated into the Work in accordance with the Contract Documents and manufacturer's written instructions.
2. During handling and assembling of materials and equipment:
 - a. Maintain validity of manufacturers' warranties.
 - b. Comply with:
 - 1) Section 01 65 00 - Product Delivery Requirements.
 - 2) Section 01 71 33 - Protection of the Work and Property.
 - c. Do not drop, drag (without appropriate rollers or skids), or scrape materials and equipment.
 - d. Use proper construction equipment and machinery, and tools, operated by sufficient number of qualified personnel.
 - e. Maintain materials and equipment in neutral position.
 - f. Do not exert undue stress on materials and equipment.
 - g. Do not deform, bend, or damage materials and equipment.
 - h. Do not deform or mar shafts, bearings, or other parts.

B. Additional Requirements for Hoisting and Lifting:

1. When lifting or hoisting, support materials and equipment from appropriate lifting points using proper hooks and suitable nylon lifting straps, chains, and cables. Do not mar or scrape surfaces of materials and equipment during handling.
2. Do not support rigging from building or structure without written approval of Engineer.
3. Contractor is responsible for and shall remedy damage to building, structure, [and existing hoisting equipment and elevators, resulting from Contractor's operations, in accordance with Section 01 71 33 - Protection of the Work and Property.

1.5 STORAGE

A. Storage – General:

1. Contractor shall make all arrangements and provide all measures necessary and required for, and pay all costs associated with, storing materials and equipment.
2. Store materials and equipment in accordance with the Contract Documents and manufacturer's written instructions. In event of conflict between the Contract Documents and manufacturer's written instructions regarding storage and protection, comply with the more-stringent, more-protective requirements.
3. Comply with Section 01 71 33 - Protection of the Work and Property.
4. Records:

- a. Establish and maintain up-to-date account of materials and equipment in storage, to facilitate preparation of progress payment requests, if the Contract Documents provide for payment for materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing.
 - b. Submit affidavits of inspection and maintenance of mechanical and electrical equipment in long-term storage in accordance with this Section's Article 3.1 ("Maintenance of Storage").
5. Arrange stored materials and equipment to allow easy access for observation or inspection by Owner, Engineer, Resident Project Representative (RPR), Owner-hired testing and inspection entities, and authorities having jurisdiction.
 6. Inspect and maintain stored materials and equipment in accordance with this Section's Article 3.1 ("Maintenance of Storage").

B. Storage Location:

1. Area(s) available at the Site for storing materials and equipment are addressed in Section 01 14 19 - Use of Site.
2. When onsite storage is insufficient, Contractor shall provide additional lands for storage facilities as necessary and required for the Work.
3. Restrictions on Storage Locations:
 - a. Do not store materials or equipment in structures being constructed unless approved by Engineer in writing.
 - b. Do not use lawns, landscaped areas, or private property for storage without written permission of property owner.
 - c. Comply with:
 - 1) Section 01 14 19 - Use of Site.
 - 2) Section 01 55 13 - Vehicular Access and Parking.
 - 3) Section 01 71 33 - Protection of the Work and Property.

C. Protection of Stored Items – General:

1. Store materials and equipment indicated below to ensure preservation of quality and fitness for intended uses in the Work, including proper protection against damage and deterioration resulting from: water (including precipitation, flood, and other), moisture, humidity, wind, dust, freezing, and outdoor ambient air high temperature as high as 100 degrees F. Temperature and humidity inside crates, containers, storage structures, and packaging may be significantly higher than outdoor ambient air temperature.
2. Store in indoor, climate-controlled storage all materials and equipment subject to damage or deterioration by water, moisture, humidity, heat, cold, and other elements, unless otherwise acceptable to Owner and Engineer.
3. Do not open manufacturer's crates, containers, and packaging until time of installation, unless recommended by the manufacturer or otherwise required in the Contract Documents.
4. Store all materials and equipment off the ground (or floor) on raised supports such as skids or pallets.
5. Electrical Equipment, Instrumentation and Controls, Items Containing Computer Chips, Solid-State Devices, and Other Electronics:
 - a. Contractor shall obtain, coordinate, and comply with specific temperature, humidity, and environmental limitations on materials and equipment, because temperature inside cabinets and components stored in warm temperatures can approach 200 degrees F.
 - b. Protect from water, moisture, humidity, dust, heat, cold, and other potentially harmful elements and environments. Space heaters provided in equipment shall be connected and operating at all times until equipment is connected to active, permanent, electrical power.

- c. Provide inside each electrical panel, control panel, and other enclosures with electronic device(s) each of the following: (1) desiccant, (2) volatile corrosion inhibitor (VCI) blocks, (3) moisture indicator, and (4) maximum- and minimum-indicating thermometer.
 - d. Check panels and equipment not less than once per month. Replace desiccant, VCI, and moisture indicator the earlier of: (1) as often as necessary, or (2) every six months.
 - e. Establish and maintain certified record of daily maximum and minimum temperature and humidity in storage facility. Such records shall be available for Engineer's and Owner's inspection upon request. Certified record of monthly inspection, noting maximum and minimum temperature for month, condition of desiccant, VCI, and moisture indicator, shall be available to Engineer and Owner upon request..
- 6. Finished Surfaces:
 - a. Protect finished surfaces against impact, abrasion, discoloration, and other damage.
 - b. Remedy, in accordance with requirements of item manufacturer and finishing system manufacturer damaged, marred, or deteriorated finishes, to Engineer's satisfaction.
- 7. Contractor is fully responsible for loss, damage, and deterioration, including theft and vandalism, to stored materials and equipment.
- D. Storage of Materials or Equipment Containing Constituents of Concern:
 - 1. Prevent contamination of personnel, storage areas, the Site, and adjacent areas.
 - 2. Comply with Laws and Regulations, and other provisions of the Contract Documents relative to Constituents of Concern and Hazardous Environmental Conditions.
- E. Uncovered Storage:
 - 1. The following materials may be stored outdoors without cover on supports, so there is no contact with the ground:
 - a. Reinforcing steel.
 - b. Precast concrete materials.
 - c. Structural steel.
 - d. Metal stairs.
 - e. Handrails and railings.
 - f. Grating.
 - g. Checker plate.
 - h. Metal access hatches, such as floor doors, roof hatches, and the like.
 - i. Castings.
 - j. Fiberglass items.
 - k. Rigid electrical conduit, except PVC-coated conduit.
 - l. Fencing intended for permanent, outdoor installation.
 - m. Piping, except PVC or chlorinated PVC (CPVC) pipe.
- F. Covered Storage:
 - 1. The following materials and equipment may be stored outdoors on supports and completely covered with covering impervious to water:
 - a. Grout and mortar materials.
 - b. Masonry units.
 - c. Metal decking.
 - d. Rough lumber.
 - e. Soil materials and granular materials such as aggregate.
 - f. PVC and CPVC pipe.
 - g. PVC-coated electrical conduit.
 - h. Filter media.

2. Properly and fully secure covers against coming loose in strong winds.
3. Install coverings properly sloped to prevent accumulation of water.
4. Loose Soil Material and Loose Granular Material:
 - a. Store such materials in well-drained areas.
 - b. Prevent mixing of such materials with foreign matter. Provide underlying separation layer or store on solid, impervious surface, where appropriate.
 - c. Provide temporary erosion and sediment controls for stockpiled soil materials in accordance with Section 01 57 05 - Temporary Controls.

G. Fully-Protected Storage:

1. Store all materials and equipment not indicated in the provisions above regarding uncovered storage and covered storage on supports, in buildings, trailers, or other suitable temporary storage facility with concrete or wood flooring, solid and impervious roof, and fully closed walls on all sides.
2. Covering with visqueen plastic sheeting or similar material in storage space without floor, roof, and walls is unacceptable.
3. Provide heated storage for materials and equipment that could be damaged or deteriorate by low temperatures or freezing.
4. Provide air-conditioned storage for materials and equipment that could be damaged or deteriorate by high temperature or humidity.
5. Protect mechanical and electrical equipment from being contaminated by dust, dirt, and moisture.
6. Maintain temperature and humidity at levels recommended by materials and equipment manufacturers.
7. Prevent infestation of stored items by pests and rodents. Promptly and properly remedy such infestation when apparent.

H. Removal of Temporary Storage Facilities and Restoration of Storage Areas:

1. Completely remove temporary storage facilities when no longer necessary for the Work.
2. Restore areas used for storage and areas occupied by temporary storage facilities, in accordance with the Contract Documents, including Section 01 71 33 - Protection of the Work and Property.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 MAINTENANCE OF STORAGE

- A. On a scheduled basis, periodically inspect stored materials and equipment to ensure that:
1. Condition and status of storage facilities is adequate to provide required storage conditions.
 2. Required environmental conditions are maintained on continuing basis.
 3. Materials and equipment exposed to weather elements or other environment are not adversely affected.
- B. Mechanical and Electrical Equipment in Long-Term Storage:
1. Meaning of the term "long-term storage" is as established in written instructions of manufacturer of associated materials or equipment.
 2. Mechanical and electrical equipment requiring long-term storage shall have complete manufacturer's written instructions for servicing each item, with notice of enclosed instructions shown on exterior of crate, container, or packaging.
 3. Frequency of inspections and maintenance of stored items shall be in accordance with manufacturer's written instructions.

4. For mechanical equipment with bearings and shafts, manually rotate shaft during inspection and maintenance, as recommended by equipment manufacturer.
5. Space heaters that are part of electrical equipment shall be connected and operated continuously until equipment is connected to permanent electrical power supply.
6. Other requirements for maintenance during storage of electrical equipment, instrumentation and controls, items with computer chips, solid-state devices and other electronics are in this Section's provision on general protection during storage.

C. Affidavits:

1. Submit to Engineer affidavit for each time maintenance and inspection was performed on materials and equipment in long-term storage. Affidavit shall be signed by Contractor and entity performing the inspection and maintenance on the stored items.
2. Indicate on affidavit:
 - a. Date of inspection.
 - b. Personnel involved and employer of each.
 - c. Condition of storage environment.
 - d. Specific stored items inspected, equipment condition, problems observed, problems corrected, maintenance tasks performed, and other relevant information.
 - e. Signature of Contractor's person responsible for the inspection and maintenance.
 - f. Signed and notarized statement by items' manufacturer indicating whether storage conditions and tasks performed are suitable for continued compliance with manufacturer's warranties.
3. Submit each affidavit, complete, not later than seven days after performing associated inspection and maintenance.

END OF SECTION

SECTION 01 71 14
MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Construction mobilization and demobilization.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals to perform mobilization and demobilization for the Work.
 - 2. This Section is general and does not necessarily indicate all activities required for mobilization and demobilization, which may be indicated in other parts of the Contract Documents.,
- C. Related Requirements: Include, but are not necessarily limited to:
 - 1. Section 01 14 19 - Use of Site.
 - 2. Section 01 22 00 - Measurement and Payment.
 - 3. Section 01 29 73 - Schedule of Values.
 - 4. Section 01 55 13 - Access Roads and Parking.
 - 5. Section 01 57 05 - Temporary Controls.
 - 6. Section 01 71 33 - Protection of the Work and Property.
 - 7. Section 01 74 00 - Cleaning.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and Payment:
 - 1. Where costs of mobilization and demobilization are to be included in a specific bid/pay item, such item is indicated in the Contract, including Section 01 22 00 - Measurement and Payment.
 - 2. Where the Contract does not expressly require costs for mobilization and demobilization are to be under specific bid/pay item(s), Contractor may allocate such costs among bid/pay items as Contractor deems appropriate.
 - 3. Where mobilization and demobilization is to be part of a larger lump sum bid/pay item, limitations on eligibility for payment of mobilization and demobilization costs are indicated in Section 01 29 73 - Schedule of Values..
- B. If costs for mobilization, demobilization, or both change as a result of Contract modifications, include the total cost of such changes to mobilization and demobilization in Change Proposal submitted for each associated change. Make no subsequent claim, whether via Change Proposal, Claim, or dispute, for additional compensation for mobilization, demobilization, or both.

1.03 MOBILIZATION AND DEMOBILIZATION - GENERAL

- A. Do not commence mobilization at the Site or other areas until:
 - 1. The Contract is signed by both parties and is effective.
 - 2. Required insurance documentation, performance bond, and payment bond have been submitted by Contractor and accepted by Owner, and builder's risk insurance complying with the Contract Documents is furnished and in place, and documentation thereof accepted by the parties.
 - 3. Conditions, if any, of Owner-issued Notice to Proceed, if any, have been complied with by the applicable party.

4. Preconstruction conference(s), including items on agenda for site mobilization matters, is completed.
 5. Preconstruction photographic documentation is obtained and submitted in accordance with the Contract Documents.
- B. Mobilization Work includes, but is not limited to:
1. Establishing vehicular access and parking in accordance with Section 01 55 13 - Vehicular Access and Parking.
 2. Establishing temporary controls in accordance with Section 01 57 05 - Temporary Controls and establishing and initial compliance with security for the Site in accordance with Section 01 57 33 - Temporary Security.
 3. Establishing Contractor's staging and laydown areas, in accordance with Section 01 14 19 - Use of Site.
 4. Establishing temporary utilities and temporary facilities in accordance with the Contract Documents.
 5. Establishing required and necessary temporary project signage.
 6. Other mobilization Work required by the Contract Documents, including Section 01 22 00 - Measurement and Payment, and Section 01 29 73 - Schedule of Values.
- C. Demobilization Work includes, but is not limited to:
1. Removing from the Site and other areas Contractor's temporary utilities, temporary facilities, temporary signage, temporary security measures; construction equipment, machinery, and tools; ,unused items of materials and equipment; and other items.
 2. Final restoration and repair of damage caused by Contractor, in accordance with Section 01 71 33 - Protection of the Work and Property.
 3. Final cleaning in accordance with Section 01 74 00 - Cleaning.
 4. Other demobilization Work required by the Contract Documents, including Section 01 22 00 - Measurement and Payment, and Section 01 29 73 - Schedule of Values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION - (NOT USED)

SECTION 01 71 23
FIELD ENGINEERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for Contractor's onsite recordkeeping.
2. Contractor's field engineering.
3. Contractor's surveying and layouts, and associated requirements.
4. This section supplements the General Conditions' provisions on reference points and other matters.

B. Scope:

1. Contractor shall provide onsite recordkeeping, field engineering (not related to design of the completed Work), surveying and layout services, and professional services of the types indicated for the Project, including:
 - a. Furnishing civil, structural, geotechnical, electrical, and other professional engineering and geology services, whether required by the Contract Documents or necessary in Contractor's judgment, to perform Contractor's means, methods, techniques, sequences, and procedures of construction. Such services do not include professional services associated with delegation of professional design responsibility, which (when required as part of the Work) is addressed elsewhere in the Contract Documents.
 - b. Developing and making all detail surveys and measurements required for construction; including slope stakes, batter boards, and all other working lines, elevations, and cut sheets.
 - c. Providing materials required for Contractor's benchmarks, control points, batter boards, grade stakes, structure and pipeline elevation stakes, and other items.
 - d. Keeping a transit, theodolite, or total station (i.e., theodolite with electronic distance measurement device); leveling instrument; and related implements such as survey rods and other measurement devices, at the Site at all times, and having a skilled instrument person available when necessary for laying out the Work and verifying lines, grades, and elevations.
 - e. Being solely responsible for all locations, dimensions, and levels of the Work. No data other than Change Order, Work Change Directive, or Field Order shall justify departure from dimensions and levels required by the Contract Documents.
 - f. Rectifying all Work improperly installed because of not maintaining, not protecting, or removing without authorization established reference points, stakes, marks, and monuments.
 - g. Providing such facilities and assistance necessary for Engineer and Resident Project Representative (if any) or Owner's Site Representative (if any) to check lines and grade points placed by Contractor.

1.2 PRICE AND PAYMENT PROCEDURES

A. Unit Price Work:

1. Do not perform excavation or embankment work until all cross-sectioning necessary for determining payment quantities for Unit Price Work have been completed and accepted by Engineer.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review requirements of this and other Specifications sections and coordinate other elements of the Work with field engineering, surveying, and layout Work and recordkeeping obligations set forth in this Specifications Section.

1.4 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Certificates:
 - a. When requested by Engineer following completion of the Work or a part thereof, submit certificate signed by professional engineer or professional surveyor, as applicable, indicating that elevations and locations of the Work comply with the Contract Documents. Explain each discrepancy, if any, from the requirements of the Contract Documents.
2. Contractor's Daily Reports and Field Engineering Records:
 - a. Submit daily reports as indicated in this Specification Section.
 - b. When requested by Engineer, submit documentation verifying accuracy of field engineering.
3. Contractor's Surveying Plan and Records:
 - a. Complete plan for performing surveying Work, submitted not less than 10 days prior to beginning surveying Work.
 - b. Example of proposed surveying field books to be maintained by Contractor's surveyor. Example surveying field book shall have sufficient information and detail, including example calculations and notes, to demonstrate that surveying field books will be organized and maintained in a professional manner in accordance with the Contract Documents.
 - c. Submit original surveying field books within two days after completing surveying Work.
 - d. Submit certified survey in accordance with this Specifications' section.
4. Qualifications Statements:
 - a. Field Engineer: Name, employer, and professional address. When requested by Engineer, submit qualifications, including detailed resume'.
 - b. Surveyor: Name, employer, professional address of firm, and detailed resumes of each professional land surveyor and crew chief that will be engaged in surveying Work. Submit not less than 10 days prior to beginning surveying Work. During the Project, submit detailed resume' for each new registered, licensed land surveyor and crew chief employed by or retained by Contractor not less than 10 days prior to starting on the surveying Work.

1.5 CONTRACTOR'S ENGINEERS

A. Qualifications of Contractor's Field Engineer:

1. Employ and retain at the Site a field engineer with experience and capability of performing all field engineering tasks required of Contractor, as indicated in this Article and elsewhere in the Contract Documents.
2. Contractor's field engineer shall possess not less than five years of experience performing duties similar in scope and complexity to those required of Contractor's field engineer on this Project.
3. Contractor's field engineer may serve as Contractor's Site superintendent, or as the recorder of as-constructed conditions in accordance with Section 01 78 39 - Project Record Documents, or as any combination of these roles as deemed appropriate by Contractor.
4. Maintain at the Site full-time superintendent or field engineer fluent in written and spoken English language.

B. Responsibilities of Contractor's Field Engineer:

1. Daily Reports:

- a. Prepare and maintaining daily reports of activity on the Contract. Submit reports to Engineer. Contractor's daily reports shall indicate the following information:
 - 1) Contractor's Employees: Number of Contractor's employees at the Site, apportioned by trade(s).
 - 2) Subcontractors: Separately indicate and identify each Subcontractor and the number of workers onsite for each. Apportion number of workers by trade(s).
 - 3) Equipment and materials installed as part of the Work.
 - 4) Equipment and materials, to be installed in the Work, delivered to the Site or off site storage location that day. When delivered to off site storage, indicate the storage location.
 - 5) Major construction equipment utilized by major activity. Indicate for each manufacturer, model number, and year of manufacture.
 - 6) Location of areas in which construction was performed.
 - 7) Work performed, including field quality control activities such as inspections and testing. Indicate field quality control activities witnessed by Engineer, Resident Project Representative (if any), or Owner's Site Representative (if any).
 - 8) Weather conditions, including minimum and maximum ambient air temperatures, relative humidity, conditions of high winds or other extreme weather, and precipitation.
 - 9) Safety concerns, events, and precautions taken.
 - 10) Defective Work observed or believed to exist.
 - 11) Delays encountered, extent of delay incurred, reasons for the delay, and measures that will be taken to rectify delays encountered.
 - 12) Acknowledgement of specific instructions received from Engineer, Resident Project Representative (if any), Owner, or Owner's Site Representative (if any).
 - 13) Visitors to the Site.
 - 14) Other notable events occurring on the Project.
 - b. Daily reports shall be signed and dated by responsible member of Contractor's staff, such as Contractor's field engineer, superintendent, project manager, or foreman designated by Contractor as having authority to sign daily reports.
 - c. Submit Contractor's daily reports in accordance with Section 01 31 26 - Electronic Communication Protocols, by 9:00 a.m. (local time at the Site) the next working day after the day covered in the associated report.
2. Check all formwork, reinforcing materials, inserts, structural steel, masonry, insulation, waterproofing and element protection, doors and windows, finishes, bolts, sleeves, piping, other materials and equipment for compliance with the Contract Documents.
 3. Continually inspect the Work to ensure that the quality and quantities required by the Contract Documents are provided.
 4. Promptly report defective Work to Contractor, Engineer, Resident Project Representative (if any), and Owner's Site Representative (if any).
 5. Cooperate as required with Engineer, Resident Project Representative (if any), and Owner's Site Representative (if any) in observing the Work and performing field inspections and other field quality control activities.
 6. Check and coordinate the Work for conflicts and interferences, and immediately advise Engineer and Resident Project Representative (if any) of all discrepancies of which Contractor is aware.
 7. Maintain field office files and drawings, record documents, and coordinate field engineering services with Subcontractors and Suppliers as appropriate, and other prime contractors (if any).
 8. Supervise or personally prepare and maintain Project record documents in accordance with Section 01 78 39 - Project Record Documents.
 9. Prepare layout and coordination drawings for construction operations.

10. Review and coordinate the Work with Shop Drawings approved by Engineer, other Submittals accepted by Engineer, and Contractor's means, methods, techniques, sequences, and procedures of construction and safety programs incident thereto.
 11. Coordinate onsite work of Subcontractors and Suppliers, or assist Contractor's Site superintendent in doing so.
- C. Design Professionals Services Retained by Contractor (whether or not stationed at the Site):
1. Delegated Professional Design Services:
 - a. Where the Contract Documents require Contractor to furnish professional engineering, geology, or architecture services as delegated professional design, the provisions of the General Conditions, Specifications, and other Contract Documents regarding delegated design responsibility apply.
 2. Design Professional Services that are Not Delegated Professional Design of the Completed Work:
 - a. Where the Contract Documents require that Contractor retain a design professional such as a professional engineer, geologist, or architect, or when in Contractor's judgment retaining such entity is necessary for implementing Contractor's means, methods, techniques, sequences, or procedures of construction or safety and protection programs incident thereto, retain a design professional with necessary skills, experience, and qualifications to perform the required services. Where required by the Contract Documents or by Laws or Regulations, such entity shall be duly licensed and registered to perform the associated design professional services in the same jurisdiction as the Site, unless otherwise allowed by Laws or Regulations or by the Contract Documents.
 - b. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed by such design professional(s).

1.6 CONTRACTOR'S SURVEYOR

- A. Qualifications:
1. Employ or retain the services, as needed, at the Site a surveyor with experience and capability of performing surveying and layout tasks required in the Contract Documents and as required for the Work. Comply with Laws and Regulations governing land surveying.
 2. Contractor's surveyor shall possess not less than five years of experience performing duties similar in scope and complexity to those required of Contractor's surveyor on this Project.
 3. Surveyor completing the as-built drawings shall be a professional land surveyor registered and licensed in the jurisdiction where the Site is located, or a professional engineer registered and licensed as a professional engineer in the jurisdiction where the Site is located and authorized under Laws and Regulations to practice land surveying.
- B. Responsibilities of Contractor's Surveyor:
1. Providing required surveying equipment, including transit, theodolite, or total station; level; stakes; and surveying accessories.
 2. Establishing required lines and grades for constructing all facilities, structures, pipelines, and site improvements, including outdoor electrical equipment and feeders.
 3. Preparing and maintaining professional-quality, accurate, well-organized, legible notes of all measurements and calculations made while surveying and laying out the Work.
 4. Prior to backfilling operations, survey, locate, and record on a copy of the Drawings accurate representation of buried Work and Underground Facilities provided and encountered.
 5. Locating on a site plan of the Site the actual location of above-ground work to be indicated on record documents.
 6. Complying with requirements of the Contract Documents relative to surveying and related Work, including requirements of this Specification section's Articles 1.6 and 3.1.

1.7 RECORDS

A. Records – General:

1. Maintain at the Site:
 - a. Contractor's field engineer's daily reports, with information and submitted in accordance with Article 1.5 of this Specification Section.
 - b. Information and documents required by Section 01 78 39 - Project Record Documents.
 - c. Complete and accurate log of control and survey Work as such Work progresses.
 - d. Other records deemed by Contractor to be necessary or appropriate.

B. Field Books and Records:

1. Survey data and records shall be in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standard of care in the locality where the Site is located.
2. Original field notes, calculations, and other surveying data shall be recorded by Contractor's surveyor in Contractor-furnished hard-bound field books, and shall be signed and sealed by Contractor's surveyor.
3. Completeness and accuracy of surveying Work, and completeness and accuracy of surveying records, including field books, shall be responsibility of Contractor.
4. Unacceptable Records of Contractor's Surveyor:
 - a. Failure to organize and maintain survey records in an appropriate manner that allows reasonable and independent verification of calculations, and to allow identification of elevations, lines, locations, dimensions, and grades of the Work, shall be cause for rejecting the surveying records, including field books.
 - b. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by Engineer.
 - c. Other provisions of the Contract notwithstanding, Contractor shall have sole responsibility for uncovering, re-surveying, and restoring uncovered Work should survey data be unacceptable to Engineer.

C. Certified Survey of Surface Structures:

1. Upon completion of foundation walls and major site improvements, prepare a certified survey, signed and sealed by professional surveyor, showing or indicating dimensions, locations, angles and elevations of construction and locations and elevations of Underground Facilities installed and encountered during the Work.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 SURVEYING

A. Reference Points:

1. Refer to the General Conditions, as may be modified by the Supplementary Conditions, for requirements regarding reference points.
2. Owner's established reference points that are damaged or destroyed by Contractor will be re-established by Owner at Contractor's expense. Owner may deduct from payments due Contractor such amounts as set-offs in accordance with the Contract Documents.
3. From Owner-established reference points, establish lines, grades, and elevations necessary to control the Work. Obtain measurements required for performing the Work to tolerances indicated in the Contract Documents.

4. Establish, place, and replace as necessary and required, such additional stakes, markers, and other reference points necessary for controlling the Work and verifying accuracy and compliance with the Contract Documents.
- B. Surveys to Determine Quantities for Payment:
1. For each application for progress payment, perform such surveying and calculations necessary to determine quantities of Work performed or placed, including Unit Price Work. Perform surveying necessary for Engineer to determine final quantities of Work in place.
 2. Comply with additional requirements, elsewhere in the Contract Documents for measurement for payment for specific types of Work.
 3. Advise Engineer, Resident Project Representative (if any), and Owner's Site Representative (if any) not less than 24 hours before performing surveying services for determining quantities to be included in Application for Payment. Unless waived in writing by Engineer, perform quantity surveys in presence of Engineer or Resident Project Representative (if any).
- C. Construction Surveying: Comply with the following:
1. Alignment Staking: Provide alignment stakes at 50 feet intervals on tangent, and at 25 feet intervals on curves.
 2. Slope Staking: Provide slope staking at 50 feet intervals on tangent, and at 25 feet intervals on curves. Re-stake at every ten-foot difference in elevation.
 3. Structure: Stake-out structures, including elevations, and check prior to and during construction.
 4. Pipelines: Stake-out pipelines including elevations, and check prior to and during construction.
 5. Roads, Drives, and Paved Areas: Stake-out roadway, driveway, and paved area elevations at 50-foot intervals on tangent, and at 25 feet intervals on curves.
 6. Cross-Sections: Provide original, intermediate, and final staking as required, for site work and other locations as necessary for quantity surveying.
 7. Easement Staking: Provide easement staking at 50 feet intervals on tangent, and at 25 feet intervals on curves. Also provide wooden laths with flagging at maximum intervals of 100 FT.
 8. Record Staking: Provide permanent stake at each blind flange and each utility cap provided for future connections. Stakes for record staking shall be material acceptable to Engineer, durably installed for long-term reference by Owner, utility owners, and others as necessary.
- D. Accuracy:
1. Establish Contractor's temporary survey reference points for Contractor's use to order of accuracy appropriate for Contractor's purposes while complying with the contract Documents. Construction staking used as a guide for the Work shall be 1:5,000 for all the Work. Notwithstanding the foregoing, provide the Work within the tolerances indicated below.
 2. Tolerances:
 - a. Horizontal tolerances for easement staking shall be plus or minus 0.1 feet.
 - b. Accuracy of other staking shall be plus or minus 0.04 feet horizontally and plus or minus 0.01 feet vertically, except that a tolerance of 0.1 feet vertically applies to earthwork and grading, riprap, and installation of buried piping for-inch diameter and less.
 - c. Tolerances for measurement for payment for selected types of the Work shall be as indicated elsewhere in the Contract Documents, including Specifications for the associated Work.
 - d. Provide the permanent Work within the tolerances indicated for staking in this Article.
 3. Survey calculations shall include an error analysis sufficient to demonstrate required accuracy.

END OF SECTION

This page intentionally left blank.

SECTION 01 71 33
PROTECTION OF THE WORK AND PROPERTY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for protecting the Work and property, including:
 - a. Accessing or entering property.
 - b. Temporary barricades and temporary warning lights and signs.
 - c. Responsibility to remedy damaged property.
 - d. Protecting natural habitats, including trees, plants, lawns and meadows, and wildlife.
 - e. Protecting Underground Facilities.
 - f. Protecting existing surface structures.
 - g. Protecting floors, walls, and roofs.
 - h. Protecting other installed items and landscaping.
- B. Scope:
 - 1. This Section augments requirements of the General Conditions as may be modified by the Supplementary Conditions regarding protection of the Work and property, including Underground Facilities.
 - 2. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required for protecting the Work and property in accordance with the Contract Documents.
 - 3. Responsibilities for security during the Project are indicated in Section 01 57 33 - Temporary Security.
- C. Related Requirements: Include, but are not necessarily limited to:
 - 1. Section 01 55 26 - Traffic Control.
 - 2. Section 01 57 05 - Temporary Controls.
 - 3. Section 01 57 33 - Temporary Security.
 - 4. Section 01 65 00 - Product Delivery Requirements.
 - 5. Section 01 66 00 - Product Storage and Handling Requirements.
 - 6. Section 01 71 23 - Field Engineering.
 - 7. Section 01 74 00 - Cleaning.

1.2 PROTECTION - GENERAL

- A. Contractor shall provide all precautions and programs and perform all actions necessary to protect personnel health and safety, and to protect the Work and all public and private property and facilities from damage, in accordance with the Contract Documents, Laws and Regulations, and other applicable requirements.
- B. To prevent damage, injury, and loss, Contractor's actions shall include the following:
 - 1. Providing measures for safety of all personnel at and adjacent to the Site, whether engaged in performing the Work, operating or maintaining the facility, or performing other functions for Owner or others.
 - 2. Storing construction equipment, machinery, tools, and similar items, materials and equipment to be incorporated into the Work, supplies, and other items in an orderly, safe manner that does not unduly interfere with progress of the Work or work of others, including Owner and facility manager (if other than Owner).

3. Suitably storing materials and equipment to be incorporated into the Work, in accordance with the Contract Documents, including Section 01 66 00 - Product Storage and Handling Requirements.
4. Placing upon the Work or any part thereof only loads consistent with the safety and integrity of that portion of the Work and existing construction and facilities.
5. Frequently removing and disposing of rubbish, scrap materials, and debris, in accordance with the Contract Documents, including Section 01 74 00 - Cleaning, resulting from Contractor's operations.
6. Providing temporary controls, including controlling pests and rodents, in accordance with the Contract Documents, including Section 01 57 05 - Temporary Controls.

PART 2 - PRODUCTS

2.1 TEMPORARY BARRICADES

A. Materials and Construction - General:

1. Temporary barricades shall be of materials that are either new or of good quality and sufficient for the intended purpose, exposure, and duration of use.
2. Provide temporary barricades of sturdy materials of grade, thickness, and durability sufficient for the probable loads to which they will be subject. Temporary barricades intended for fall prevention, such as railings and handrails on temporary stairs and temporary walkways and at openings, shall be in accordance with Laws and Regulations, including the applicable building and safety codes.
3. Color: Use appropriately colored and reflective barricades, or paint barricades accordingly, to be visible at night and during periods of low visibility.
4. Where owner of transportation right-of-way or transportation facility having jurisdiction or other authority having jurisdiction requires compliance with standards more stringent than the Contract Documents, comply with both the Contract Documents and requirements of the authorities having jurisdiction.

B. Temporary Snow Fence-type Barriers:

1. Unless shown or indicated otherwise, temporary barrier shall be not less than snow fence-type, four feet high, orange-colored or other high-visibility color. Polyethylene material or other, similar, durable material. Mesh size 1.25-inch by 1.5-inch.
2. Supports: Adequately support barriers to protect persons and property. Vertical supports may be timber, metal, or other appropriate material sufficient for the intended use, exposure, and duration of use. Properly secure fencing to supports with appropriate, stout, wire or other fastenings, sufficient to engage fencing for the intended use.

C. Temporary Concrete Barriers (Jersey Barriers):

1. Location:
 - a. Where shown or indicated, or where deemed appropriate by Contractor, provide temporary concrete barriers for trenches and excavations.
2. Materials:
 - a. Temporary concrete barriers shall be precast reinforced concrete.
 - b. Provide temporary barriers that are crash-worthy and are new or used; if used, materials shall be in good condition. Lifting holes not larger than four inches or lifting loops are acceptable.
 - c. Provide on temporary barriers white or yellow retroreflectors as applicable, to top or side of barrier at 25 feet on centers. Install retroreflectors at uniform height of not less than two feet above road surface. Flexible barrier delineators or barrier delineation tape may be provided in lieu of retroreflectors when approved by Owner.

D. Temporary Security Fencing: Comply with Section 01 57 33 - Temporary Security.

PART 3 - EXECUTION

3.1 ACCESSING OR ENTERING PROPERTY

A. Accessing or Entering Property - General:

1. Use and occupy only lands and easements furnished by Owner, unless appropriate consent from property owner and occupants is obtained by Contractor.
2. The foregoing applies to personnel, construction equipment and machinery, tools, vehicles, materials or equipment to be incorporated into the Work, supplies, temporary facilities, and other items or obstructions.
3. Limitations, if any, on accessing the Site are indicated in Section 01 55 13 - Vehicular Access and Parking.

3.2 BARRICADES

A. Temporary Barricades and Temporary Warning Lights and Signs - General:

1. All Work Areas:
 - a. Provide temporary barricades, warning lights, and warning signs for both indoor and outdoor Work, in accordance with Laws and Regulations and requirements of owners of affected property and facilities.
 - b. Warning Lights and Signage: From 30 minutes before terrestrial sunset to 30 minutes after terrestrial sunrise, provide and maintain not less than one temporary flashing light at each vehicle barricade and at other barriers and barricades as necessary.
 - c. Provide temporary barriers where shown or indicated, and where necessary to protect persons and property. At minimum, provide temporary barriers for all excavations that remain open during non-working hours.
 - d. Promptly replace temporary barricades that are damaged or are otherwise no longer capable of serving their intended function.
2. Where the Work is performed on or adjacent to roadway, access road, other area travelled by motor vehicles, railroad, or similar transportation right-of-way, or public place:
 - a. Provide temporary barricades, temporary fences, temporary guard rails, temporary lights and warning signs, temporary danger signals, and other precautions for protecting persons, property, vehicles, and the Work.
 - b. Provide sufficient temporary barricades to keep vehicles from being driven on or into excavations and the Work under construction.
 - c. Comply with Section 01 55 26 - Traffic Control.
3. Temporary Barriers for Areas Not Subject to Vehicular Traffic:
 - a. Provide temporary barriers around:
 - 1) Openings.
 - 2) Scaffolding.
 - 3) Temporary stairs and ramps.
 - 4) Around excavations.
 - 5) Around elevated walkways, slabs, and platforms.
 - 6) Other areas that may present a fall-hazard or hazard to persons and property.
 - b. Provide appropriate temporary barriers, warning signs and, where necessary, warning lights, at ground level and other low elevations, and at higher elevations. Protect persons and property from fall-hazards and protect persons and property at lower elevations from falling objects.
4. Duration of Temporary Barriers, Barricades, Signs, and Warning Lights:
 - a. Contractor's responsibility for maintaining temporary barriers, barricades, signs, and warning lights shall continue until the associated Work is substantially complete in accordance with the Contract Documents, unless other provision for protection are agreed to by the parties.

- b. After Substantial Completion, protect Work and property during periods when Contractor is onsite: completing the remaining Work, performing correction period work, and performing warranty work.
- B. Temporary Snow Fence-type Barriers:
 - 1. Establish temporary barriers around excavations and other areas as necessary for the protection of persons and property.
 - 2. Install snow fence-type barriers vertical for entire height of barrier.
 - 3. Maintenance:
 - a. Maintain temporary snow fence-type barriers as necessary.
 - b. Repair or replace when damaged, when barrier (or any section thereof) is no longer vertical, or when barrier (or any section thereof) is no longer properly supported for its full height and .
 - c. Reinstall barriers promptly following temporary removals for performing work and where barrier installation has degraded over original temporary barrier installation.
 - 4. Removal:
 - a. Remove temporary barriers from the Site when associated excavation is properly filled and the area is sufficiently safe for persons and other property.
- C. Temporary Concrete Barriers (Jersey Barriers):
 - 1. Installation:
 - a. Provide clean, precast concrete barriers on stable base.
 - b. Properly join and align barrier segments to provide crash-worthy barrier system.
 - c. Provide bond breaker when placing barrier segments on pavement to prevent damaging pavement when removing barriers.
 - d. Provide delineators and warning lights in accordance with the Contract Documents, manufacturer's recommendations, and requirements of owner of roadway right-of-way, as applicable.
 - 2. Maintenance:
 - a. Maintain alignment, delineation, warning lights, and condition of barriers as necessary and required by owner of roadway right-of-way, as applicable.
 - b. Immediately replace or repair damaged barriers. Such damage includes, but is not limited to, cracks or fractures that may hinder barrier performance.
 - 3. Removal:
 - a. Remove barriers from the Site when excavation is filled and appropriately restored, the area is sufficiently safe for persons, traffic, and other property, and when acceptable to owner of roadway right-of-way as applicable.
 - b. Where temporary concrete barriers were installed on pavement to remain following construction, remove from pavement all traces of temporary concrete barrier installation and temporary pavement markings and related traffic control devices, if any.
- D. Temporary Security Fencing: Comply with Section 01 57 33 - Temporary Security.

3.3 RESPONSIBILITY TO REMEDY DAMAGED PROPERTY

- A. Contractor to Remedy Damage:
 - 1. Contractor has full responsibility for preserving public and private property and facilities on and adjacent to the Site.
 - 2. Direct or indirect damage done by, or on account of, any act, omission, neglect (including inadvertent acts), or misconduct by Contractor (including any person or entity for whom contractor is responsible) in performing the Work, shall be promptly remedied by Contractor, at Contractor's expense, in accordance with the Contract Documents.

3. If the Contract Documents do not show or indicate the required restoration, or remedy, restore or remedy the damage to condition equal or better than that existing before damage was done.
- B. Owner May Remedy:
1. Should Contractor fail to protect and safeguard property and the Work after requests from Engineer or Owner, Owner reserves the right to implement measures to protect property and the Work.
 2. Cost of such Owner-implemented measures shall be paid by Contractor. Owner may deduct from payments due Contractor such amounts as set-offs in accordance with the Contract Documents.
 3. Such right, however, does not obligate Owner or Engineer to continuously monitor or have responsibility for protection of property and the Work, which responsibility is exclusively Contractor's.
 4. In exercising its rights under this provision, Owner will endeavor to give Contractor sufficient notice to allow Contractor to remedy the damage or defect within a reasonable time. However, if Owner or Engineer deems that the situation requires prompt remedy, Owner may act as quickly as Owner deems appropriate, without infringing on or mitigating Owner's rights under this provision and elsewhere in the Contract Documents

3.4 PROTECTION OF NATURAL HABITATS

- A. Tree and Plant Protection – General:
1. Protect existing trees, shrubs, and plants on or adjacent to the Site, shown or designated to remain in place, against unnecessary cutting, breaking, damage, and skinning of trunk, branches, bark, and roots.
 2. Protect irrigation servicing existing trees, shrubs, and plants on or adjacent to the Site that remain in place.
 3. Do not store materials or equipment or park construction equipment, machinery, or vehicles within foliage drip lines.
 4. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.
 5. Burning is not allowed at or adjacent to the Site, including burning, in open fires or otherwise, trees, plants, debris, or other combustible materials.
 6. Within the limits of the Work, water trees and plants that are to remain, to maintain their health during construction operations.
 7. Cover exposed roots with burlap, and keep such burlap continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by storm water runoff, erosion, flooding, and noxious materials in solution.
- B. Coordinate the Work in this Article with the following Specifications:
1. Section 31 10 00 - Site Clearing.
- C. Remedy of Damaged Trees:
1. If branches are damaged, prune branches immediately and protect as indicated below.
 2. If bark on trunk or major branches is scraped or damaged, using a sharp knife or other suitable cutting implement, clean the edge of the wound, leaving the bark smooth and tight against the wood. Avoid exposing more live tissue and do not remove too much healthy bark. Apply material indicated below.
 3. After pruning and cutting back damaged wood and bark, protect cut or damaged wood by applying emulsified asphaltic sealant specifically manufactured for sealing pruned and damaged trees. Apply sealant in accordance with sealant manufacturer's instructions, in manner acceptable to Engineer and tree owner.
 4. When directed by Engineer, remove and dispose of (at location away from the Site) damaged trees and plants (and parts thereof) that die or suffer permanent injury, and

replace each such damaged tree and plant with new tree or plant of equal or better species and quality.

D. Protection of Lawns and Meadows:

1. Protect lawns and meadows from unnecessary damage during performance of the Work.
2. To extent practicable, do not drive vehicles, construction equipment, machinery, or wheeled items such as carts and wheelbarrows, across lawns and meadows.
3. When existing lawn or meadow areas are disturbed, promptly stabilize exposed soil in accordance with Section 01 57 05 - Temporary Controls.
4. Remedy damaged lawns and meadows in accordance with the Contract Documents. If not otherwise addressed in the Contract Documents, restore to preconstruction condition or better with the same or substantively similar species.

E. Protection of Wildlife:

1. To extent practicable, avoid harming wildlife and damaging or destroying wildlife habitats, except for areas where the Work is to be located.
2. In the event a threatened or endangered species is discovered at the Site for which provisions was not otherwise provided, stop work in the vicinity and immediately orally advise Engineer by telephone or in-person, promptly followed by written notice in accordance with the Contract's provisions for notice for differing Site conditions. If species is not threatened or endangered, promptly resume work; no change in Contract Price or Contract Times is due for misidentification of threatened or endangered species.
3. Contractor is not responsible for wholesale inventorying or Site-wide evaluation of wildlife at the Site, except as indicated in the paragraph immediately above this paragraph.

3.5 PROTECTION OF UNDERGROUND FACILITIES

A. Underground Facilities – General:

1. Underground Facilities known to Owner and Engineer, except laterals or services to individual structures or properties, such as water, wastewater, storm water, gas and fuel, hydronic, steam, electric, and communications laterals or services, are shown on the Drawings. Information shown for Underground Facilities is the best available to Engineer but, in accordance with the General Conditions, as may be modified by the Supplementary Conditions, is not guaranteed to be correct or complete.
2. Comply with Laws and Regulations regarding notification of utility owners prior to performing the Work, including necessary "call before you dig" notifications.
3. Contractor shall explore ahead of trenching and excavating Work and shall sufficiently uncover Underground Facilities that will or may interfere with the Work to determine their location, to prevent damage to Underground Facilities, and to prevent service interruption to structures and properties served by Underground Facilities.
4. If Contractor damages an Underground Facility, Contractor shall promptly restore the damaged Underground Facility in accordance with requirements of the owner of the damaged facility and the Contract Documents. If the Contract Documents do not address repair or remedy of the damaged facility, restore to not less than preconstruction condition.
5. Necessary changes in the location of the Work may be directed by Engineer to avoid Underground Facilities not shown or indicated on the Contract Documents.
6. If permanent relocation of an existing Underground Facility is required and is not otherwise shown or indicated in the Contract Documents, Contractor may be directed in writing to perform the required work. When such relocation Work results in a change in the Contract Price, Contract Times, or both, the associated Contract modification procedures and payment for such Work shall be in accordance with the Contract Documents.

B. Protection of Underground Facilities under Roads and Parking Areas:

1. Provide temporary, heavy-duty steel roadway plates to protect existing manholes, handholes, valve boxes, vaults, and other Underground Facilities near to, or visible at, the ground surface.

2. Avoid imparting heavy loads, especially transitory loading (such as heavy truck traffic), vibration forces, and impact loads on Underground Facilities that are close to the ground surface and below-grade work areas. Provide temporary bridging or other appropriate protection where traffic must pass over Underground Facilities in close proximity to the ground surface.

C. Temporary Support of Underground Facilities:

1. Where Contractor exposes or excavates around or under one or more existing Underground Facilities, provide appropriate and adequate temporary supports for the associated Underground Facilities.
2. Do not allow Underground Facilities exposed by Contractor's operations to remain exposed without temporary support necessary to properly protect the Underground Facility. Where joint of Underground Facility is exposed by excavation, provide temporary support for each exposed joint and other temporary support as necessary.
3. Design of Temporary Supports:
 - a. Where necessary or where expressly required by the Contract Documents, retain services of professional engineer, in accordance with Section 01 71 23 - Field Engineering, to design the temporary supports. Such professional engineer shall be experienced with the type and size of subject Underground Facility, structural engineering, and geotechnical engineering sufficient for the foundations of the temporary supports.
 - b. Temporary supports are not delegation of professional design responsibility unless expressly so indicated in the Contract Documents.
 - c. Responsibilities of Contractor's professional engineer shall include, but are not necessarily limited to, the following:
 - 1) Advising Contractor on investigations necessary to obtain information for design of temporary supports. Reviewing and considering results of such investigations in the design of temporary supports.
 - 2) Visiting the Site to make personal observations as needed.
 - 3) Identify appropriate design criteria for temporary supports.
 - 4) Preparing necessary calculations, design drawings, and design specifications (sealed and signed when required by Contract or Laws or Regulations), appropriately based on the associated soil conditions and subsurface conditions, considering the consequences of failure of the temporary supports and associated potential for damage or failure of the existing subject Underground Facility.
 - 5) Design temporary supports with a safety factor of not less than 2.0.
 - 6) Review and approve or take other appropriate action on submittals of shop drawings and product data for the temporary supports and related materials.
 - 7) Make periodic visits to the Site during erection of the temporary supports and at appropriate intervals thereafter to inspect the temporary supports during performance of other, adjacent Work.
 - 8) Issue to Contractor written recommendations for repairs and improvements necessary for the proper protection of the associated Underground Facility.
 - 9) Submit to Contractor detailed, written recommendations for backfilling the excavation underneath and adjacent to the Underground Facility and for removing the temporary supports.
 - d. Contractor shall comply with the professional engineer's design of the temporary supports.
 - e. Owner may require and, in such event, Contractor shall submit, design documents, shop drawings, product data, and reports by Contractor-hired professional engineer. Do not submit such documents to Engineer. When such documents are furnished to Owner, the Owner has no obligation to perform any review of such documents and Owner's possession of such documents does not impart on Owner or Engineer any responsibility for or professional liability associated with design of such temporary

supports and consequences of implementing such designs. Owner and Engineer are not obligated in any way to implement recommendations of Contractor's professional engineer.

3.6 PROTECTION OF EXISTING SURFACE STRUCTURES

A. Surface Structures – General:

1. Surface structures are existing buildings, structures, and other facilities at or extending above ground surface, including their foundations and any extension below ground surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage routes, exposed piping and utilities, poles, exposed wires and cabling, posts, signs, markers, curbs, walks, fencing, and other facilities visible at or above ground surface.
2. Protect surface structures as necessary and promptly remedy damage and defects resulting or arising from Contractor's operations. Unless expressly shown or indicated otherwise in the Contract Documents, protect such items regardless of whether shown or indicated on the Drawings or elsewhere in the Contract Documents.
3. Protection of Overhead Utilities:
 - a. Protect visible, overhead utilities, including electrical power, communications, and piped utilities, and related supports, regardless of whether such items are shown or indicated in the Contract Documents.
 - b. When required by the Contract Documents or when acceptable to owner of such utility or facility, temporarily relocate overhead utilities or facilities as necessary perform the Work.
 - c. Provide temporary barriers, barricades, and warning signs identifying overhead utilities within reach of Contractor's construction equipment, machinery, or operations.

B. Temporary Removals of Surface Structures:

1. Existing surface facilities, including but not limited to guard rails, handrails, posts, guard cables, signs, poles, markers, curbs, and fencing, that are temporarily removed to facilitate the Work shall be replaced and restored promptly after the associated Work is performed.
2. Replace and restore such items in accordance with the Contract Documents. If not addressed in the Contract Documents, replace and restore such items to preconstruction condition or better.
3. Remedy damage to all items temporarily removed and later replaced and restored.
4. All such temporary relocations, replacement, and restoration is at Contractor's cost.

C. Protection of Surface Structures:

1. Sustain in their original location and protect from direct and indirect injury all surface structures located within or adjacent to the Site. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure or facility.
2. Before proceeding with the Work of sustaining and supporting such structure or facility, Contractor shall, upon Engineer's request, promptly satisfy Engineer that methods and procedures to be used have been approved by party owning the surface structure or facility.
3. Regardless of approval or acceptance by owner of property, structure, or facility, responsibility for protecting the Work and property is solely Contractor's.

3.7 PROTECTION OF FLOORS, WALLS, AND ROOFS

A. Protection of Floors, Walls, and Roofs – General:

1. Use proper protective covering when moving equipment, handling materials or other loads, when painting, handling mortar or grout, and when cleaning walls, ceilings, or structure contents.
2. Use metal pans to collect oil and cuttings from piping, conduits, and rod threading machines, and under metal cutting machines.
3. Maintain at the Site and use spill kits and absorbent pads for remedying spills.

4. Do not load concrete floors less than 28 days after concrete placement without Engineer's written permission.
5. Do not load slabs, floors, walls, or roofs in excess of design loading.
6. Do not load roofs without Engineer's written permission.
7. Restrict access to roofs, and keep Contractor's workers and personnel off existing roofs, except as necessary for the Work.
8. If access to roofs is necessary, roofing, parapets, openings, and all other construction on or adjacent to roof shall be protected with suitable plywood, barricades, or other appropriate means.

3.8 PROTECTION OF INSTALLED MATERIALS, EQUIPMENT, AND LANDSCAPING

A. General:

1. Protect existing facilities and installed Work to prevent damage from subsequent operations.
2. Remove protective items when no longer needed, prior to Substantial Completion of the associated Work.
3. Where work will continue in adjacent area(s) after Substantial Completion of a portion of the Work, protect the substantially completed Work until all work in the area is complete.

B. Control traffic (foot traffic, wheeled items such as carts, vehicles, and other traffic) to prevent damage to equipment, materials, and surfaces.

C. Coverings:

1. Provide temporary coverings to protect materials and equipment from damage.
2. Cover: projections, wall corners and jambs, sills, and soffits of openings, in areas used for traffic and for passage of materials and equipment in subsequent work.
3. Fasten protective items without harming the Work. Use tape or adhesives that do not leave residue when removed.

END OF SECTION

This page intentionally left blank.

SECTION 01 74 00

CLEANING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for keeping the Site free of accumulations of waste materials during construction ("progress cleaning").
2. Cleaning for Substantial Completion and prior to final inspection (collectively, "closeout cleaning").

B. Scope:

1. Contractor shall perform cleaning during the Project, including progress cleaning, as condition precedent to Substantial Completion, upon completion of the Work, and as required by the General Conditions, as may be modified by the Supplementary Conditions, this Specifications section, and elsewhere in the Contract Documents.
2. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Fire Protection Association (NFPA):
 - a. 241, Safeguarding Construction, Alteration, and Demolition Operations.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

A. Progress Cleaning – General:

1. Clean the Site, work areas, and other areas occupied by Contractor not less than weekly. Dispose of waste materials in accordance with the General Conditions, as may be modified by the Supplementary Conditions, and the following:
 - a. Comply with NFPA 241 for removing combustible waste materials and debris.
 - b. Do not hold non-combustible materials at the Site more than three days if the ambient air temperature is expected to rise above 80 degrees F. When ambient air temperature is less than 80 degrees F, dispose of non-combustible materials within seven days of their generation.
 - c. Provide suitable containers for storage of waste materials and debris. Avoid generation of odors and creation of nuisances.
 - d. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.

B. Progress Cleaning – Site:

1. Keep outdoor, dust-generating areas wetted down or otherwise control dust emissions.
2. Not less than weekly, brush-sweep roadways and paved areas at the Site and adjacent areas used by construction vehicles or otherwise affected by construction activities.
3. Comply with dust control requirements of Section 01 57 05 - Temporary Controls.

C. Progress Cleaning – Work Areas:

1. Clean areas where the Work is in progress to maintain an extent of cleanliness necessary for proper execution of the Work and safety of personnel.
 2. Remove liquid spills promptly. Where spills may have harmful effects on health, safety, protection of facilities, or the environment, immediately report spills to Owner, Engineer, and authorities having jurisdiction, in accordance with the Contract Documents and Laws and Regulations.
 3. Where dust would impair proper execution of or quality of the Work, broom-clean or vacuum entire work area, as necessary.
 4. Concealed Spaces: Remove waste material and debris from concealed spaces before enclosing the space.
- D. Progress Cleaning – Installed Work:
1. Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of installed materials and equipment, using only cleaning agents and methods specifically recommended by material or equipment Supplier.
 2. If Supplier does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and property and that will not damage or mar exposed surfaces.
- E. Progress Cleaning – Exposed Surfaces:
1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.
- F. Progress Cleaning – Cutting and Patching:
1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, trailings and cuttings, and similar materials.
 2. Thoroughly clean piping, ductwork, conduits, and similar features before applying patching material, paint, or other finishing materials.
 3. Restore damaged insulation and coverings on piping, cutwork, and similar items to its pre-construction condition.
- G. Cleaning of Hydraulic Structures:
1. Clean hydraulic structures that will contain fluid, such as tanks and channels.
 2. Do not perform field quality control activities such as testing tanks, channels, and other hydraulic structures for leakage or disinfecting (where applicable), and do not apply for inspection for Substantial Completion for hydraulic structures, until the associated hydraulic structures are clean and free of all waste materials, and ready for intended use.
- H. Waste Disposal:
1. Properly dispose of waste materials (including surplus materials, debris, rubbish, and other waste) off the Site.
 2. Do not burn or bury waste materials at the Site.
 3. Remove waste material and rubbish from excavations before backfilling.
 4. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into storm sewers, gutters, sanitary sewers, or other location in the environment. Dispose of such materials in accordance with Laws and Regulations.
 5. Do not discharge wastes to surface waters, drainage routes, or groundwater.
 6. Contractor is solely responsible for complying with Laws and Regulations regarding storing, transporting, and disposing of waste generated by Contractor's operations or brought to the Site by Contractor.
- I. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply protective covering where necessary or required for protection from damage or deterioration, until Substantial Completion.

- J. Clean completed construction as frequently as necessary throughout the construction period.

3.2 CLOSEOUT CLEANING

A. Complete the following prior to requesting inspection for Substantial Completion:

1. Clean and remove from the Site waste material (including rubbish and debris) and other foreign and undesirable items and substances.
2. Sweep broom-clean paved areas suitable for access by vehicles.
3. Remove spills and stains or petroleum, oils, solvents, other chemicals, and other foreign and undesirable deposits.
4. Hose-clean sidewalks and loading areas.
5. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
6. Surface waterways and drainage routes (including storm sewers, gutters, and ditches) shall be open and clean.
7. Repair pavement, roads, sod, and other areas affected by construction operations and restore to specified condition; if condition is not specified, restore to preconstruction condition.
8. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign and undesirable substances.
9. Clean, wax, and polish wood, vinyl, and painted floors.
10. Remove waste material and surface dust from limited-access spaces, including roofs, plenums, shafts, trenchway, equipment vaults, manholes, and similar spaces.
11. In unoccupied spaces, sweep concrete floors broom-clean.
12. Clean transparent materials, including mirrors and glazing in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
13. Remove non-permanent tags and labels.
14. Surface Finishes:
 - a. Touch-up and otherwise repair and restore chipped, scratched, dented or otherwise marred surfaces to specified finish and match adjacent surfaces.
 - b. Do not paint over "UL" or similar labels, including mechanical and electrical nameplates.
15. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign or undesirable substances.
16. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
17. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
18. Clean lighting fixtures, lamps, globes, and reflectors to function with full efficiency. Replace temporary lamps provided in permanent fixtures. Replace existing lighting fixture components that are burned out or noticeably dimmed from use during construction. Replace defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
19. Leave the Site clean, and in neat, orderly condition, satisfactory to Owner and Engineer.

B. Complete the following prior to requesting final inspection:

1. After Substantial Completion of all the Work, following completion of items of incomplete or damaged Work ("punch list Work"), clean "punch list Work" areas in accordance with Paragraph 3.2.A of this Specifications Section.
2. Remove field offices, Contractor's storage sheds, and remaining stockpiles and clean all such areas in accordance with Paragraph 3.2.B of this Specifications Section, and in accordance with Contract Documents for landscaping and restoration.

END OF SECTION

SECTION 01 77 19
CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements for:
1. Substantial Completion.
 2. Final inspection.
 3. Request for final payment and acceptance of the Work.

1.2 SUBSTANTIAL COMPLETION

- A. Substantial Completion – General:
1. Prior to requesting inspection for Substantial Completion, perform the following for the substantially completed Work:
 - a. Materials and equipment for which Substantial Completion is requested shall be fully ready for their intended use, including full operating and monitoring capability in automatic, manual, and other operating modes set forth in the Contract Documents.
 - b. Permanent provisions for safety and protection, shown and indicated in the Contract Documents and associated with the substantially completed Work or for personnel accessing and using the substantially completed Work, shall be in place and ready for their intended use.
 - c. Complete field quality control Work, including inspections and testing at the Site, indicated in Specifications sections for individual materials and equipment items and related Contract Documents. Submit results of, and obtain Engineer's acceptance of, field quality control tests and inspections required by the Contract Documents.
 - d. Complete checkout and startup in accordance with requirements of the Specifications for the various materials and equipment in the substantially completed Work, and related Contract Documents.
 - e. Cleaning for Substantial Completion shall be completed in accordance with Section 01 74 00 - Cleaning.
 - f. Spare parts, tools, and extra materials shall be delivered and accepted in accordance with the Contract Documents and documentation of Owner's acceptance thereof has been submitted to Engineer in acceptable form in accordance with Section 01 78 43 - Spare Parts and Extra Materials.
 - g. Submit and obtain Engineer's acceptance of final operations and maintenance manuals in accordance with Section 01 78 23 - Operation and Maintenance Data.
 - h. Obtain and submit to Engineer all required permits, inspections, and approvals of authorities having jurisdiction for the substantially completed Work to be occupied and used by Owner.
 - i. Complete other tasks that the Contract requires be completed prior to Substantial Completion.
 2. Procedures for requesting and documenting Substantial Completion are in the General Conditions, as may be modified by the Supplementary Conditions.

3. Sample letter for Contractor's request for inspection for Substantial Completion is attached to this Specifications section. Use the model language of the sample letter, modified to suit the Project and the needs of Contractor's request.
4. Unless decided otherwise by Owner and Engineer, form of certificate of Substantial Completion will be EJCDC C-625, "Certificate of Substantial Completion" (2018 edition or later), prepared by Engineer.
5. Refer to the Agreement and Section 01 29 76 - Progress Payment Procedures, for requirements regarding consent of surety to partial release of or reduction in retainage.

1.3 FINAL INSPECTION

A. Final Inspection – General:

1. Prior to requesting final inspection, verify that all the Work is fully complete and ready for final payment. Partial checklist for this purpose is attached to this Specifications section.
2. Sample letter for Contractor to request final inspection is attached to this Specifications section. Use the model language of the sample letter, modified to suit the Project.
3. Procedures for requesting and documenting the final inspection are in the General Conditions, as may be modified by the Supplementary Conditions, and as augmented in this Specifications section.

1.4 REQUEST FOR FINAL PAYMENT AND ACCEPTANCE OF THE WORK

A. Procedure:

1. After successful completion of the final inspection, submit request for final payment in accordance with the Agreement and General Conditions, as may be modified by the Supplementary Conditions, and using procedure specified in Section 01 29 76 - Progress Payment Procedures, and this Specifications section.
2. Acceptance of the Work:
 - a. Upon Engineer's concurrence that the Work is complete and ready for final payment (as a result of the final inspection and other communications between the parties and Engineer) and receipt of the final Application for Payment, accompanied by other required Contract closeout documentation, all in accordance with the Contract Documents, Engineer will issue to Owner and Contractor a notice of acceptability of the Work, in accordance with the General Conditions, as may be modified by the Supplementary Conditions.
 - b. Unless decided otherwise by Owner and Engineer, form of acceptance will be EJCDC C-626, "Notice of Acceptability of Work", (2018 edition or later).
 - c. Nothing other than receipt of such notice of acceptability from Engineer constitutes acceptance of the Work.
 - d. Receipt of Engineer's notice of acceptability of the Work does not relieve Contractor of Contractor's continuing obligations under the Contract, including correction period obligations, warranty obligations, indemnification obligations, insurance requirements, and Contractor's other obligations following acceptance of the Work by Engineer and final payment. Such obligations shall commence and remain in effect as indicated elsewhere in the Contract Documents.

B. Request for final payment shall include:

1. Documents required for progress payments in Section 01 29 76 - Progress Payment Procedures.

2. Documents required in the General Conditions, as may be modified by the Supplementary Conditions.
3. List, on Contractor's letterhead, of all Change Proposals, Claims, and disputes that Contractor believes are unsettled. If there are no such Change Proposals, Claims, or disputes, so indicate in writing.
4. Consent of Surety to Final Payment:
 - a. Acceptable form includes AIA G707, "Consent of Surety to Final Payment" (1994 or later edition), or other form acceptable to Owner.
5. Releases of Liens:
 - a. Submit complete and legally effective releases (satisfactory to Owner) of all Liens filed in connection with the Work, regardless of whether such Lien was filed by Contractor, Subcontractor, or Supplier.
 - b. Each release of Lien shall be signed by an authorized representative of the entity submitting the release of Lien, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
6. Waivers of Lien Rights:
 - a. Submit legally-binding waivers of rights to file Liens, acceptable to Owner, as required in the General Conditions (as may be modified by the Supplementary Conditions) from Contractor and each Subcontractor and Supplier that furnished or provided labor, material, or equipment totaling \$1,000 or more for the Work.
 - b. Furnish final list of Subcontractors and Suppliers indicating final amount of the associated subcontract or purchase order for each. Include on the list all lower-tier Subcontractors and Suppliers retained by higher-tier Subcontractors and Suppliers. Prepare the list using the form included in Section 01 29 76 - Progress Payment Procedures.
 - c. Each waiver of Lien rights shall be signed by an authorized representative of the entity submitting waiver of Lien rights, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
 - d. Waiver of Lien rights may be conditional upon receipt of final payment.
 - e. Required Affidavits: Submit the following:
 - 1) Affidavit of payment of debts and claims, submitted by Contractor. Acceptable form includes AIA G706, "Contractor's Affidavit of Payment of Debts and Claims" (1994 or later edition), or other form acceptable to Owner, and;
 - 2) Affidavit of release of Liens, submitted by Contractor. Acceptable form includes AIA G706A, "Affidavit of Release of Liens" (1994 or later edition).
 - 3) Each affidavit shall be signed by an authorized representative of Contractor and shall bear Contractor's corporate seal, as applicable.
 - f. In the event Contractor is unable to obtain one or more required waivers of Lien rights, recourse is set forth in the General Conditions, as may be modified by the Supplementary Conditions.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Specification section's "End of Section" designation, are part of this Specifications section:

1. Sample letter for Contractor's use in requesting inspection for Substantial Completion (two pages).
 2. Sample partial checklist to identify readiness for final inspection (four pages).
 3. Sample letter for Contractor's use in requesting final inspection (one page).
- B. In the model language of the attached sample letters for Contractor to request inspection for Substantial Completion and the final inspection, italicized language in brackets, e.g., "[insert date]" indicates instructions to the drafter of the letter and often indicates specific information to be inserted by Contractor; do not include bracketed, italicized text in the final version of the letter(s) prepared for the Project. Non-italicized language in brackets is optional language; use the appropriate language to complete the actual letter for the Project and edit where required to suit the specific circumstances.

END OF SECTION

**SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING INSPECTION FOR SUBSTANTIAL COMPLETION**

SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT REQUESTED

[Date]

[Name of Engineer's contact person]

HDR

[Street address]

[City, state, postal code]

Subject:

[Project name, Contract designation]

Request for Inspection for Substantial Completion

Dear [addressee]:

In our opinion, [all of] [or] [a portion of] the Work under the above-referenced Contract is substantially complete as of [insert month, day, year on which Substantial Completion was achieved]. [The specific portion of the Work that we believe is substantially complete is [insert identification of that portion of the Work that is substantially complete].]

Enclosed is our listing of uncompleted Work items ("punch list"). In accordance with Paragraph 15.03.A of the General Conditions, we hereby request: (1) That the Engineer schedule and perform the inspection for Substantial Completion as soon as possible, and (2) Issuance of the certificate of Substantial Completion.

In accordance with Paragraph 15.03.D of the General Conditions, upon Substantial Completion, we propose the following relative to apportionment of responsibilities between the Owner and the Contractor:

1. Security, Protection, Insurance:
 - a. Site Security: [insert proposal; address whether Owner or Contractor will be responsible for security of the Site].
 - b. Protection of the Substantially Completed Work: [insert proposal; address whether Owner or Contractor will be responsible for protection].
 - c. Property Insurance: [insert proposal; typically Owner assumes responsibility for property insurance upon Substantial Completion]
2. Operation and Maintenance:
 - a. Operation: [insert proposal; address whether Owner or Contractor will be responsible for operating the substantially completed Work].
 - b. Maintenance: [insert proposal; address whether Owner or Contractor will be responsible for maintaining the substantially completed Work].
3. Utilities: [for each of the following, indicate whether Owner or Contractor will be responsible for utilities and services, or whether responsibility will be shared; if shared, indicate proposed cost-sharing]
 - a. Electricity: [insert proposal].
 - b. Natural Gas/Fuel/Heating: [insert proposal].

- c. Water Supply: [insert proposal].
- d. Wastewater: [insert proposal].
- e. Communications (Telephone, Internet, Video): [insert proposal].

In accordance with Paragraph 15.08.A of the General Conditions, we understand that the Contract's correction period for the Work covered by the certificate of Substantial Completion commences on the Substantial Completion date documented in said certificate. [Drafter: Also see Paragraph 15.04 ("Partial Utilization") of the General Conditions and, where necessary, edit this paragraph of the letter accordingly.]

Should you have questions or comments regarding this notice, please contact [the undersigned] [or] [insert other contact person's name], at [insert telephone number and e-mail address].

Sincerely,

[Contractor's company name]

[Signatory name]

[Signatory's title]

Attachments:

Preliminary list of uncompleted Work items ("punch list"; [##] pages)

Copies:

[Owner's project manager]

SAMPLE PARTIAL CHECKLIST TO IDENTIFY READINESS FOR FINAL INSPECTION

Project:
 Contract:
 Contractor:

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
1. All Submittals, including all Shop Drawings and Samples, approved or accepted by Engineer	☐	☐	☐	☐		
Remarks:						
1. Final services completed by Suppliers, including submittal of "Manufacturer Field Service Report" in Section 01 61 03 - Common Work Results for Equipment	☐	☐	☐	☐		
Remarks:						
2. Final Work completed by Subcontractors	☐	☐	☐	☐		
Remarks:						
3. Permits closed out and regulatory compliance transitioned from construction to operations	☐	☐	☐	☐		
Remarks:						
4. All outstanding change issues are addressed and all Change Proposals submitted	☐	☐	☐	☐		
Remarks:						

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
5. All Change Proposals and Claims are resolved	☐	☐	☐	☐		
Remarks:						
6. All defective Work of which Contractor is aware has been corrected in accordance with the Contract Documents	☐	☐	☐	☐		
Remarks:						
7. Issues related to Constituents of Concern and potential Hazardous Environmental Condition have been fully addressed	☐	☐	☐	☐		
Remarks:						
8. All spare parts, tools, and extra materials have been furnished in accordance with the Contract Documents, and documentation thereof submitted to Engineer	☐	☐	☐	☐		
Remarks:						
9. All final operations & maintenance manuals have been submitted and accepted by Engineer	☐	☐	☐	☐		
Remarks:						
10. Manufacturer warranties and software license(s) furnished	☐	☐	☐	☐		
Remarks:						

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
11. Instruction and training of operations and maintenance personnel is complete and records of training submitted	☐	☐	☐	☐		
Remarks:						
12. MBE/WBE/DBE/VBE compliance report(s) submitted (when applicable)	☐	☐	☐	☐		
Remarks:						
13. All field engineering Submittals, including survey data, furnished	☐	☐	☐	☐		
Remarks:						
14. All Work on "punch list" is complete in accordance with the Contract Documents	☐	☐	☐	☐		
Remarks:						
15. All record documents submitted to and accepted by Engineer	☐	☐	☐	☐		
Remarks:						
16. Contractor is fully demobilized from the Site	☐	☐	☐	☐		
Remarks:						
17. All Site restoration is complete	☐	☐	☐	☐		
Remarks:						

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
18. Final cleaning of all work areas is complete	☐	☐	☐	☐		
Remarks:						
19. Releases of Liens and waivers of Lien rights (or acceptable alternative) obtained from Subcontractors and Suppliers	☐	☐	☐	☐		
Remarks:						
20. Evidence of Contractor liability insurance furnished for correction period	☐	☐	☐	☐		
Remarks:						
21. All other required Contract closeout documents obtained	☐	☐	☐	☐		
Remarks:						
	☐					
Remarks:						
22. All other Work and documentation required prior to final payment is complete and provided in accordance with the Contract Documents	☐	☐	☐	☐		
Remarks:						
	☐					

SAMPLE LETTER FOR CONTRACTOR'S USE IN REQUESTING FINAL INSPECTION

SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT REQUESTED

[Date]

[Name of Engineer's contact person]

HDR

[Street address]

[City, state, postal code]

Subject:

[Project name, Contract designation]

Request for Final Inspection

Dear [addressee]:

The Work under the above-referenced Contract is complete and ready for final payment as of [insert month, day, year on which final completion was achieved]. In accordance with Paragraph 15.05 of the General Conditions, we hereby request that the Engineer schedule and perform the final inspection as soon as possible. Upon successful completion of the final inspection, we will submit our final Application for Payment accompanied by the required Contract closeout documentation in accordance with the Contract Documents.

Should you have questions or comments regarding this notice, please contact [the undersigned] [or] [insert other contact person's name], at [insert telephone number and e-mail address].

Sincerely,

[Contractor's company name]

[Signatory name]

[Signatory's title]

Attachments:

None

Copies:

[Owner's project manager]

This page intentionally left blank.

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for Contractor-furnished, manufacturers' operation and maintenance (O&M) data, including:
 - a. Required operation and maintenance data groupings into operation and data manuals and timing of such Submittals.
 - b. Requirements for paper copies of operation and maintenance data and related Electronic Documents.
 - c. Content of operation and maintenance data Submittals.

B. Scope:

1. Contractor shall submit operation and maintenance data, and related information, in accordance with this Section and requirements elsewhere in the Contract Documents, as instructional and reference information for use by: (a) Owner's operation and maintenance personnel, and (b) others retained by or working for Owner.
2. In addition to operation and maintenance data expressly required elsewhere in the Contract Documents, also submit operation and maintenance data for:
 - a. All equipment and systems, including facility equipment, conveying equipment, fire suppression systems, plumbing equipment, HVAC equipment, electrical equipment, communications equipment, electronic safety and security systems, utility equipment, transportation equipment, waterway and marine equipment, and process equipment, and other equipment.
 - b. Valves, gates, actuators, and related accessories.
 - c. Instrumentation and control devices and systems.
 - d. Building materials, systems, and finishes that need post-construction troubleshooting, cleaning, or maintenance, [such as roofing, doors, windows, louvers, flooring, paint and coatings, other finishes, and other items].

C. Related Requirements:

1. Section 01 31 26 - Electronic Communication Protocols.
2. Section 01 33 00 - Submittal Procedures.
- 3.
4. Section 01 78 36 - Warranties.

1.2 SUBMITTALS

A. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data:
 - a. Submit operation and maintenance data, required by the Contract Documents, grouped into operation and maintenance manual Submittals indicated in Table 01 78 23-A.

- b. Where operation and maintenance data required by the Contract Documents, is not expressly indicated in table 01 78 23-A, obtain written clarification or interpretation from Engineer prior to preparing and transmitting such Submittal.
- c. For each required operation and maintenance manual Submittal, furnish preliminary Submittal and final Submittal. Timing of preliminary and final operation and maintenance manual Submittals, and differences between preliminary and final Submittals, are indicated in this Section.

Table 01 78 23-A
Required Groupings of Operation and Maintenance Data Submittals

Name of O&M Manual/Data	For Materials or Equipment Specified in Section(s)

B. Timing of Submittals and Quantity Required:

1. Preliminary Operation and Maintenance Manual Submittals:
 - a. Paper Copies: Three copies, exclusive of copies required for Contractor's use.
 - b. Electronic Documents: In accordance with Section 01 31 26 - Electronic Communication Protocols.
 - c. Submit to entity indicated in Section 01 33 00 – Submittal Procedures, by the earlier of: 90 days following approval of Shop Drawings and product data Submittals, or 14 days prior to starting training of operation and maintenance personnel, or 14 days prior to field quality control testing at the Site.
 - d. Do not perform checkout, startup, and training without Engineer's acceptance of preliminary operation and maintenance data Submittals for the associated Work.
2. Final Operation and Maintenance Manual Submittals: Furnish final Submittal prior to Substantial Completion of the associated Work, unless submittal is required prior to an interim Milestone.
 - a. Paper Copies: Three copies, exclusive of copies required for Contractor's use.
 - b. Electronic Documents: In accordance with Section 01 31 26 - Electronic Communication Protocols.
 - c. Work will not be eligible for Substantial Completion until associated, required final operation and maintenance data Submittals are accepted by Engineer.
 - d. If Contractor (whether or not via Subcontractor or Supplier), revises program code or configuration files between acceptance of Submittal by Engineer and end of the Contract's correction period and Contractor's general warranty obligation, furnish updated program code and configuration files to Owner]. Before modifying program code and configuration files after Substantial Completion, verify with facility manager that Owner- or facility manager modifications of program code or configuration files were incorporated into the modified files, subject to the provisions of this Section.

1.3 PAPER COPIES OF O&M MANUALS

A. Binding and Cover:

1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy, as necessary.
2. Binders shall be not less than one inch wide and maximum of three inches wide. Binders for each copy of each volume shall be same size and color.
3. Binders shall be locking three-ring ("D"-ring) type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front and back of each volume.
4. Do not overfill binders.
5. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
6. Indicate the following information on cover of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title.
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, if more than one volume is submitted, listed as "Volume [] of []", with appropriate volume-designating numbers filled in.
 - d. Name of Project and, when applicable, Contract name and number.
 - e. Name of building or structure, as applicable.
7. Provide the following information on spine of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title.
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, when more than one volume is submitted, listed as "Volume [] of []", with appropriate volume-designating numbers filled in.
 - d. Project name and building or structure name.

B. Pages:

1. Print pages in paper copies of operation and maintenance manuals on 30-pound (minimum) paper, 8.5-inch by 11-inch size.
2. Reinforce binding holes in each individual paper sheet with plastic, cloth, or metal. When published, separately-bound booklets or pamphlets are part of manuals, reinforcing of pages within booklet or pamphlet is not required.
3. Furnish each page with binding margin not less than 3/4-inch wide.
4. Properly punch each paper page with holes suitable for associated binding. Provide not less than 3/8-inch of paper between outer edge of punched holes and edge of paper. Manuals with improperly punched holes will be returned to Contractor as unacceptable.
5. In paper copies of manuals, each page in each copy shall be properly bound-through by the binder's rings or posts. Paper manuals where some pages are not so bound will be returned to Contractor as unacceptable.

C. Drawings:

1. Bind into operation and maintenance manuals drawings, diagrams, and illustrations up to and including 11-inch by 17-inch size, with reinforcing and punched holes specified for paper pages.
 2. Drawings or sheets larger than 11-inch by 17-inch shall be:
 - a. Paper Copies: Neatly folded and inserted into clear plastic pockets bound into the manual. Neatly and permanently label each pocket with printed text indicating content and drawing numbers. Include not more than two drawings or sheets per pocket.
 - b. Electronic Documents Copies: Included in electronic file at appropriate location.
- D. Copy Quality and Document Clarity:
1. Provide original-quality copies. Documents in operation and maintenance manuals shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals with copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable.
 2. Clearly mark, using ink, to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished and cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.
- E. Organization:
1. Indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

1.4 ELECTRONIC DOCUMENTS O&M MANUALS

- A. Electronic Documents of Operation and Maintenance Manuals:
1. Each Electronic Document copy of operation and maintenance data shall include all information included in the corresponding paper copy.
 2. Submit Electronic Documents operation and maintenance data in accordance with Section 01 31 26 - Electronic Communication Protocols, and Section 01 33 00 - Submittal Procedures.
 3. File Format:
 - a. Unless otherwise required by Section 01 31 26 - Electronic Communication Protocols, or Section 01 33 00 - Submittal Procedures, operation and maintenance data Electronic Documents shall be "portable document format" (PDF) files.
 - b. Electronic Documents shall be electronically searchable upon delivery.
 - c. Electronic Documents shall not be password-protected and shall not be protected against Owner's or facility manager's copying and printing such files for Owner's or facility manager's use in operating and maintaining the facility.
 - d. Electronic Documents shall open to its first page.
 - e. Submit each operation and maintenance manual as a single Electronic Document file, unless file size is over-large, in which case divide into as few separate files, each with similar filename, as possible.
 - f. Within each Electronic Document, provide bookmarks for the following:

- 1) Each chapter and subsection indicated in the corresponding printed copy document's table of contents.
- 2) Each figure.
- 3) Each table.
- 4) Each appendix and attachment.

1.5 CONTENT OF OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance Manual Content – General:

1. Prepare each operation and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, as-constructed drawings as applicable, bills of materials, technical information, installation and handling requirements, maintenance and repair instructions, and other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the Specification Section for the material or equipment, data required by Laws and Regulations, and data required by authorities having jurisdiction.
2. Provisions of this Article were written for equipment. Where operation and maintenance data are required for building products, such as finishes, openings, thermal and moisture protection, and similar items, comply with this Article to the extent practical and reasonable for the associated item.
3. Completeness and Accuracy:
 - a. Operation and maintenance manuals that include language stating or implying that the manual's content may be insufficient or stating that the manual's content is not guaranteed to be complete and accurate are unacceptable.
 - b. Operation and maintenance manuals shall be complete and accurate.
 - c. Operation and maintenance manuals shall indicate the specific alternatives and features furnished, and the specific operation and maintenance provisions for the material or equipment furnished.
4. Provide dividers and Include manufacturer's information, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where published documents, included in operation and maintenance data, pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.
5. Identify each equipment item consistent with names and identification numbers shown or indicated in the Contract Documents, rather than manufacturer's model numbers.
6. Neatly type data not furnished in computer-printed text. Handwriting, except for strikeouts, arrows, and the like, is unacceptable.
7. Include copy of warranty in accordance with the Contract Documents, including Section 01 78 36 - Warranties.
8. Include copy of proposed service contract, when applicable.
9. When copyrighted material is used in operation and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.

- B. Differences Between Preliminary and Final Operation and Maintenance Manuals:
1. In preliminary operation and maintenance manuals, include flysheet or placeholder for information to be included in final operation and maintenance manual Submittal.
 2. In final operation and maintenance manuals, include information such as the following, as applicable for the associated materials and equipment:
 - a. Equipment data that requires collection after startup, for example: (1) system and equipment balancing reports, including those for HVAC systems; and (2) final settings for electrical switchgear, automatic transfer switches, and circuit breakers; and (3) materials and equipment field testing results.
- C. Initial Documents in Operation and Maintenance Manuals:
1. Table of Contents:
 - a. Provide table of contents in each volume of each operation and maintenance manual.
 - b. In table of contents and not less than once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identifying items is unacceptable.
 2. Equipment Record:
 - a. Provide "Equipment Record" section of operation and maintenance manual immediately following the table of contents. "Equipment Record" section is not required for operation and maintenance data for other than equipment (such as building materials and finishes).
 - b. Provide "Equipment Record" on forms included as this Section's Attachments 1, 2, and 3.
 - c. For instrumentation and control equipment, International Society of Automation (ISA) data sheets are acceptable in lieu of the forms included as this Section's Attachments 1, 2, and 3.
 - d. This Section's Attachments 1, 2, and 3 are available from Engineer as "fillable PDF forms".
 - e. Complete in detail each section of "Equipment Record". Merely referencing the associated equipment's operation and maintenance data for nameplate, maintenance, spare parts, lubricants, or other required information, is unacceptable.
 - f. For equipment or systems with multiple, separate components (for example, motor and gearbox), fully completed "Equipment Record" is required for each component.
 - g. Operation and maintenance data Submittals without complete and accurate "Equipment Record" sheets are unacceptable.
 3. Supplier's Field Service Reports:
 - a. Include in final operation and maintenance manuals copies of associated Supplier's field services reports.
 - b. Include Supplier's completed field service reports in operation and maintenance manual in section immediately following "Equipment Record" section.
- D. Operation and Maintenance Instructions:
1. Safety Considerations:

- a. Submit written descriptions of safety considerations relating to operation and maintenance procedures for materials and equipment.
 - b. Describe safety devices and alarms provided with materials and equipment and proper operation and use.
 - c. Indicate procedures for proper, safe operating and maintenance of materials and equipment furnished, including manufacturer's recommended personal protection equipment, apparatus, and devices not furnished under the Contract.
 - d. Describe recommended safety-related training for personnel operating and maintaining the subject materials or equipment.
 - e. Include in appendix to operation and maintenance manual manufacturers' relevant "safety data sheets" (SDS), formerly "material safety data sheets" (MSDS).
 - f. Engineer's review of operation and maintenance data expressly does not extend to adequacy, completeness, and accuracy of SDS or other safety and protection practices and procedures indicated in the operation and maintenance data.
2. Operation:
- a. Include in operation and maintenance data Submittals complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; and regulation and control. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.
 - b. Include pre-startup instructions and checklists and complete startup instructions for each material and equipment item.
 - c. Indicate recommended operating instructions for all operating modes and conditions, with associated recommendations for safe operation.
 - d. Explain available controls and instrumentation and associated function(s).
 - e. Indicate required shutdown checklists and procedures for: normal shutdown, emergency shutdown, and long-term shutdowns.
 - f. Troubleshooting instructions.
3. Maintenance – General:
- a. Include in operation and maintenance data complete, written instructions for necessary and recommended maintenance, including mechanical maintenance and electrical/instrumentation and controls maintenance, as applicable.
 - b. Include in operation and maintenance data complete instructions for necessary assembly, disassembly, installation, re-installation, storage, and shipping for materials and equipment.
 - c. Tools: Include list of required maintenance tools and equipment.
 - d. Spare Parts and Extra Materials:
 - 1) Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.
 - 2) Submit manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment.

Include estimated delivery times, shelf life limitations, and special storage requirements.

- 3) Also refer to this Article's provision, "Bills of Materials", below, for additional requirements regarding ordering replacement parts.

4. Routine and Preventative Maintenance:

- a. Submit complete, detailed, written instructions for routine and preventive maintenance including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:
 - 1) Written explanations with illustrations for each routine and preventive maintenance task such as inspection, adjustment, anchor bolt torque checks, lubrication, calibration, cleaning, replacement of filters, and the like.
 - 2) Recommended schedule for each routine and preventive maintenance task.
 - 3) Lubricants:
 - a) Provide lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
 - b) Table of alternative lubricants.

5. Major Maintenance:

- a. Include detailed, written instructions and illustrations for required periodic (non-routine, non-preventative) maintenance.
- b. Indicate relative level of training and expertise required to perform such maintenance and recommended tools and equipment.

6. Special Maintenance:

- a. Include maintenance instructions for long-term shutdowns and storage.

E. Bills of Materials:

1. Include in operation and maintenance manuals complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
2. Manufacturer's name, physical address, telephone number, internet website address.
3. Manufacturer's local service representative's or local parts supplier's name, physical address, telephone number, internet website address, and e-mail addresses.
4. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
5. For each part or piece include the following information:
 - a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
 - b. Part name or description.
 - c. Manufacturer's part number.
 - d. Quantity of each part used in each assembly.

- e. Current unit price of the part at the time the operation and maintenance manual is submitted. Price list shall be dated.
- F. Record Copy of Shop Drawings, Product data, and Other Previously Approved and Accepted Submittals:
 - 1. Submit original-quality copies of each approved and accepted (as applicable) Shop Drawing, product data Submittal, written results of source quality control activities, and other Submittals, updated to indicate as-installed condition. Do not include prior Submittals that were not approved or were not accepted. Reduced drawings are acceptable only when reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.
- G. Electrical Schematics, Diagrams, and Information:
 - 1. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
 - 2. Include as-constructed drawings of layouts of electrical panels (such as switchgear and motor control centers) and control panels.
- H. NFPA 70 (National Electric Code) Documentation:
 - 1. Include in operation and maintenance manuals for electrically-powered equipment documented calculations of: (1) arc-fault current, equipment available fault current and (2) short-circuit current rating (SCCR), provided as part of equipment Submittals.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The following, bound after this Section's "End of Section" designation, are part of this Section:
 - 1. Attachment 1 - Equipment Data and Spare Parts Summary form (one page)
 - 2. Attachment 2 - Recommended Maintenance Summary form (one page)
 - 3. Attachment 3 - Lubrication Summary form (one page)

END OF SECTION

**Equipment Data and Spare Parts Summary**

Project Name			Specification Section:		
Equipment Name			Year Installed:		
Project Equipment Tag No(s).					
Equipment Manufacturer			Project/Order No.		
Address			Phone		
Website		Web Site		E-mail	
Local Representative/Service Center					
Address			Phone		
Website		E-mail			

MECHANICAL NAMEPLATE DATA

Equip.			Serial No.		
Make			Model No.		
ID No.	Frame No.	HP	RPM	Cap.	
Size	TDH	Imp. Size	CFM	PSI	
Other:					

ELECTRICAL NAMEPLATE DATA

Equip.			Serial No.					
Make			Model No.					
ID No.	Frame No.	HP	V.	Amp.	Hertz	PH	RPM	SF
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating	
Other:								

SPARE PARTS PROVIDED PER CONTRACT

Part No.	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

(Jun 1990; Revised Oct 2001, Revised Nov 2007, Revised 2013) Copyright 1991-2014 HDR Engineering, Inc.

Recommended Maintenance Summary

Equipment Description	Project Equip. Tag No(s).	

[illegible]

* D = Daily W = Weekly M = Monthly Q = Quarterly S = Semiannual A = Annual Hours = Run Time Interval

(Jun 1990; Revised Oct 2001, Revised Nov 2007, Revised 2013) Copyright 1991-2014 HDR Engineering, Inc.

**Lubrication Summary**

Equipment Description	Project Equip. Tag No(s).

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

(Jun 1990; Revised Oct 2001, Revised Nov 2007, Revised 2013) Copyright 1991-2014 HDR Engineering, Inc.

This page intentionally left blank.

SECTION 01 78 36

WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for warranties required in the various Specifications.
2. Provisions addressing:
 - a. Suppliers' standard warranties.
 - b. Suppliers' special or extended warranties.
 - c. Implied warranties.
 - d. Commencement and duration of warranties.

1.2 SUBMITTALS

A. General:

1. For each item of equipment furnished under the Contract, submit Supplier's standard warranty, regardless of whether such warranty or Submittal thereof is required by the associated Specifications for that item. Submit such warranties for materials where such Submittal is required in the Specifications for the material.
2. For each item of material or equipment where Supplier's special (or extended) warranty is required by the Contract Documents, submit appropriate special warranty that complies with the Contract Documents.
3. Supplier's warranties shall be specifically endorsed to Owner, Contractor, and the entity purchasing the item (if other than Contractor) by the entity issuing such warranty.
4. Submit Suppliers' standard warranties and special warranties as Submittals in accordance with the Schedule of Submittals accepted by Engineer.

1.3 CONTRACTOR'S GENERAL WARRANTY AND CORRECTION PERIOD OBLIGATIONS

- A. Contractor's General Warranty and Guarantee: Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.
- B. Contractor's Warranty of Title: Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.
- C. Correction Period: Comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.

1.4 SUPPLIERS' WARRANTIES FOR MATERIALS AND EQUIPMENT

A. Warranty Types:

1. Required by the General Conditions:
 - a. Warranties specified for materials and equipment shall be in addition to, and run concurrent with, Contractor's general warranty and guarantee and requirements for the Contract's correction period.
 - b. Disclaimers and limitations in specific materials and equipment warranties do not limit Contractor's general warranty and guarantee, nor does such affect or limit Contractor's performance obligations under the correction period.
2. Material or equipment manufacturer's standard warranty is pre-printed, written warranty published by item's manufacturer and specifically endorsed by manufacturer to the entities indicated in this Specifications Section's Article 1.2.
3. Special warranty is written warranty that either extends the duration of material or equipment manufacturer's standard warranty or provides other, increased rights to Owner

and other beneficiaries (if any) of such warranty. Where the Contract Documents indicate specific requirements for warranties that differ from the manufacturer's standard warranty for that item, special warranty is implied.

B. Requirements for Special Warranties:

1. Submit written special warranty document that contains appropriate provisions and identification, ready for signature by material or equipment manufacturer, Owner, and other beneficiaries indicated in Article 1.2 of this Specifications Section. Submit draft warranty with Submittals required prior to fabrication and shipment of the item from the Supplier's facility.
2. Manufacturer's Standard Form: Modified to include Project-specific information and properly signed by product manufacturer and other entities as appropriate.
3. Specified Form: When specified forms for special warranties are included in the Contract Documents, prepare written document, properly signed by item manufacturer, Owner, and other beneficiaries indicated in Article 1.2 of this Specifications Section, using the required form.
4. Refer to the Specifications for content and requirements for submitting special warranties.

1.5 IMPLIED WARRANTIES

A. Warranty of Title and Intellectual Property Rights:

1. Except as may be otherwise indicated in the Contract Documents, implied warranty of title required by Laws and Regulations is applicable to the Work and to materials and equipment incorporated therein.
2. Provisions on intellectual property rights, including patent fees and royalties, are in the General Conditions, as may be modified by the Supplementary Conditions.

B. Warranty of Merchantability:

1. Notwithstanding any other provision of the Contract to the contrary, implied warranties of merchantability required by Laws and Regulations apply to the materials and equipment incorporated into the Work.

C. Warranty of Fitness-for-Purpose:

1. Implied warranty of fitness-for-purpose for materials and equipment to be incorporated into the Work, for which specific material or features are indicated in the Contract Documents, is hereby disclaimed by Owner and Contractor.
2. When Supplier is aware of, or has reason to be aware of, specified materials or features of the Work that are contrary to the intended use, purpose, service, application, or environment in which the material or item will be used, submit request for interpretation in accordance with Section 01 26 00 - Contract Modification Procedures. Where appropriate, such request for interpretation shall indicate the apparent discrepancy and propose appropriate, alternative materials or equipment.

1.6 COMMENCEMENT AND DURATION OF WARRANTIES

A. Commencement of Warranties:

1. Contract correction period and Contractor's general warranty commence as indicated in the General Conditions, as may be modified by the Supplementary Conditions.
2. Suppliers' standard warranties and special warranties commence running on the date that the associated item is certified by Engineer as substantially complete in accordance with the Contract Documents. In no event shall special warranties commence running prior to Engineer's review and acceptance of special warranty Submittal for the item.
3. Implied warranties commence in accordance with Laws and Regulations.

B. Duration of Warranties:

1. Duration of correction period is set forth in the General Conditions, as may be modified by the Supplementary Conditions.

2. Duration of Contractor's general warranty and guarantee is in accordance with Laws and Regulations.
3. Duration of Suppliers' standard warranties is in accordance with the applicable standard warranty document accepted for the Project by Engineer.
4. Duration of required Suppliers' special warranties shall be in accordance with the requirements of the Contract Documents for the subject item.
5. Duration of implied warranties shall be in accordance with Laws and Regulations.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

This page intentionally left blank.

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for Project record documents, to supplement record documents requirements of the General Conditions, as may be modified by the Supplementary Conditions.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, and services to establish, maintain, continuously update, and submit to Engineer Project record documents in accordance with the Contract Documents.
- C. Related Sections include but are not necessarily limited to:
 - 1. Section 01 29 73 - Schedule of Values.
 - 2. Section 01 29 76 - Progress Payment Procedures.
 - 3. Section 01 31 26 - Electronic Communication Protocols.
 - 4. Section 01 71 23 - Field Engineering.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain necessary field measurements and record all data required for Project record documents before covering up the Work or building on subsequent phases of the Work.
 - 2. Promptly after obtaining measurements and information, record the data and information on Project record documents.
 - 3. Where a licensed, registered professional land surveyor is retained on the Project, whether by Contractor or others, to perform field measurements and record other data for as-constructed Project or Site conditions, coordinate with such entity and schedule and perform the Work accordingly. Allow surveyor sufficient time and proper conditions for performing surveyor's work. Assist the surveyor as necessary in performance of surveyor's responsibilities.
- B. Monthly Status Evaluation:
 - 1. Not less than once per month, as a condition precedent to submitting Application for Payment, Contractor's site superintendent will meet with either Engineer or Resident Project Representative (RPR) at the Site to review status of Contractor's Project record documents.
 - 2. When Engineer or RPR directs corrections to Project record documents, promptly make such corrections on the Project record documents. Engineer's or RPR's directions or lack thereof do not in any way relieve or mitigate Contractor's sole responsibility for the accuracy, completeness, and clarity of Project record documents.
 - 3. Requirements for review of record documents status as a condition precedent to progress payments is in Section 01 29 73 - Schedule of Values, and Section 01 29 76 - Progress Payment Procedures.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Comply with Section 01 71 23 - Field Engineering, regarding personnel and equipment necessary to measure and record field conditions.
 - 2. Recorder of Changes and Field Conditions on Project Record Documents:

- a. Contractor's staff at the Site shall include not less than one person with suitable training and drafting (drawing) experience to record on the Project record documents changes made and field conditions encountered.
 - b. Recorder of changes and field conditions on the Project record documents shall possess not less than two semesters of drafting (drawing) training in a classroom, either in high school, college, or bona-fide vocational school.
 - c. Upon Engineer's request, submit name of proposed recorder at the Site, resume', or list of relevant experience, and copy of credentials of completion of such drafting (drawing) course(s).
 - d. If original recorder of changes and field conditions is replaced, promptly advise Engineer and RPR in writing and submit to Engineer qualifications of proposed replacement.
- B. Samples of Similar Prior Work:
1. Submit Samples of the personal work of Contractor's designated recorder of changes and field conditions on the Project record documents from not less than two prior projects of similar type(s) of work at the Work. Submit copies of not less than two marked-up drawings from each prior project and copies of two pages of marked-up specifications from each prior project.
 2. Samples shall be in the same form as proposed for the Project record documents. For example, where Contractor intends to submit hand-drawn mark-ups of the Drawings and Specifications, Samples shall be copies of hand-drawn markups. Where Contractor intends to submit Project record documents in native (executable) file format (such as CAD files), Samples shall be developed using the same software to be used in preparing the Project record documents.
 3. If original recorder of changes and field conditions is replaced by Contractor, replacement recorder shall provide the same standard of work on Project record documents as indicated in the approved Samples.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
1. Samples:
 - a. Sample of field-recorded project record documents from prior projects, in accordance with this Specifications section's "Quality Assurance" Article, to establish quality and style for markups of Project record documents. Submit within 15 days of the date the Contract Times commence running.
- B. Informational Submittals: Submit the following:
1. Qualifications Statements:
 - a. When requested by Engineer, submit qualifications of proposed recorder of changes and field conditions for Project record documents at Contractor's field office at the Site. Qualifications shall comply with the "Quality Assurance" Article of this Specifications section.
- C. Closeout Submittals: Submit the following:
1. Record Documentation:
 - a. Prior to readiness for final payment, submit to Engineer one copy of Project's final record documents and obtain Engineer's acceptance of same. Submit complete record documents; do not make partial Submittals without Engineer's concurrence.
 - b. Submit the following Project record documents:
 - 1) Record Drawings, including those issued via Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.

- 2) Record project manual, including Specifications, indicating changes made via Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.
- c. Submit record documents with transmittal letter on Contractor's letterhead in accordance with requirements in Section 01 33 00 - Submittal Procedures.
2. Certifications:
 - a. Record documents Submittal shall include certification, with original signature of official authorized to sign legally-binding contracts on behalf of Contractor, reading as follows:
 - 1) (Contractor's legal/contractual entity name) has maintained, continuously updated, and submitted Project record documentation in accordance with the General Conditions and Supplementary Conditions, Section 01 78 39 - Project Record Documents, and other elements of Contract Documents, for the Catawba County Blackburn MSW Landfill Unit 4 Construction Advance Sitework & Utility Reocation. We certify that each record document submitted is complete, accurate, and legible relative to the Work performed under our Contract, and that the record documents comply with the requirements of the Contract Documents.

By: [] (signature)

Print Name: []

Title: []

1.5 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintain in Contractor's field office, in clean, dry, legible condition, complete sets of the following record documents:
 1. Drawings, Specifications, and Addenda;
 2. Shop Drawings, Samples, and other Submittals, including records of test results, approved or accepted as applicable, by Engineer;
 3. Change Orders, Work Change Directives, Field Orders, allowance authorizations;
 4. copies of all interpretations and clarifications issued;
 5. photographic documentation;
 6. survey data; and
 7. all other documents pertinent to the Work.
- B. Provide files and racks for proper storage and easy access to Project record documents. File record documents in accordance with the edition of the Construction Specification Institute's *MasterFormat* used for organizing the project manual, unless otherwise accepted by Engineer or RPR.
- C. Promptly make Project record documents available for observation and review upon request of Engineer, RPR, or Owner.
- D. Do not use Project record documents for any purpose other than serving as Project record. Do not remove Project record documents from Contractor's field office without Engineer's approval.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- A. Recording Changes, Field Conditions, and Other Information – General:
 1. At the start of the Project, label each record document to be submitted as, "PROJECT RECORD" using legible, printed letters. Letters on record copy of the Drawings shall be two inches high.
 2. Keep record documents current consistent with the progress of the Work. Make entries on record documents within two working days of receipt of information required to record the change, field condition, or other pertinent information.
 3. Do not permanently conceal the Work until required information has been recorded for Project record documents.

4. Accuracy of record documents shall be such that future searches for items shown on the record documents may rely reasonably on information obtained from Engineer-accepted Project record documents.
5. Marking of Entries:
 - a. Use erasable, colored pencils (not ink or indelible pencil) for marking changes, revisions, additions, and deletions to Project record documents.
 - b. Clearly describe the change by graphic line and make notations as required. Use straight-edge to mark straight lines. Writing shall be legible and sufficiently dark to allow scanning of record documents into legible electronic files in "portable document format" (.PDF) files.
 - c. Date each entry on record documents.
 - d. Indicate changes by drawing a "cloud" around the change(s) indicated.
 - e. Mark initial revisions in red. In the event of overlapping changes, use different colors for subsequent changes.

B. Drawings:

1. Record changes on copy of the Drawings. Submittal of Contractor-originated or -produced drawings as a substitute for recording changes on a copy of the Drawings is unacceptable.
2. Record changes on plans, sections, elevations, schematics, schedules, and details as required for clarity, accuracy, and completeness, making reference dimensions and elevations (to Project datum) for complete record documentation.
3. Record actual construction including:
 - a. Depths of various elements of foundation relative to Project datum.
 - b. Horizontal and vertical location of Underground Facilities referenced to permanent surface improvements and Project elevation datum. For each Underground Facility, including pipe fittings, show and indicate dimensions to not less than two permanent, visible surface improvements.
 - c. Location of exposed utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure and, where applicable, to Project elevation datum.
 - d. Changes in structural and architectural elements of the Work, including changes in reinforcing.
 - e. Field changes of dimensions, arrangements, and details.
 - f. Changes made in accordance with Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.
 - g. Changes in details on the Drawings. Submit additional details prepared by Contractor when required to document such changes.
4. Recording Changes for Schematic Layouts:
 - a. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray physical layout. For such cases, the final physical arrangement shall be determined by Contractor subject to acceptance by Engineer.
 - b. Record on the Project record documents all revisions to schematics on the Drawings, including: piping schematics, ducting schematics, process and instrumentation diagrams, control and circuitry diagrams, electrical one-line diagrams, motor control center layouts, and other schematics when included in the Drawings. Show and indicate actual locations of equipment, lighting fixtures, in-place grounding system, and other pertinent data.
 - c. When dimensioned plans and dimensioned sections or elevations on the Drawings show the Work schematically, indicate on the Project record documents, by dimensions accurate to within one inch in the field, centerline location of items of Work such as conduit, piping, ducts, and similar items

- 1) Clearly identify each item of the Work by accurate notations such as “cast iron drain”, “rigid electrical conduit”, “copper waterline”, and similar descriptions.
- 2) Show by symbol or by note the vertical location of each item of the Work; for example, “embedded in slab”, “under slab”, “in ceiling plenum”, “exposed”, and similar designations. For piping not embedded, also indicate elevation dimension relative to Project elevation datum.
- 3) Descriptions shall be sufficiently detailed to be related to the Specifications.
- d. Engineer may furnish written waiver of requirements relative to schematic layouts shown on plans, sections, and elevations when, in Engineer’s judgment, dimensioned layouts of Work shown schematically will serve no useful purpose. Do not rely on such waiver(s) being issued.
5. Supplemental Drawings:
 - a. In some cases, drawings produced during construction by Engineer or Contractor supplement the Drawings and shall be included with Project record documents submitted by Contractor. Supplemental record drawings shall include drawings or sketches that are part of Change Orders, Work Change Directives, Field Orders, and allowance authorizations and that cannot be incorporated into the Drawings because of space limitations.
 - b. Supplemental drawings submitted with record drawings shall be integrated with the Drawings and include necessary cross-references between drawings. Supplemental record drawings shall be on sheets the same size as the Drawings.
 - c. When supplemental drawings developed by Contractor using computer-aided drafting/design (CAD), building information models (BIM), or civil information models (CIM) software are to be included in record drawings, submit electronic files for such drawings in accordance with Section 01 31 26 – Electronic Communication Protocols, as part of record drawing Submittal. Label such files, “Supplemental Record Drawings”, including with Contractor’s name, Project name, and Contract designation.

C. Specifications and Addenda:

1. Mark each Specifications section to record:
 - a. Manufacturer, trade name, catalog number, and Supplier of each material and equipment item actually furnished.
 - b. Changes made by Addendum, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.

1.7 ELECTRONIC DOCUMENTS FURNISHED BY ENGINEER

- A. CAD, BIM, or CIM files of the Drawings will be furnished by Engineer upon the following conditions:
 1. Contractor shall submit to Engineer a letter on Contractor letterhead requesting CAD, BIM, or CIM files of the Drawings and indicating specific definition(s) or description(s) of how such Electronic Documents will be used by Contractor, and specific description of benefits to Owner (including credit proposal, if applicable) if the request is granted.
 2. Engineer does not guarantee that Electronic Documents are available in the format(s) requested by Contractor. Some projects may have Drawings developed using only CAD software instead of BIM or CIM software. Engineer will not create BIM or CIM files for Contractor if such files do not already exist.
 3. Contractor shall sign Engineer’s standard agreement with Contractor for release of Electronic Documents and shall abide by the provisions of such agreement for release of Electronic Documents.
 4. Layering system incorporated in CAD, BIM, and CIM files shall be maintained as transmitted by Engineer. CADD, BIM, and CIM files transmitted by Engineer containing cross-referenced files shall not be bound by Contractor. Drawing cross-references and paths shall be maintained. If Contractor alters layers or cross-reference files, Contractor

shall restore all layers and cross-references prior to submitting Project record documents to Engineer.

5. Contractor shall submit Project record drawings to Engineer in same CAD, BIM, or CIM format that files were furnished to Contractor..

B. Microsoft Word files of Specifications:

1. Requirements for Engineer's potential release of word processing files of the Specifications or other written documents in native format are the same as those for Drawings.
2. When Specifications are released in native format, Contractor shall submit record specifications in the same format, with all changes tracked using Microsoft Word's "track changes" feature.
3. Do not modify the formatting of the native files furnished by Engineer. If formatting changes are made without Engineer's authorization, remedy the formatting to the same condition and status as when the files were first delivered to Contractor. Such remedy shall be at Contractor's expense.
4. Comply with all requirements of this Specifications section regarding record specifications.
5. After delivery of record specifications Submittal to Engineer, delete from Contractor's files the native word processing files. Contractor may retain a PDF version of such files for Contractor's records.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 78 43
SPARE PARTS AND EXTRA MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for furnishing spare parts, extra materials, maintenance supplies, and special tools required for maintenance (collectively, "spare parts and extra materials") required by the Contract Documents.
- B. Scope:
 - 1. Contractor shall furnish spare parts, extra materials, and associated information, for materials and equipment furnished in accordance with the Contract Documents. Furnish such items in accordance with the requirements of this Specifications section and the Specifications sections in which such items are indicated.
 - 2. Contractor is fully responsible for loss and damage to spare parts and extra materials until such items are received by Owner's facility manager.
 - 3. Promptly replace spare parts and extra materials furnished by Owner to Contractor for use in remedying defective Work.
- C. List of Spare Parts and Extra Materials:
 - 1. With the Shop Drawings and product data Submittals for each Specifications section, submit a complete listing of spare parts and extra materials necessary for maintenance for two years of operation, together with unit prices in current United States funds, and source(s) of supply for each.
 - 2. Also include listing of spare parts and extra materials, with pricing and sources, in the operations and maintenance data submitted in accordance with Section 01 78 23 - Operation and Maintenance Data.

1.2 SUBMITTALS

- A. Maintenance Material Submittals: Furnish and submit the following:
 - 1. Spare Parts and Extra Materials:
 - a. Furnish to Owner or facility manager in accordance with requirements of this Specifications section, and the Specifications section in which the spare parts and extra materials are specified.
 - 2. Transfer Documentation: For each delivery of spare parts and extra materials, submit to Engineer the following:
 - a. Submit, on Contractor's letterhead, a letter of transmittal for spare parts and extra materials furnished under each Specifications section. Letter of transmittal shall accompany spare parts and extra materials. Do not furnish letter of transmittal separate from associated spare parts and extra materials.
 - b. Furnish three original, identical, signed letters of transmittal for each delivery of spare parts and extra materials furnished under each Specifications section. Upon delivery of specified quantities and types of spare parts and extra materials to Owner or facility manager, designated person from Owner or facility manager will countersign each original letter of transmittal indicating Owner's or facility manager's receipt of spare parts and extra materials in the quantity, type, and quality required by the Contract Documents. Owner or facility manager will retain one fully-signed original, Contractor shall submit one fully-signed original to Engineer. Contractor shall retain one fully-signed original for Contractor's records.
 - c. Letter of transmittal shall include the following:

- 1) Information required for letters of transmittal in Section 01 33 00 - Submittal Procedures.
- 2) Transmittal shall list spare parts and extra materials furnished under the associated Specifications section. Indicate each individual part, material, equipment item, tool, and product and the associated quantity furnished.
- 3) Include space for countersignature by Owner or facility manager as follows: space for signature, space for printed name, space for signatory's title, and date.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Packaging and Labeling of Spare Parts and Extra Materials:

1. Furnish spare parts and extra materials in manufacturer's unopened cartons, boxes, crates, or other original, protective covering suitable for preventing corrosion and deterioration.
2. Protect and package spare parts and extra materials for maximum shelf life normally anticipated by manufacturer.
3. Packaging of spare parts and extra materials shall be clearly marked and identified with name of manufacturer, applicable material or equipment, part number, part description, and part location in the equipment or system.

B. Storage Prior to Delivery to Owner:

1. Prior to furnishing spare parts and extra materials to Owner or facility manager, store spare parts and extra materials in accordance with the Contract Documents and manufacturers' written recommendations.

C. Procedure for Delivery to Owner or Facility Manager:

1. Deliver spare parts and extra materials to Owner's or facility manager's permanent storage rooms at the Site or area(s) at the Site designated by Owner or facility manager.
2. When spare parts and extra materials are delivered, Contractor and Owner (or facility manager) will mutually inventory the spare parts and extra materials delivered to verify compliance with the Contract Documents regarding quantity, part numbers, and quality.
3. Additional procedures for delivering spare parts and extra materials to Owner or facility manager, if required, will be developed by Engineer and complied with by Contractor.
4. Contractor shall reimburse Owner for all costs and expenses incurred by Owner and facility manager, including professional services, for delivery of inadequate, incorrect, or defective spare parts and extra materials. Owner may withhold such amounts from payments due Contractor via set-offs in accordance with the Contract Documents.

D. Delivery Time and Eligibility for Payment:

1. Deliver to Owner or facility manager spare parts and extra materials prior to date of Substantial Completion for materials and equipment associated therewith.
2. Do not deliver spare parts and extra materials before commencing startup for associated material or equipment.
3. Spare parts and extra materials are not eligible for payment until delivered to Owner or facility manager and Contractor's receipt of Owner's or facility manager's countersignature on letter of transmittal as required in this Specifications section.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General provisions applicable to all demolition and removals.
 - 2. Civil/site demolition and removals.
 - 3. Electrical demolition and removals.
 - 4. Disposal of demolition debris, materials, and equipment.
- B. Related Requirements: Include, but are not necessarily limited to:
 - 1. Section 31 10 00 - Site Clearing.
 - 2. [Section 31 23 00 - Earthwork Section 31 23 33 – Utilities - Trenching and Backfilling.

1.2 REFERENCES

- A. Reference Standards: Standards referenced in this section include, but are not necessarily limited to, the following:
 - 1. National Fire Protection Association (NFPA):
 - a. 241 - Safeguarding Construction, Alteration, and Demolition Operations.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Review procedures under this and other Sections and coordinate the Work that will be performed with, or before, demolition and removals.
 - 2. Responsibilities of each prime Contractor, relative to demolition and removals, is indicated in Section 01 11 00 - Summary of Work. Notify other contractors in advance of demolition and removals Work to provide other contractors with sufficient time for performing work and coordinating items included in their contracts that will be performed before, or in conjunction with, demolition and removals Work.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with requirements of authorities having jurisdiction and relevant permits, if any, required and obtained for demolition Work.
 - 2. [
- B. Qualifications:
 - 1. Electrical Removals: Entity and personnel performing electrical removals shall be electrician(s) legally qualified to perform electrical construction and electrical work in the jurisdiction where the Site is located.

1.5 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Procedure Submittals:
 - a. Demolition and Removal Plan: Not less than ten days prior to starting demolition Work, submit acceptable plan for demolition and removal Work, including:
 - 1) Plan for coordinating shut-offs, capping, temporary services, and continuing utility services.

- 2) General indication of intended approach for performing demolition Work, including how proposed demolition will affect Owner and others, including owners and occupants of properties at and adjacent to the Site and the public.
 - 3) Disposal and recycling facilities proposed, including facility owner, facility name, location, and processes. Include copy of appropriate permits and licenses, and compliance status.
 - 4) Planned demolition operating sequences, relative to their effect on Owner and others, including owners and occupants of properties at and adjacent to the Site and the public.
 - 5) Detailed schedule of demolition Work in accordance with the Progress Schedule accepted by Engineer.
 - 6) Copy of demolition permit (when required) obtained from authorities having jurisdiction.
 - 7)
 - b. Engineer's review, comments upon, and acceptance of Contractor's procedure Submittals for demolition are only for the limited purposes indicated in the Contract Documents. Engineer's review, comments upon, action, or inaction concerning such Submittals, shall not, in any way, reduce or mitigate Contractor's sole responsibility for construction means, methods, techniques, procedures, and sequences, or associated safety and protection measures.
- 2.
 3. Notification of Intended Demolition Start: Submit in accordance with Paragraph 3.1.B of this Section.
 4. Field Quality Control Test Results:
 - a. Results of megger-testing of existing motors that will remain Owner's property.
 5. Qualifications Statements:
 - a. Name and qualifications of entity performing electrical removals, including copy of licenses required by authorities having jurisdiction.
 - b. Name and qualifications of entity performing plumbing removals.

1.6 FIELD CONDITIONS

A. Existing Conditions:

1. Owner and Engineer make no representation of condition or structural integrity of areas to be demolished or where removals are required by the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Notification:

1. Not less than 48 hours prior to commencing demolition or removal, advise Engineer in writing of planned start of demolition Work. Do not start removals when either Owner or Engineer furnishes reasonable objection in a timely manner.
2. Where demolition or removal has potential to affect adjacent properties, occupants, streets, or other public thoroughfare, transportation facilities, utilities, water courses, or any combination thereof, furnish required notices to owners and occupants of properties, buildings, and structures that may be affected by the demolition or removal.
3. In accordance with Laws and Regulations, and applicable permits, furnish to authorities having jurisdiction, including emergency services as necessary, appropriate notices of planned demolition and removals.

4. Submit to Engineer copies of notices furnished to adjacent property owners, occupants, and authorities having jurisdiction.
- B. Protection of In-Place Conditions:
1. Perform demolition and removal Work in manner that prevents damage and injury to property, structures, occupants, the public, and facilities. Do not interfere with use of, and free and safe access to and from, buildings, structures, and properties, unless allowed by the Contract Documents or otherwise allowed in writing by Owner.
 2. Closing or obstructing roads, drives, sidewalks, and passageways adjacent to the Work is not allowed unless indicated otherwise in the Contract Documents. Perform the Work with minimum interference to vehicular and pedestrian traffic.
 3. Provide temporary partitions between demolition work areas and (a) areas that will be occupied during demolition and removals, and (b) areas accessible to the public or visitors. Temporary partitions shall be sturdy, braced plywood in good condition, of dimensions sufficient to adequately screen demolition work from view of occupants, public, and visitors. Maintain temporary partitions in place until demolition and removal Work in the subject area is complete or until other work requires removal of temporary partitions.
 4. Provide appropriate temporary barriers, lighting, sidewalk sheds, and other necessary protection.
 5. Repair damage to facilities not subject to demolition or removal when such damage results from Contractor's action or inaction.
- C. Existing Utilities: In addition to requirements of the General Conditions, as may be modified by the Supplementary Conditions, Section 01 71 33 - Protection of the Work and Property, and other Division 01 Specifications, perform the following:
1. Should unforeseen, unknown, or incorrectly shown or indicated Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions, as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.
 2. Sanitary Sewerage: Before proceeding with demolition, locate and cap all sewer lines and service laterals discharging from the building or structure being demolished.
 3. Storm Water Sewerage: Existing storm water system shall remain in place until demolition of existing building or structure is complete. Upon completing demolition, cut and cap storm sewerage at locations shown on the Drawings. Remove existing storm water piping and related structures between points of cutting, and backfill, restore to grade, and stabilize the area over the removed facilities in accordance with the Contract Documents.
 4. Water Piping and Related Facilities: Before proceeding with demolition, locate and cap all potable and non-potable waterlines and service laterals serving the building or structure being demolished. Ensure compliance with Laws and Regulations regarding water quality.
 5. Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as fuel and gas; compressed air; heating, ventilating, and air conditioning; electric; and communications; and service laterals serving the building or structure being demolished.
 6. Coordinate with utility owners relative to demolition and removal Work. Where utility owner requires that only the associated utility owner modify, disconnect, cap, or any combination thereof, its associated utility service, pay the utility owner for performing such modification, disconnection, capping, or other necessary work.
 7. Shutdown of utility services shall be coordinated by Contractor, assisted by Owner as required relative to contacting utility owners.
- D. Remediation:
- 1.
 2. If unanticipated Hazardous Environmental Condition is believed to be encountered during demolition and removals, comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.

3.2 DEMOLITION - GENERAL

A. General, Common Requirements for Demolition and Removal Work:

1. Contractor shall provide all labor, materials, construction equipment and machinery, tools, services (including professional services when necessary), and incidentals as shown, specified and required for demolition, removals, and disposal Work.
2. The Work under this Section includes, but is not necessarily limited to:
 - a. Demolition and removal of existing materials and equipment as shown or indicated in the Contract Documents. The Work includes demolition of existing underground electric and leachate forcemains, stormwater culverts, stormwater basin riser structure, appurtenances, electrical connections and components, , and other items.
 - b.
3. Demolition and removals indicated in other Sections shall comply with requirements of this Section.
4. Perform demolition Work as shown or indicated on the Drawings and as indicated elsewhere in the Contract Documents.
5. Pay for transporting and, as applicable, disposing of materials and equipment resulting from demolition and removals Work.
6. Locate construction equipment used for demolition Work and remove demolished materials and equipment to avoid imposing excessive loading on supporting and adjacent walls, floors, framing, facilities, and Underground Facilities.
7. Comply with NFPA 241.

B. Pollution Controls:

1. Use water sprinkling, temporary enclosures, and other suitable methods to limit emissions of dust and dirt to lowest practical level. Comply with Section 01 57 05 - Temporary Controls, and Laws and Regulations.
2. Do not use water when water may create hazardous or objectionable conditions such as icing, flooding, or pollution.
3. Clean adjacent structures, facilities, properties, and improvements of dust, dirt, and debris caused by demolition Work, in accordance with the General Conditions and Section 01 74 00 - Cleaning.

C. Explosives:

1. Explosives are not allowed at the Site. Do not use explosives for demolition and removal Work.

D. Building or Structure Demolition and Removals:

1. Unless otherwise acceptable to Engineer, proceed with demolition from top of building or structure to the ground. Complete demolition Work above each floor or tier before disturbing supporting members of lower levels.
2. Demolish concrete and masonry in small sections.
3. Remove structural framing members and lower to ground using hoists, cranes, or other suitable methods. Do not throw or drop to the ground.
4. Break up and remove foundations, mats, and slabs-on-grade unless otherwise shown or indicated as remaining in place.
5. Temporary Bracing and Supports:
 - a. Provide temporary bracing and supports sufficient to maintain safety, stability, and resist all loads to which the structure may be subject during demolition and removals, until entirety is permanently removed or permanently stabilized.
 - b. Temporary bracing and supports shall be sufficient for associated dead load, live load, transient loading, and dynamic loads such as wind, seismic, and other loads to which the temporary bracing or support may be subject.

- c. Where appropriate, retain a professional structural engineer, complying with applicable requirements for Contractor-retained design professionals in Section 01 71 23 – Field Engineering, to design temporary bracing and supports.
- E. Salvage and Ownership:
- 1. The following applies to materials and equipment to remain Owner's property:
 - a. Contractor shall carefully remove and appropriately handle materials and equipment to remain Owner's property in manner avoids damaging and invalidating warranties in effect for such items. Brace motors attached to flexible mountings until reinstallation or delivery to Owner's storage location. Fully remedy to pre-construction condition or replace items damaged during removal, handling, or storage by Contractor.
 - b. Remove, as functional units, together with all appurtenances required for operation.
 - c. Clean and tag for storage, items to remain Owner's property, and maintain comprehensive, detailed listing of such items. Update such listing when items are relocated.
 - d. Protect from damage.
 - e. Deliver to designated storage location at the Site, or other site, indicated in the Contract Documents, at place designated by Engineer or Owner.
 - 2. Items to be and delivered to Owner are as indicated in Table 02 41 00-A.

Table 02 41 00-A - Items to be Salvaged

Equipment Name/ Designation	Equipment Location	Deliver to Owner's Location

- 3. Preparation of Owner's existing equipment for storage:
 - a. Where appropriate, identify each component with markings or tags to indicate its position in the assembly and the assembly of which it is part.
 - b. Place small parts in appropriate, durable boxes and clearly mark contents on the outside of box or container.
 - c. Remove oil from oil-lubricated bearings and gear boxes and replace with storage oil.
 - d. Provide grease for grease-lubricated bearings.
 - e. Replace breather plugs with solid plugs.
 - f. Megger-test motor windings: Attach report of the test results to the associated motor and submit copy to Engineer.
 - g. Attach unit to suitable crate bottom.
 - h. Enclose unit in polyethylene film and seal all seams and the film to the base of the unit with tape.
 - i. Construct crate of wood slats around top and sides of unit.
 - j. Attach permanent instruction tag to outside of crate stating: "This unit has been prepared for storage. Replace oil, vent plugs, and lubricant in accordance with manufacturer's instructions before start-up."
- F. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces of walls, floors, ceilings, and other areas exposed by removals, and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by Engineer.

3.3 STRUCTURAL REMOVALS

- A. Remove structures to lines and grades shown or indicated, unless otherwise directed by Engineer. Where limits are not shown or indicated, limits shall be four inches outside item to be installed. Removals beyond limits shown or indicated shall be at Contractor's risk and expense and such excess removals shall be reconstructed to satisfaction of Engineer without additional cost to Owner.
- B. Recycling and Reuse of Demolition Materials:
 - 1. All concrete, brick, tile, masonry, roofing materials, reinforcing steel, structural metals, miscellaneous metals, plaster, wire mesh, and other items contained in, or upon, building or structure to be demolished, shall be removed, transported, and disposed of away from the Site, unless otherwise approved by Engineer.
 - 2. Do not use demolished materials as fill or backfill adjacent to buildings and structures, in pipeline trenches, or as subbase under buildings, structures, or pavement.
- C. After removing concrete and masonry walls or portions thereof, mats, slabs, and similar construction that ties in to the Work or to existing construction, neatly repair the junction point to leave exposed only finished edges and finished surfaces.
- D. Where parts of existing structures are to remain in service following demolition:
 - 1. Where parts of existing structures are to remain in service following demolition, remove the portions shown or indicated for removal, repair damage, and leave the building or structure in proper condition for the intended use.
 - 2. Remove concrete and masonry to the lines shown or indicated by sawing, drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp, straight corners, resulting in neat joints with new construction and be satisfactory for the purpose intended.
 - 3. Do not damage reinforcing bars beyond the area of concrete and masonry removal. Do not saw-cut beyond the area to be removed.
 - 4. Reinforcing bars that are exposed at surfaces of removed concrete and masonry that will not be covered with new concrete or masonry shall be removed to 1.5 inches below the final surface. Repair resulting hole, with repair mortar (for concrete), or grout (for masonry), so that filled hole is flush with adjacent surface.
 - 5. Where existing reinforcing bars are shown or indicated to extend into new construction, remove existing concrete so that reinforcing bars are clean and undamaged.
- E. Removal of Anchorages and Protruding Metals:
 - 1. Where equipment or material anchored to concrete or masonry are removed, and anchors are not to be re-used, and where existing metals (and to be removed) protrude from concrete, remove anchors and other metal to not less than 1.5 inches beneath surface of concrete or masonry member. Repair resulting hole, with repair mortar (for concrete), or grout (for masonry), so that filled hole is flush with adjacent surface.
 - 2. At Contractor's option, when anchor is stainless steel, anchor may be cut flush with surface of concrete or masonry, when so approved by Engineer.
- F. Jambs, sills and heads of windows, passageways, doors, or other openings (as applicable) cut-in to the Work or to existing construction, shall be dressed with masonry, concrete, or metal to provide smooth, finished appearance.
- G. Where anchoring materials, including bolts, nuts, hangers, welds, and reinforcing steel, are required to attach the Work to existing construction, provide such materials under this Section, unless specified elsewhere in the Contract Documents.

3.4 MECHANICAL REMOVALS

- A. Mechanical demolition and removal Work includes dismantling and removing existing:
 - 1. Piping systems and ductwork systems.

2. Mechanical equipment and appurtenances.
 3. Mechanical elements of instrumentation and control systems, such as sensors and transmitters and similar items.
 4. Mechanical removals include cutting and capping as required, except that cutting of existing piping and ductwork to make connections is included under Section 01 14 16 - Coordination with Owner's Operations; and applicable Specifications of Division 40 - Process Interconnections, and others as applicable.
 5. Mechanical removals as required in this Section apply to systems exposed to view, hidden from view, and Underground Facilities. Mechanical removals may require working in spaces that are OSHA-classified as confined spaces.
- B. Life-Safety Systems:
1. Retain existing life-safety systems, including but not limited to fire suppression systems, in place for as long as possible prior to performing associated demolition and removals.
 2. Where demolishing buildings or structures equipped with life-safety systems, remove or deactivate life-safety systems only in the area where active demolition operations are in progress.
- C. Demolition and Removals of Piping, Ductwork, and Similar Items:
1. Scope:
 - a. Safely and properly purge piping and tanks (as applicable) of chemicals, fuel, solids, liquids, and gases (as applicable) and make safe for removal and capping. Discharge contents of existing piping appropriately while avoiding damaging property; restricting access to or use of property; and creating unsafe, unsanitary, nuisances, and noisome conditions.
 - b. To the extent shown or indicated, remove existing piping conveying water (potable and non-potable), waste and vent, fuel (liquids and gases), heating fluids (such as water-glycol solutions), chemicals, solids and slurries, sludge, wastewater, other fluids, and process gases, and other piping.
 - c. Remove piping to the nearest structurally sound (or "solid") piping support, and provide caps on ends of remaining piping.
 - d. Where piping to be demolished passes through existing walls to remain, cut off and cap pipe on each side of wall.
 2. Caps, Closures, Blind Flanges, and Plugs – General (All Piping and Ducts):
 - a. Provide closure pieces, such as blind flanges and caps, where shown, indicated, or necessary to complete the Work.
 - b. Where used in this Section, the term "cap" means the appropriate type of closure for piping or ductwork being closed, including caps, blind flanges, and other closures.
 - c. Caps shall be compatible with the piping or ductwork on which the cap is installed, fluid-tight and gastight, and appropriate for the fluid or gas conveyed in the pipe or duct.
 - d. Unless otherwise shown or indicated, caps shall be mechanically fastened, fused, or welded to pipe or duct. Plug piping with means other than specified in this Section only when expressly shown or indicated in the Contract Documents or when allowed, in writing, by Engineer.
 3. Underground Facilities:
 - a. When Underground Facilities are altered or removed, properly cut and cap piping left in place, unless otherwise shown or indicated.
 4. Waste and Vent Piping; Ductwork:
 - a. Remove waste and vent piping, and ductwork to extent shown and cap as required.
 - b. Where demolished vent piping, stacks, and ductwork passes through existing roofing, patch the roof with same or similar materials as existing, and fully compatible with existing roofing materials. Completed patch shall be watertight and comply with roofing

manufacturer's written recommendations, and warranty requirements (when existing warranty remains in effect).

5. Potable Water Piping; Plumbing; Fire Suppression Piping and Systems; Heating Piping:
 - a. Modifications to potable water piping, fire suppression systems, plumbing piping (other than soil, waste, and vent piping), and heating system piping, shall comply with Laws and Regulations.
 - b. All portions of potable water systems that have been modified or opened shall be hydrostatically tested and disinfected in accordance with the Contract Documents, and Laws and Regulations. Hydrostatically test other, normally-pressurized, plumbing and fire suppression piping and heating piping systems that convey fluid. Field-test piping conveying air or gas in accordance with the Contract Documents prior to returning such systems to service.

D. Equipment Demolition and Removals:

1. To the extent shown or indicated and to the extent necessary for the Work, remove existing mechanical equipment, including (but not limited to):
 - a. Facility equipment, such as food service equipment, laundry equipment, dumbwaiters, and similar facility items.
 - b. Conveying equipment such as elevators, escalators, and similar general-use conveying systems.
 - c. Fire suppression and plumbing equipment.
 - d. Heating, ventilating, and air conditioning equipment.
 - e. Standby power generators.
 - f. Security systems equipment.
 - g. Transportation-related equipment.
 - h. Flow control gates and valves.
 - i. Hoisting equipment.
 - j. Bulk materials conveying equipment.
 - k. Process heating and cooling equipment.
 - l. Blowers, compressors, air filters, air dryers, and similar equipment.
 - m. Pumps.
 - n. Tanks.
 - o. Process equipment, including purification equipment, pollution control and solid waste equipment, and treatment process equipment.
 - p. Turbines.
 - q. Appurtenances (including motors, drive systems, controls, cooling water and seal water systems) as shown, indicated, and necessary for completing the Work.
2. Where necessary, disassemble equipment to avoid imposing excessive loading on supporting walls, floors, framing, facilities, and Underground Facilities. Disassemble equipment as necessary for access through, and egress from, buildings and structures. Disassembly and removal shall comply with Laws and Regulations. Provide means to remove equipment from buildings and structures.
3. Remove control panels, operator stations, and instrumentation associated with equipment being removed, unless shown or indicated otherwise.
4. Tanks and Equipment Containing Process Liquids, Gases, Solids, or a combination thereof:
 - a. Purge contents in accordance with Paragraph 3.4.C of this Section and other applicable requirements of the Contract Documents.
 - b. When removing generators, remove associated fuel storage tanks unless otherwise indicated to remain.

- c. Where contents of tank or equipment item may pose a potential hazard, such as hydrocarbon fuels or chemicals, properly dispose of contents and tanks in accordance with Laws and Regulations and the Contract Documents.
- d. Where tank or equipment contains wastewater or liquid sludge, and the Site is a wastewater treatment facility, transport and dispose of stored contents onsite at location acceptable to Owner and facility manager (if other than Owner) unless otherwise indicated in the Contract Documents. If Site is other than a wastewater treatment facility, dispose of contents appropriately in accordance with Laws and Regulations.
- e. Where tank or equipment contains solid or slurry-type material, remove, handle, and transport the contents and appropriately dispose of the materials offsite in accordance with Laws and Regulations, unless otherwise indicated in the Contract Documents.
- 5. Remove equipment supports as applicable, anchorages, base, grout, and piping. Remove anchorage systems in accordance with the "Structural Removals" Article in this Section.
- 6. Remove small-diameter piping back to header unless otherwise indicated.
- 7. Remove access platforms, ladders, and stairs related to equipment being removed, unless otherwise shown or indicated.
- 8. Instrumentation and Control Systems Removal:
 - a. Remove instrumentation and controls equipment in accordance with this Section's requirements for mechanical removals and electrical removals.
- 9. Reuse and Sale of Removed Equipment:
 - a. Entities indicated below may be interested in acquiring removed equipment:
 - 1) D.H. Griffin Companies.
 - 2) EcReCon.
 - 3) Federal Equipment Company.
 - 4) Phoenix Equipment Corporation.
 - b. Comply with this Section's "Disposal of Demolition Debris" Article for restrictions on sales of removed items.

3.5 ELECTRICAL REMOVALS

- A. Electrical Demolition Work Includes Performing the Following Activities and Removing Existing Electrical Items as follows:
 - 1. Disconnecting cabling from motors, electrical sources, control panels, control stations, instrumentation and control items, and similar devices and equipment.
 - 2. Conduits, raceways, cable trays, hangers and supports, cabling, and related items.
 - 3. Switches, panelboards, control stations, and similar items.
 - 4. Transformers, distribution switchboards, control panels, motors, starters, variable speed controllers, and similar items.
 - 5. Lighting fixtures and related items.
 - 6. Utility poles, site lighting standards, and overhead cabling.
 - 7. Appurtenances and miscellaneous electrical equipment, as shown, specified, or required.
- B. Electrical Removals – General:
 - 1. Comply with Laws and Regulations, including applicable electrical construction codes.
 - 2. Lock Out and Tagging:
 - a. Contractor shall lock out and tag circuit breakers and switches operated by Owner or facility manager (if other than Owner), and shall verify that affected cabling are de-energized to ground potential before commencing electrical removals Work.
 - b. Upon completion of electrical removals Work, remove locks and tags and promptly advise Resident Project Representative (RPR) or Engineer and Owner that existing facilities are available for use.

3. Remove existing electrical equipment, fixtures, and systems while avoiding damaging items required to remain. Unless shutdown is expressly allowed in Section 01 14 16 - Coordination with Owner's Operations, keep existing electrical systems in operation. Maintain integrity of grounding systems.
 4. Disconnect and remove motors, control panels, and other electrical items where shown or indicated.
 5. Store removed motors, microprocessors and electronics, and other electrical items to be reused in accordance with its manufacturer's recommendations and requirements of the Contract Documents.
- C. Motor Control Centers and Switchgear:
1. Remove or modify motor control centers and switchgear as shown or indicated.
 2. Modified openings shall be cut square and dressed smooth to dimensions required for installation of equipment.
- D. Removal of Cabling, Conduits, Raceways and Similar Items:
1. Verify the function of each cable before disconnecting and removing.
 2. Remove cabling, conduits, hangers and supports, and similar items back to the power source or control panel, unless otherwise shown or indicated.
 3. Remove cabling, conduits, and similar items where shown or indicated for removal. Abandoned conduits concealed in floors, ceiling slabs, or in walls shall be cut flush with the slab or wall (as applicable) at point of entrance, suitably capped, and the area repaired in a flush, smooth manner acceptable to Engineer.
 4. Disassemble and remove exposed conduits, junction boxes, other electrical appurtenances, and their supports.
 5. Repair all areas of the Work to prevent rusting on exposed surfaces.
 6. Underground Electric Demolition and Removal:
 - a. Conduits in Underground Facilities not scheduled for reuse shall be suitably capped watertight where each enters building or structure to remain.
 - b. Where shown or indicated, remove direct-burial cabling. Openings in buildings or structures for entrance of direct-burial cabling shall be patched with repair mortar or other material approved by Engineer for such purpose, and shall be watertight.
- E. Electrical Service Entrances and Outdoor, Overhead Electrical Utilities:
1. Remove existing poles and overhead cabling as shown or indicated. Where acceptable to Owner and Engineer, such facilities and items may be secured and abandoned in-place, although Owner and Engineer are under no obligation to authorize abandonment in lieu of removal.
 2. Completely remove from the Site poles not owned by electric utility, including site lighting standards and appurtenances, shown or indicated for removal.
 3. Existing substation(s) and poles owned by electric utility will be removed by the electric utility.
 4. Make necessary arrangements with electric utility owner for removal of utility owner's transformers and metering equipment after new electrical system has been installed and energized.
- F. Lighting fixtures, wall switches, receptacles, starters, and other miscellaneous electrical equipment, not designated as remaining as Owner's property, shall be removed and properly disposed off-Site as required in accordance with Laws and Regulations.

3.6 DEMOLITION OF SITE IMPROVEMENTS

A. Pavement, Sidewalks, Curbs, and Gutters:

1. Demolition of asphalt or concrete pavement, sidewalks, curbs, and gutters, as applicable, shall terminate at cut edges. Edges shall be linear and have a vertical cut face.

2. To cut pavement, sidewalks, curbs, and gutters, use machinery or tools that provide a smooth-cut edge, appropriate for the required result. Where cut edges are not smooth and vertical, appropriately repair cut edge to remain, or provide new cut (in accordance with the Contract Documents) through sound material not less than six inches from original cut, providing smooth, even appearance.
- B. Fencing, Guardrails, and Bollards:
1. Remove to the limits shown or indicated on the Drawings.
 2. Completely remove below-grade posts and concrete.
- C. Manholes, Vaults, Chambers, and Handholes:
1. Remove to the limits shown or indicated on the Drawings.
 2. If not shown or indicated on the Drawings, remove to not less than three feet below finished grade indicated on the Drawings.
 3. Where a portion of manhole, vault, handhole, or similar structure remains in-place, backfill portion of item that will remain with material as indicated in the "Underground Facilities Other than Manholes, Vaults, Chambers, and Handholes" provision, below, of this Article.
- D. Underground Facilities Other than Manholes, Vaults, Chambers, and Handholes:
1. Remove to the extent shown or indicated on the Drawings.
 2. Unless otherwise shown or indicated, cap ends of piping to remain in place in accordance with the "Mechanical Removals" Article of this Section.
 3. Completely fill, with flowable fill (controlled low-strength material), the following Underground Facilities that will be abandoned in-place:
 - a. Portions of manholes, vaults, handholes, and similar items that will remain in-place. At Contractor's option, such structures to remain may be filled with granular structural fill.
 - b. Buried piping 10 inches in diameter and larger.
 - c. [Indicate Project-specific buried piping or other Underground Facility].
 4. Provide flowable fill in accordance with Section 03 31 30 - Concrete Materials and Proportioning]and Section 31 20 00 - Earthwork Section 31 23 33 - Trenching and Backfilling. Where other material is allowed for backfilling Underground Facilities, provide such material in accordance with Section 31 23 00 - EarthworkSection 31 23 33 – Utilities - Trenching and Backfillinggg.
- E. Landscaping: Comply with Section 31 10 00 - Site Clearing.
- F. Other Site Improvements: When the Contract Documents require removal of other site improvements not addressed above, comply with Contract requirements for removal of buildings or structures.

3.7 DISPOSAL OF DEMOLITION DEBRIS

- A. Disposal – General:
1. Promptly remove from the Site all debris, waste, rubbish, material, and equipment resulting from demolition and removal Work. Promptly upon completion of demolition and removal Work, remove from the Site construction equipment used in demolition Work.
 2. Do not sell at, or adjacent to, the Site demolition materials or removed equipment and items. If materials, equipment or debris will be sold by Contractor, remove the items from the Site and adjacent areas, and perform the sale or transaction elsewhere, in accordance with Laws and Regulations.
 3. Cleaning and Removal of Debris: Comply with the General Conditions, Supplementary Conditions, and Section 01 74 00 - Cleaning.
- B. Transportation and Disposal:
1. Non-Hazardous Materials, Equipment, and Debris: Properly transport and dispose of non-hazardous demolition materials, equipment, and debris at appropriate landfill or other

suitable location, in accordance with Laws and Regulations. Non-hazardous material does not contain Constituents of Concern such as (but not limited to) asbestos, PCBs, petroleum, hazardous waste, radioactive material, or other material designated as hazardous in Laws or Regulations.

2. Hazardous Materials, Equipment, and Debris: When handling and disposal of items containing Constituents of Concern is included in the Work, properly transport and dispose of such items in accordance with the Contract Documents and Laws and Regulations.
- C. Submit to Engineer information required in this Section on proposed facilities where demolition materials, equipment, and debris will be recycled. Upon request, Engineer or Owner, shall be allowed to visit recycling facilities to verify adequacy and compliance status. During such visits, recycling facility operator shall cooperate and assist Engineer and Owner.

END OF SECTION

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic requirements for electrical systems.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Common Work Results for Equipment.
 - 2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 26 05 33 - Raceways and Boxes for Electrical Systems.

1.2 REFERENCES

- A. Definitions
 - 1. For the purposes of providing materials and installing electrical work the following definitions shall be used.
 - a. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
 - b. Architecturally finished interior area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
 - c. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
 - d. Highly corrosive and corrosive area: Areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
 - e. Hazardous areas: Class I, II or III areas as defined in NFPA 70.
 - f. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.
- B. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. ADM, Aluminum Design Manual.
 - 2. American Institute of Steel Construction (AISC):
 - a. Steel Construction Manual.
 - 3. American National Standards Institute (ANSI).
 - 4. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - c. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. C2, National Electrical Safety Code (NESC).
 - 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 7. National Electrical Manufacturers Association (NEMA):

8. Underwriters Laboratories, Inc. (UL).
- C. Products to be listed by a Nationally Recognized Testing Laboratory (NRTL) in accordance with applicable product standards.
 1. Applicable product standards including, but not limited to, ANSI, FM, IEEE, NEMA and UL.
 2. NRTL includes, but is not limited to, CSA Group Testing and Certification (CS), FM Approvals LLC (FM), Intertek Testing Services NA, Inc. (ETL), and Underwriters Laboratories, Inc. (UL).

1.3 SUBMITTALS

- A. Shop Drawings:
 1. See Specification Section 01 61 03 and individual specification sections for submittal requirements for products defined as equipment.
 2. General requirements:
 - a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
 - b. Include data sheets that include manufacturer's name and product model number.
 - 1) Clearly identify all optional accessories.
 - c. Acknowledgement that products are NRTL listed or are constructed utilizing NRTL recognized components.
 - d. Manufacturer's delivery, storage, handling and installation instructions.
 - e. Product installation details.
 - f. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
 - g. See individual specification sections for any additional requirements.
 3. Fabrication and/or layout drawings:
 - a. Concrete and reinforcing steel, per Division 03 requirements.
- B. Operation and Maintenance Manuals:
 1. See Specification Section 01 78 23 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content process of Operation and Maintenance Manuals.
- C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01 33 00 and all Specification Sections shall be submitted simultaneously.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect nameplates on electrical equipment to prevent defacing.

1.5 AREA DESIGNATIONS

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
 1. Outdoor areas:
 - a. Wet.
 - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
 2. Indoor areas:
 - a. Dry.
 - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to specific Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.
- B. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

- A. Electrical Equipment Support Pedestals and/or Racks:
 - 1. Manufacturers:
 - a. Modular strut:
 - 1) Unistrut Building Systems.
 - 2) B-Line by Eaton.
 - 3) Globe Strut.
 - 4) Superstrut by Thomas & Betts.
 - 2. Material requirements:
 - a. Modular strut:
 - 1) Galvanized steel: ASTM A123/A123M or ASTM A153/A153M.
 - 2) Stainless steel: AISI Type 316.
 - 3) PVC coated galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 mil PVC coating.
 - 4) Aluminum: AA Type 6063-T6.
 - b. Structural members (e.g., I beams, L and C channels):
 - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
 - 2) Aluminum: AA Type 6061-T6 or 6063-T6.
 - c. Mounting plates:
 - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
 - 2) Aluminum: AA Type 6063-T6.
 - d. Mounting hardware:
 - 1) Galvanized steel.
 - 2) Stainless steel.
 - e. Concrete and reinforcing steel: See Division 03 specifications.
- B. Equipment pads (interior and exterior):
 - 1. Concrete and reinforcing steel: See Division 03 specifications.
- C. Field touch-up of galvanized surfaces.
 - 1. Zinc-rich primer.
 - a. One coat, 3.0 mils, ZRC by ZRC Products.

PART 3 - EXECUTION

3.1 PREPARATION

3.2 INSTALLATION

- A. Install and wire all equipment, including pre-purchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.
- B. Install equipment in accordance with the requirements of:
 - 1. NFPA 70.

2. IEEE C2.
 3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:
1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
 2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
 3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
 4. See Section 26 05 19 for combining multiple branch circuits in a common conduit.
- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.
- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 inches from process, gas, air and water piping and equipment.
- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
 - a. Light switch (to center): 46 inches.
 - b. Receptacle in architecturally finished areas (to center): 18 inches.
 - c. Receptacle on exterior wall of building (to center): 18 inches.
 - d. Receptacle in non-architecturally finished areas (to center): 46 inches.
 - e. Telephone outlet in architecturally finished areas (to center): 18 inches.
 - f. Telephone outlet for wall-mounted phone (to center): 46 inches.
 - g. Safety switch (to center of operating handle): 54 inches.
 - h. Separately mounted motor starter (to center of operating handle): 54 inches.
 - i. Pushbutton or selector switch control station (to center): 46 inches.
 - j. Panelboard (to top): 72 inches.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 6 inches in equipment location with the Engineer's approval.
- K. Provide electrical equipment support system per the following area designations:
1. Dry areas:
 - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.

- b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
- 2. Wet areas:
 - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
 - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
- 3. Corrosive areas:
 - a. Aluminum system consisting of aluminum channels and fittings with stainless steel nuts and hardware.
- 4. Highly corrosive areas:
 - a. PVC coated steel system consisting of PVC coated steel channels and fittings with stainless steel nuts and hardware.
- L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
 - 1. Do not cut, or weld to, building structural members.
 - 2. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- M. Provide non-metallic corrosion resistant spacers to maintain 1/4 inches separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.
- N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.
- O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.
- P. Do not use materials that may cause the walls or roof of a building to discolor or rust.
- Q. Provide field markings and/or documentation of available short-circuit current (available fault current) and related information for equipment as required by the NFPA 70 and other applicable codes.
- R. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
 - 1. Determine the SCCR rating by one of the following methods:
 - a. Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
 - b. Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
 - c. Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
 - 2. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the equipment or control panel circuit originates.
 - 3. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

3.3 FIELD QUALITY CONTROL

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. Cleaning:

1. See Specification Section 01 74 00.
- D. The protective coating integrity of support structures and equipment enclosures shall be maintained.
 1. Repair galvanized components utilizing a zinc rich paint.
 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
 4. Repair surfaces which will be inaccessible after installation prior to installation.
 5. See Specification Section 26 05 33 for requirements for conduits and associated accessories.
- E. Replace nameplates damaged during installation.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Material and installation requirements for:
 - a. Building wire.
 - b. Power cable.
 - c. Control cable.
 - d. Instrumentation cable.
 - e. Wire connectors.
 - f. Insulating tape.
 - g. Pulling lubricant.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 26 05 00 - Common Work Results for Electrical.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Insulated Cable Engineers Association (ICEA):
 - a. S-58-679, Standard for Control Cable Conductor Identification.
2. National Electrical Manufacturers Association (NEMA):
 - a. ICS 4, Industrial Control and Systems: Terminal Blocks.
3. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
 - a. WC 57/S-73-532, Standard for Control Cables.
 - b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
5. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
 - a. 568, Commercial Building Telecommunications Cabling Standard.
6. Underwriters Laboratories, Inc. (UL):
 - a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
 - b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - c. 467, Standard for Safety Grounding and Bonding Equipment.
 - d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
 - e. 486C, Standard for Safety Splicing Wire Connections.
 - f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
 - g. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

- h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.
- i. 2250, Standard for Safety Instrumentation Tray Cable.

1.3 DEFINITIONS

- A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- B. Instrumentation Cable:
 - 1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
 - 2. The following are specific types of instrumentation cables:
 - a. Analog signal cable:
 - 1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 VDC) signals, using No. 16 AWG and smaller conductors.
 - 2) Commonly used types are defined in the following:
 - a) TSP: Twisted shielded pair.
 - b) TST: Twisted shielded triad.
 - b. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.
- C. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, No. 8 AWG and larger.
- D. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.
- E. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Wire connectors.
 - 2) Insulating tape.
 - 3) Cable lubricant.
 - b. See Section 26 05 00 for additional requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Section 26 05 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Building wire, power and control cable and multiplex cable:
 - a. Aetna Insulated Wire.
 - b. Alphawire.
 - c. Cerrowire.
 - d. Encore Wire Corporation.
 - e. General Cable.
 - f. Okonite Company.

- g. Southwire Company.
- 2. Instrumentation cable:
 - a. Analog cable:
 - 1) Alphawire.
 - 2) Belden Inc.
 - 3) General Cable.
- 3. Wire connectors:
 - a. Burndy Corporation.
 - b. Buchanan.
 - c. Ideal.
 - d. IlSCO.
 - e. 3M Co.
 - f. Teledyne Penn Union.
 - g. Thomas and Betts.
 - h. Phoenix Contact.
- 4. Insulating and color coding tape:
 - a. 3M Co.
 - b. Plymouth Bishop Tapes.
 - c. Red Seal Electric Co.

2.2 MANUFACTURED UNITS

A. Building Wire:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
- 3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
- 4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for type THHN/THWN and THHN/THWN-2 insulation.
- 5. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.

B. Power Cable:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
- 3. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
- 4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
- 5. Number of conductors as required, including a bare ground conductor.
- 6. Individual conductor color coding:
 - a. ICEA S-58-679, Method 4.
 - b. See PART 3 of this Specification Section for additional requirements.
- 7. Conform to NFPA 70 Type TC and IEEE 1202 or CSA FT-4.

C. Control Cable:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.

3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
 4. Conform to NEMA/ICEA WC 57/S-73-532 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
 5. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.
 - a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).
 6. Individual conductor color coding:
 - a. ICEA S-58-679, Method 1, Table E-2.
 - b. See PART 3 of this Specification Section for additional requirements.
 7. Conform to NFPA 70 Type TC and IEEE 1202, CSA FT-4 or NFPA 262.
- D. Electrical Equipment Control Wire:
1. Conductor shall be copper with 600 V rated insulation.
 2. Conductors shall be stranded.
 3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
 4. Conform to UL 44 for Type SIS insulation.
 5. Conform to UL 83 for Type MTW insulation.
- E. Instrumentation Cable:
1. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
 2. Analog cable:
 - a. Tinned copper conductors.
 - b. 300 V or 600 V PVC insulation with PVC jacket.
 - c. Twisted with 100% foil shield coverage with drain wire.
 - d. Six (6) twists per foot minimum.
 - e. Individual conductor color coding: ICEA S-58-679, Method 1, Table E-2.
 - f. Conform to IEEE 1202 or CSA FT-4 or NFPA 262, UL 2250, UL 1581 and NFPA 70 Type ITC.
 3. Digital cable:
 - a. As recommended by equipment (e.g., PLC, RTU) manufacturer.
 - b. Horizontal voice and data cable:
 - 1) Category 6 per TIA/EIA/ANSI 568.
 - 2) Cable shall be label-verified.
 - 3) Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level.
 - 4) Conductors: No. 24 AWG solid untinned copper.
 - 5) Rated CMP per NFPA 70.
 - c. Conform to IEEE 1202 or CSA FT-4 or NFPA 262 and NFPA 70 Type ITC.
- F. Wire Connectors:
1. Twist/screw on type:
 - a. Insulated pressure or spring type solderless connector.
 - b. 600 V rated.
 - c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
 - d. Phase and neutral conductors: Conform to UL 486C.

2. Compression and mechanical screw type:
 - a. 600 V rated.
 - b. Ground conductors: Conform to UL 467.
 - c. Phase and neutral conductors: Conform to UL 486A.
3. Terminal block type:
 - a. High density, screw-post barrier-type with white center marker strip.
 - b. 600 V and ampere rating as required, for power circuits.
 - c. 600 V, 20 ampere rated for control circuits.
 - d. 300 V, 15 ampere rated for instrumentation circuits.
 - e. Conform to NEMA ICS 4 and UL 486A.
- G. Insulating and Color Coding Tape:
 1. Pressure sensitive vinyl.
 2. Premium grade.
 3. Heat, cold, moisture, and sunlight resistant.
 4. Thickness, depending on use conditions: 7, 8.5, or 10 mil.
 5. For cold weather or outdoor location, tape must also be all-weather.
 6. Color:
 - a. Insulating tape: Black.
 - b. Color coding tape: Fade-resistant color as specified herein.
 7. Comply with UL 510.
- H. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Permitted Usage of Insulation Types:
 1. Type XHHW-2:
 - a. Building wire and power and control cable in architectural and non-architectural finished areas.
 - b. Building wire and power and control cable in conduit in outdoor areas and below grade.
 - c. Building wire and power and control cable in cable tray in outdoor areas.
 2. Type THHN/THWN and THHN/THWN-2:
 - a. Building wire and power and control cable No. 8 AWG and smaller in architectural and non-architectural finished areas.
 3. Type SIS and MTW:
 - a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.
- B. Conductor Size Limitations:
 1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
 2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
 3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.
- C. Color Code All Wiring as Follows:
 1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V	480 V, 480/277 V
Phase 1	Black	Brown
Phase 2	Red *	Orange
Phase 3	Blue	Yellow
Neutral	White	White or Gray
Ground	Green	Green

* Orange when it is a high leg of a 120/240 V Delta system.

- a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
- b. Conductors larger than No. 6 AWG:
 - 1) Insulated phase and neutral conductors shall be identified by one of the following methods:
 - a) Continuous colored outer finish along its entire length.
 - b) 3 inches of colored tape applied at the termination.
 - 2) Insulated grounding conductor shall be identified by one of the following methods:
 - a) Continuous green outer finish along its entire length.
 - b) Stripping the insulation from the entire exposed length.
 - c) Using green tape to cover the entire exposed length.
 - 3) The color coding shall be applied at all accessible locations, including but not limited to: Junction and pull boxes, wireways, manholes and handholes.
2. Power cables ICEA S-58-679, Method 4 with:
 - a. Phase and neutral conductors identified with 3 inches of colored tape, per the Table herein, applied at the terminations.
 - b. Ground conductor: Bare.
3. Control cables ICEA S-58-679, Method 1, Table E-2:
 - a. When a bare ground is not provided, one of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.
 - b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 inches of colored tape, per the Table herein, applied at the terminations.
- D. Install all wiring in raceway unless otherwise indicated on the Drawings.
- E. Feeder, branch, control and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:
 1. Where specifically indicated on the Drawings.
 2. Where field conditions dictate and written permission is obtained from the Engineer.
 3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.
 - a. The combinations shall comply with the following:
 - 1) 12 VDC, 24 VDC and 48 VDC may be combined.
 - 2) 125 VDC shall be isolated from all other AC and DC circuits.
 - 3) AC control circuits shall be isolated from all DC circuits.
 4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.
 - a. The combinations shall comply with the following:

- 1) Analog signal circuits may be combined.
 - 2) Digital signal circuits may be combined but isolated from analog signal circuits.
5. Multiple branch circuits for similar loads may be combined in a common raceway, such as multiple lighting circuits or multiple receptacle circuits or other 120Vac circuits. Do not combine lighting and receptacle circuits.
- a. Do not combine control device circuits with lighting or receptacle circuits.
 - b. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:
 - 1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
 - 2) The neutral conductors may not be shared.
 - 3) Up sizing raceway size for the size and quantity of conductors.
- F. Ground the drain wire of shielded instrumentation cables at one end only.
1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).
- G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
1. Feeder and branch power circuits:
 - a. Device outlet boxes:
 - 1) Twist/screw on type connectors.
 - b. Junction and pull boxes and wireways:
 - 1) Twist/screw on type connectors for use on No. 8 and smaller wire.
 - 2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.
 - c. Motor terminal boxes:
 - 1) Twist/screw on type connectors for use on No. 10 AWG and smaller wire.
 - 2) Insulated mechanical screw type connectors for use on No. 8 AWG and larger wire.
 - d. Manholes or handholes:
 - 1) Twist/screw on type connectors pre-filled with epoxy for use on No. 8 AWG and smaller wire.
 - 2) Watertight compression or mechanical screw type connectors for use on No. 6 AWG and larger wire.
 2. Control circuits:
 - a. Junction and pull boxes: Terminal block type connector.
 - b. Manholes or handholes: Twist/screw on type connectors pre-filled with epoxy.
 - c. Control panels and motor control centers: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.
 3. Instrumentation circuits can be spliced where field conditions dictate and written permission is obtained from the Engineer.
 - a. Maintain electrical continuity of the shield when splicing twisted shielded conductors.
 - b. Junction and pull boxes: Terminal block type connector.
 - c. Control panels and motor control centers: Terminal block or strip provided within the equipment or field installed within the equipment by the Contractor.
 4. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.
- H. Insulating Tape Usage:
1. For insulating connections of No. 8 AWG wire and smaller: 7 mil vinyl tape.

2. For insulating splices and taps of No. 6 AWG wire or larger: 10 mil vinyl tape.
 3. For insulating connections made in cold weather or in outdoor locations: 8.5 mil, all weather vinyl tape.
- I. Color Coding Tape Usage: For color coding of conductors.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for grounding and bonding system(s).
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 26 05 00 - Common Work Results for Electrical.
 - 2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 26 05 33 - Raceways and Boxes for Electrical Systems.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
 - 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 467, Grounding and Bonding Equipment.
- B. Assure ground continuity is continuous throughout the entire Project.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data.
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Grounding clamps, terminals and connectors.
 - 2) Exothermic welding system.
 - b. See Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Ground rods and bars and grounding clamps, connectors and terminals:
 - a. ERICO by Pentair.
 - b. Harger Lightning & Grounding.
 - c. Heary Bros. Lightning Protection Co. Inc..
 - d. Burndy by Hubbell.
 - e. Robbins Lightning, Inc.
 - f. Blackburn by Thomas & Betts.

- g. Thompson Lightning Protection, Inc.
- 2. Exothermic weld connections:
 - a. ERICO by Pentair - Cadweld.
 - b. Harger Lightning & Grounding - Ultraweld.
 - c. Burndy by Hubbell - Thermoweld.
 - d. FurseWELD by Thomas & Betts.

2.2 COMPONENTS

- A. Wire and Cable:
 - 1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
 - 2. Insulated conductors: Color coded green, per Section 26 05 19.
- B. Conduit: As specified in Section 26 05 33.
- C. Ground Bars:
 - 1. Solid copper:
 - a. 1/4 inches thick.
 - b. 2 or 4 inches wide.
 - c. 24 inches long minimum in main service entrance electrical rooms, 12 inches long elsewhere.
 - 2. Predrilled grounding lug mounting holes.
 - 3. Stainless steel or galvanized steel mounting brackets.
 - 4. Insulated standoffs.
- D. Ground Rods:
 - 1. [3/4 inches x 10 feet, or as indicated on the Drawings].
 - 2. Copper-clad:
 - a. 10 mil minimum uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
 - b. Corrosion resistant bond between the copper and steel.
 - c. Hard drawn for a scar-resistant surface.
- E. Grounding Clamps, Connectors and Terminals:
 - 1. Mechanical type:
 - a. Standards: UL 467.
 - b. High copper alloy content.
 - 2. Compression type for interior locations:
 - a. Standards: UL 467.
 - b. High copper alloy content.
 - c. Non-reversible.
 - d. Terminals for connection to bus bars shall have two bolt holes.
 - 3. Compression type suitable for direct burial in earth or concrete:
 - a. Standards: UL 467, IEEE 837.
 - b. High copper alloy content.
 - c. Non-reversible.
 - d. Factory filled with oxide inhibiting compound.
- F. Exothermic Weld Connections:
 - 1. Copper oxide reduction by aluminum process.
 - 2. Molds properly sized for each application.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install products in accordance with manufacturer's instructions.
2. Size grounding conductors and bonding jumpers in accordance with NFPA 70, Article 250, except where larger sizes are indicated on the Drawings.
3. Remove paint, rust, or other non-conducting material from contact surfaces before making ground connections. After connection, apply manufacturers approved touch-up paint to protect metallic surface from corrosion.
4. Where ground conductors pass through floor slabs or building walls provide nonmetallic sleeves.
 - a. Seal the sleeve interior to stop water penetration.
5. Do not splice grounding electrode conductors except at ground rods.
6. Install ground rods and grounding electrode conductors in undisturbed, firm soil.
 - a. Provide excavation required for installation of ground rods and conductors.
 - b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
 - c. Unless otherwise specified, connect conductors to ground rods with compression type connectors or exothermic weld.
 - d. Provide sufficient slack in conductor to prevent conductor breakage during backfill or due to ground movement.
 - e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.
7. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.

B. Grounding Electrode System:

1. Provide a grounding electrode system in accordance with NFPA 70, Article 250 and as indicated on the Drawings.
 - a. All grounding electrode conductors terminate on a main ground bar located adjacent to the service entrance equipment.
2. Grounding electrode conductor terminations:
 - a. Ground bars mounted on wall: Use a two-hole compression type conductor terminal and bolt it to the ground bar with two bolts.
 - b. Ground bars in electrical equipment: Use compression type conductor terminal and bolt it to the ground bar or manufacture's provided mechanical type termination device.
 - c. Piping systems: Use mechanical type connections.
 - d. Building steel, below grade and encased in concrete: Use compression type connector or exothermic weld.
 - e. Building steel, above grade: Use a two-hole compression type conductor terminal and bolt to the steel with two bolts or exothermic weld.
 - f. Ground rod: Compression type or exothermic weld, unless otherwise specified.
 - g. At all above grade terminations, the conductors shall be labeled. Choose the desired grounding system (ring, triad, single rod, Ufer) based on your grounding detail.
3. Ground ring grounding system:
 - a. Ground ring consists of ground rods and a conductor looped around the structure.
 - b. Placed at a minimum of 10 feet from the structure foundation and 2 feet-6 inches below grade.

- c. Provide a minimum of four ground rods placed at the corners of the structure and additional rods so that the maximum distance between ground rods does not exceed 50 FT.
 - d. Building/Structure grounding:
 - 1) Bond building/structure metal support columns to the ground ring at all corners of the structure.
 - e. Grounding conductor: Bare conductor, size as indicated on the Drawings.
- 4. Triad grounding system:
 - a. Triad consists of three ground rods arranged in a triangle separated by 20 feet and a conductor interconnecting each ground rod.
 - b. Place first ground rod a minimum of 10 feet from the structure foundation and 2 FT-6 IN below grade.
 - c. Grounding conductor: Bare conductor, size as indicated on the Drawings.
- C. Supplemental Grounding Electrode:
 - 1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
 - a. See Grounding Electrode System paragraph for conductor termination requirements.
 - 2. Metal light poles:
 - a. Connect metal pole and pole base reinforcing steel to a ground rod.
 - b. Grounding conductor: Bare #6 AWG minimum.
 - 3. Equipment support rack and pedestals mounted outdoors:
 - a. Connect metallic structure to a ground rod.
 - b. Grounding conductor: #6 AWG minimum.
- D. Transformer Separately Derived Grounding System:
 - 1. Install the System Bonding Jumper at the transformer. At the first disconnect, ensure the neutral is isolated from ground.
 - 2. Structures with a single electrical room/area:
 - a. Connect grounding electrode conductor to the Grounding Electrode System main ground bar.
 - 3. Structures with multiple electrical rooms/areas:
 - a. Provide a ground bar mounted in each electrical room/area.
 - b. Interconnect all ground bars in a daisy chain or radial fashion to the main ground bar as indicated on the Drawings.
 - c. Connect grounding electrode conductor to the electrical room/area ground bar.
 - 4. See Grounding Electrode System paragraph for conductor termination requirements.
- E. Raceway Bonding/Grounding:
 - 1. Install all metallic raceway so that it is electrically continuous.
 - 2. Provide an equipment grounding conductor in all raceways with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.
 - 3. NFPA 70 required grounding bushings shall be of the insulating type.
 - 4. Provide double locknuts at all panels.
 - 5. Bond all conduits, at entrance and exit of equipment, to the equipment ground bus or lug.
 - 6. Provide bonding jumpers if conduits are installed in concentric knockouts.
 - 7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.

F. Equipment Grounding:

1. Ground all utilization equipment with an equipment grounding conductor.

G. Manhole and Handhole Grounding:

1. Provide a ground rod and ground bar, when indicated or as needed, in each manhole and handhole with exposed metal parts.
 - a. Expose a minimum of 4 inches of the rod above the floor for field connections to the rod.
2. Connect all exposed metal parts (e.g., conduits and cable racks) to the ground rod.

3.2 FIELD QUALITY CONTROL

- A. Leave grounding system uncovered until observed by Owner.

END OF SECTION

This page intentionally left blank.

SECTION 26 05 33
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Material and installation requirements for:
 - a. Conduits.
 - b. Conduit fittings.
 - c. Conduit supports.
 - d. Wireways.
 - e. Outlet boxes.
 - f. Pull and junction boxes.
- B. Related Specification Sections include but are not necessarily limited to:
1. Section 26 05 00 - Common Work Results for Electrical.
 2. Section 26 05 43 - Underground Work for Electrical Systems.
 3. Section 26 27 26 - Wiring Devices.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Aluminum Association (AA).
 2. American Iron and Steel Institute (AISI).
 3. ASTM International (ASTM):
 - a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - c. D2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
 4. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - c. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - d. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
 - e. TC 14.AG, Aboveground Reinforced Thermosetting Resin Conduit and Fittings.
 - f. TC 14.BG, Belowground Reinforced Thermosetting Resin Conduit and Fittings.
 5. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. C80.1, Electric Rigid Steel Conduit (ERSC).
 - b. C80.3, Steel Electrical Metallic Tubing (EMT).
 - c. C80.5, Electrical Aluminum Rigid Conduit (ERAC).
 - d. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 7. Underwriters Laboratories, Inc. (UL):

- a. 1, Standard for Flexible Metal Conduit.
- b. 6, Electrical Rigid Metal Conduit - Steel.
- c. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
- d. 360, Standard for Liquid-Tight Flexible Metal Conduit.
- e. 467, Grounding and Bonding Equipment.
- f. 514A, Metallic Outlet Boxes.
- g. 514B, Conduit, Tubing, and Cable Fittings.
- h. 651, Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
- i. 797, Electrical Metallic Tubing - Steel.
- j. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
- k. 1203, Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.
- l. 2420, Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
- m. 2515, Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

1.3 SUBMITTALS

A. Shop Drawings:

- 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Conduit fittings.
 - 2) Support systems.
 - b. See Section 26 05 00 for additional requirements.
- 2. Fabrication and/or layout drawings:
 - a. Identify dimensional size of pull and junction boxes to be used.

1.4 DELIVERY, STORAGE, AND HANDLING

A. See Section 26 05 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Rigid metal conduits and electrical metallic tubing:
 - a. Allied Tube and Conduit.
 - b. Western Tube and Conduit Corporation.
 - c. Wheatland Tube.
 - d. Patriot Aluminum Products, LLC.
 - 2. PVC coated rigid metal conduits:
 - a. Robroy Industries.
 - b. Atkore - Calbond
 - 3. Rigid nonmetallic conduit:
 - a. Prime Conduit.
 - b. Cantex, Inc.
 - c. Osburn Associates, Inc.
 - d. Champion Fiberglass, Inc.
 - e. United Fiberglass of America, Inc.

4. Flexible conduit:
 - a. AFC Cable Systems.
 - b. Anamet, Inc.
 - c. Electri-Flex Company.
 - d. International Metal Hose Company.
 - e. Southwire Company, LLC.
5. Wireway:
 - a. Hoffman Engineering.
 - b. Wiegmann by Hubbell.
 - c. Square D by Schneider Electric.
6. Conduit fittings and accessories:
 - a. Appleton by Emerson Electric Co.
 - b. Carlon by Thomas & Betts.
 - c. Cantex, Inc.
 - d. Crouse-Hinds by Eaton.
 - e. Killark by Hubbell.
 - f. Osburn Associates, Inc.
 - g. O-Z/Gedney by Emerson Electric Co.
 - h. Raco by Hubbell.
 - i. Steel City by Thomas & Betts.
 - j. Thomas & Betts.
7. Support systems:
 - a. Unistrut by Atkore International, Inc.
 - b. B-Line by Eaton.
 - c. Kindorf by Thomas & Betts.
 - d. Minerallac Company.
 - e. CADDY by Pentair.
 - f. Superstrut by Thomas & Betts.
8. Outlet, pull and junction boxes:
 - a. Appleton by Emerson Electric Co.
 - b. Crouse-Hinds by Eaton
 - c. Killark by Hubbell.
 - d. O-Z/Gedney by Emerson Electric Co.
 - e. Steel City by Thomas & Betts.
 - f. Raco by Hubbell
 - g. Bell by Hubbell.
 - h. Hoffman Engineering.
 - i. Wiegmann by Hubbell.
 - j. B-Line by Eaton.
 - k. Adalet.
 - l. RITTAL North America LLC.
 - m. Stahlin by Robroy Enclosures.

2.2 RIGID METAL CONDUITS

- A. Rigid Galvanized Steel Conduit (RGS):
 1. Mild steel with continuous welded seam.

2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
 3. Threads galvanized after cutting.
 4. Internal coating: Baked lacquer, varnish or enamel for a smooth surface.
 5. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6.
- B. PVC-Coated Rigid Steel Conduit (PVC-RGS):
1. Nominal 40 mil Polyvinyl Chloride Exterior Coating:
 - a. Coating: Bonded to hot-dipped galvanized rigid steel conduit conforming to NEMA/ANSI C80.1.
 - b. The bond between the PVC coating and the conduit surface: Greater than the tensile strength of the coating.
 2. Nominal 2 mil, minimum, urethane interior coating.
 3. Urethane coating on threads.
 4. Conduit: Epoxy prime coated prior to application of PVC and urethane coatings.
 5. Female Ends:
 - a. Have a plastic sleeve extending a minimum of one pipe diameter or 2 inches, whichever is less beyond the opening.
 - b. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used with it.
 6. Pass high temperature water PVC coating adhesion test and be ETL Verified PVC-001.
 7. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6, NEMA RN 1.
- C. Rigid Aluminum Conduit (RAC):
1. AA Type 6063 aluminum alloy, T-1 temper.
 2. Maximum copper content of 0.10%.
 3. Extruded, seamless.
 4. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.5, UL 6.

2.3 ELECTRICAL METALLIC TUBING (EMT)

- A. Mild steel with continuous welded seam.
- B. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
- C. Internal coating: Baked lacquer, varnish, or enamel for a smooth surface.
- D. Standards: NFPA 70 Type EMT, NEMA/ANSI C80.3, UL 797.

2.4 RIGID NONMETALLIC CONDUIT

- A. Schedules 40 (PVC-40) and 80 (PVC-80):
 1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.
 2. Rated for direct sunlight exposure.
 3. Fire retardant and low smoke emission.
 4. Shall be suitable for use with 90 degrees C wire and shall be marked "maximum 90 degrees C".
 5. Standards: NFPA 70 Type PVC, NEMA TC 2, UL 651.
- B. Fiberglass:
 1. Epoxy based resin system using an anhydride curing agent.
 2. Continuous E-glass roving.
 3. Winding angle approximately 54.75 degrees.
 4. Smooth internal walls with all fibers imbedded in the epoxy.

5. Above grade rated: Halogen free additive for flame spread and smoke control.
6. Ultraviolet inhibitor: Carbon black.
7. Two-step curing process.
8. Tensile strength: 11,000 psi per ASTM D2105.
9. Dimensions: Iron Pipe Size (IPS).
10. Wall thickness:
 - a. Standard: 3/4 inches to 4 inches nominal size.
 - b. Medium: 5 inches to 6 inches nominal size.
 - c. Extra Heavy for "bullet proof" and Class 1, Division 2 areas: 3/4 inches to 6 inches nominal size.
11. Integral bell and spigot.
12. Conduits and fittings to be joined with an interference joint and epoxy adhesive creating a concrete and water tight connection.
13. Standard: NFPA 70 Type RTRC, NEMA TC14.AG, NEMA TC14.BG, NEMA TC.XW, UL 2420, UL 2515 , UL 2515A.

2.5 FLEXIBLE CONDUIT

- A. Flexible Galvanized Steel Conduit (FLEX):
 1. Formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
 2. Standard: NFPA 70 Type FMC, UL 1.
- B. PVC-Coated Flexible Galvanized Steel (liquid-tight) Conduit (FLEX-LT):
 1. Core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
 2. Extruded PVC outer jacket positively locked to the steel core.
 3. Liquid and vaportight.
 4. Standard: NFPA 70 Type LFMC, UL 360.

2.6 WIREWAY

- A. General:
 1. Suitable for lay-in conductors.
 2. Designed for continuous grounding.
 3. Covers:
 - a. Hinged or removable in accessible areas.
 - b. Non-removable when passing through partitions.
 4. Finish: Rust inhibiting primer and manufacturer's standard paint inside and out except for stainless steel type.
 5. Standards: UL 870, NEMA 250.
- B. General Purpose (NEMA 1 rated) Wireway:
 1. 14 or 16 gage steel without knockouts.
 2. Cover: Solid, non-gasketed and held in place by captive screws.
- C. Raintight (NEMA 3R) Wiring Trough:
 1. 14 or 16 GA galvanized steel without knockouts.
 2. Cover: Non-gasketed and held in place by captive screws.
- D. Watertight (NEMA 4X rated) Wireway:
 1. 14 GA Type 304 or 316 stainless steel bodies and covers without knockouts and 10 GA stainless steel flanges.

2. Cover: Fully gasketed and held in place with captive clamp type latches.
 3. Flanges: Fully gasketed and bolted.
- E. Dusttight (NEMA 12 rated) Wireway:
1. 14 GA steel bodies and covers without knockouts and 10 GA steel flanges.
 2. Cover: Fully gasketed and held in place with captive clamp type latches.
 3. Flanges: Fully gasketed and bolted.

2.7 CONDUIT FITTINGS AND ACCESSORIES

- A. Fittings for Use with RGS [nd IMC and RAC:
1. General:
 - a. In hazardous locations listed for use in Class I, Groups C and D locations.
 2. Locknuts:
 - a. Threaded steel or malleable iron.
 - b. Gasketed or non-gasketed.
 - c. Grounding or non-grounding type.
 3. Bushings:
 - a. Threaded, insulated metallic.
 - b. Grounding or non-grounding type.
 4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
 5. Couplings:
 - a. Threaded straight type: Same material and finish as the conduit with which they are used on.
 - b. Threadless type: Gland compression or self-threading type, concrete tight.
 6. Unions: Threaded galvanized steel or zinc plated malleable iron.
 7. Conduit bodies (ells and tees):
 - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
 - b. Standard and mogul size.
 - c. Cover:
 - 1) Clip-on type with stainless steel screws.
 - 2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
 8. Conduit bodies (round):
 - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
 - b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.
 9. Sealing fittings:
 - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
 - b. Standard and mogul size.
 - c. With or without drain and breather.
 - d. Fiber and sealing compound: UL listed for use with the sealing fitting.
 10. Hazardous location flexible coupling (HAZ-FLEX):
 - a. Liquid tight and arc resistant.
 - b. Electrically conductive so no bonding jumper is required.
 - c. Dry and wet areas:
 - 1) Bronze braided covering over flexible brass core.
 - 2) Bronze end fittings.
 - 3) Zinc-plated steel or malleable iron unions and nipples.

- d. Corrosive areas:
 - 1) Stainless steel braided covering over flexible stainless steel core.
 - 2) Stainless steel end fittings.
 - 3) Aluminum unions and nipples.
- 11. Service entrance head:
 - a. Malleable iron, galvanized steel or copper free aluminum.
 - b. Insulated knockout cover for use with a variety of sizes and number of conductors.
- 12. Expansion couplings:
 - a. 2 inches nominal straight-line conduit movement in either direction.
 - b. Galvanized steel with insulated bushing.
 - c. Gasketed for wet locations.
 - d. Internally or externally grounded.
- 13. Expansion/deflection couplings:
 - a. 3/4 inches nominal straight-line conduit movement in either direction.
 - b. 30 degrees nominal deflection from the normal in all directions.
 - c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.
 - d. Internally or externally grounded.
 - e. Watertight, raintight and concrete tight.
- 14. Standards: UL 467, UL 514B, UL 1203.
- B. Fittings for Use with PVC-RGS:
 - 1. The same material and construction as those fittings listed under paragraph "Fittings for Use with RGS and IMC and RAC" and coated as defined under paragraph "PVC Coated Rigid Steel Conduit (PVC-RGS)."
- C. Fittings for Use with EMT:
 - 1. Connectors:
 - a. Straight, angle and offset types furnished with locknuts.
 - b. Zinc plated steel.
 - c. Insulated gland compression type.
 - d. Concrete and raintight.
 - 2. Couplings:
 - a. Zinc plated steel.
 - b. Gland compression type.
 - c. Concrete and raintight.
 - 3. Conduit bodies (ells and tees):
 - a. Body: Copper free aluminum with threaded hubs.
 - b. Standard and mogul size.
 - c. Cover:
 - 1) Screw down type with steel screws.
 - 2) Gasketed or non-gasketed galvanized steel or copper free aluminum.
 - 4. Standard: UL 514B.
- D. Fittings for Use with FLEX:
 - 1. Connector:
 - a. Zinc plated malleable iron.
 - b. Squeeze or clamp-type.
 - 2. Standard: UL 514B.

E. Fittings for Use with FLEX-LT and FLEX-NM:

1. Connector:
 - a. Straight or angle type.
 - b. Metal construction, insulated and gasketed.
 - c. Composed of locknut, grounding ferrule and gland compression nut.
 - d. Liquid tight.
2. Standards: UL 467, UL 514B.

F. Fittings for Use with Rigid Nonmetallic PVC Conduit:

1. Coupling, adapters and conduit bodies:
 - a. Same material, thickness, and construction as the conduits with which they are used.
 - b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
 - c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.

G. Fittings for Use with Rigid Nonmetallic Fiberglass Conduit:

1. Coupling and adapters shall be of the same material, thickness, and construction as the conduit.
2. Epoxy adhesive for joining conduits and fittings shall be supplied by the same manufacturer as the conduit and fittings and shall provide a concrete and water tight connection.
3. Standard: NFPA 70 Type RTRC, NEMA TC14.AG, NEMA TC14.BG, NEMA TC.XW, UL 2420, UL 2415 , UL 2515A Weather and Corrosion Protection Tape:
4. PVC based tape, 10 mils thick.
5. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
6. Used with appropriate pipe primer.

2.8 ALL RACEWAY AND FITTINGS

A. Mark Products:

1. Identify the nominal trade size on the product.
2. Stamp with the name or trademark of the manufacturer.

2.9 OUTLET BOXES

A. Metallic Outlet Boxes:

1. Hot-dip galvanized steel.
2. Conduit knockouts and grounding pigtail.
3. Styles:
 - a. 2 inches x 3 inches rectangle.
 - b. 4 inches square.
 - c. 4 inches octagon.
 - d. Masonry/tile.
4. Accessories:
 - a. Flat blank cover plates.
 - b. Barriers.
 - c. Extension, plaster or tile rings.
 - d. Box supporting brackets in stud walls.
 - e. Adjustable bar hangers.

5. Standards: NEMA/ANSI OS 1, UL 514A.
- B. Cast Outlet Boxes:
1. Zinc plated cast iron or die-cast copper free aluminum with manufacturer's standard finish.
 2. Threaded hubs and grounding screw.
 3. Styles:
 - a. "FS" or "FD".
 - b. "Bell".
 - c. Single or multiple gang and tandem.
 - d. "EDS" or "EFS" for hazardous locations.
 4. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.
 5. Standards: UL 514A, UL 1203.
- C. See Specification Section 26 27 26 for wiring devices, wallplates and coverplates.

2.10 PULL AND JUNCTION BOXES

- A. NEMA 1 Rated:
1. Body and cover: 14 GA minimum, galvanized steel or 14 GA minimum, steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 2. With or without concentric knockouts on four sides.
 3. Flat cover fastened with screws.
- B. NEMA 4 Rated:
1. Body and cover: 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 2. Seams continuously welded and ground smooth.
 3. No knockouts.
 4. External mounting flanges.
 5. Hinged or non-hinged cover held closed with stainless steel screws and clamps.
 6. Cover with oil resistant gasket.
- C. NEMA 4X Rated (metallic):
1. Body and cover: 14 GA Type 304 or 316 stainless steel.
 2. Seams continuously welded and ground smooth.
 3. No knockouts.
 4. External mounting flanges.
 5. Hinged door and stainless steel screws and clamps.
 6. Door with oil-resistant gasket.
- D. NEMA 4X Rated (Nonmetallic):
1. Body and cover: Ultraviolet light protected fiberglass-reinforced polyester boxes.
 2. No knockouts.
 3. External mounting flanges.
 4. Hinged door with quick release latches and padlocking hasp.
 5. Door with oil resistant gasket.
- E. NEMA 7 and NEMA 9 Rated:
1. Cast gray iron alloy or copper-free aluminum with manufacturer's standard finish.
 2. Drilled and tapped openings or tapered threaded hub.
 3. Cover bolted-down with stainless steel bolts or threaded cover with neoprene gasket.
 4. External mounting flanges.

5. Grounding lug.
 6. Accessories: 40 mil PVC exterior coating and 2 mil urethane interior coating.
- F. NEMA 12 Rated:
1. Body and cover:
 - a. 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. Type 5052 H-32 aluminum, unpainted.
 2. Seams continuously welded and ground smooth.
 3. No knockouts.
 4. External mounting flanges.
 5. Non-hinged cover held closed with captivated cover screws threaded into sealed wells or hinged cover held closed with stainless steel screws and clamps.
 6. Flat door with oil resistant gasket.
- G. Miscellaneous Accessories:
1. Rigid handles for covers larger than 9 square feet or heavier than 25 pounds.
 2. Split covers when heavier than 25 pounds.
 3. Weldnuts for mounting optional panels and terminal kits.
 4. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.
- H. Standards: NEMA 250, UL 50.

2.11 SUPPORT SYSTEMS

- A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:
1. Material requirements.
 - a. Galvanized steel: ASTM A123/A123M or ASTM A153/A153M.
 - b. Stainless steel: AISI Type 316.
 - c. PVC coat galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 mil PVC coating.
- B. Single Conduit and Outlet Box Support Fasteners:
1. Material requirements:
 - a. Zinc plated steel.
 - b. Stainless steel.
 - c. Malleable iron.
 - d. PVC coat malleable iron or steel: 20 mil PVC coating.
 - e. Steel protected with zinc phosphate and oil finish.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION - GENERAL

- A. Shall be in accordance with the requirements of:
1. NFPA 70.
 2. Manufacturer instructions.
- B. Size of Raceways:
1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
 2. Unless specifically indicated otherwise, the minimum raceway size shall be:
 - a. Conduit: 3/4 inches.

- b. Wireway: 2-1/2 inches x 2-1/2 inches.
- C. Field Bending and Cutting of Conduits:
 - 1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
 - 2. Do not reduce the internal diameter of the conduit when making conduit bends.
 - 3. Prepare tools and equipment to prevent damage to the PVC coating.
 - 4. Degrease threads after threading and apply a zinc rich paint.
 - 5. Debur interior and exterior after cutting.
- D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.
- E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
 - 1. Repair galvanized components utilizing a zinc rich paint.
 - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 - 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the conduit; or a self-adhesive, highly conformable, cross-linked silicone composition strip, followed by a protective coating of vinyl tape.
 - a. Total nominal thickness: 40 mil.
 - 4. Repair surfaces which will be inaccessible after installation prior to installation.
- F. Remove moisture and debris from conduit before wire is pulled into place.
 - 1. Pull mandrel with diameter nominally 1/4 inches smaller than the interior of the conduit, to remove obstructions.
 - 2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
 - 3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.
- G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.
- H. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.

3.2 RACEWAY ROUTING

- A. Raceways shall be routed in the field unless otherwise indicated.
 - 1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
 - 2. Run in straight lines parallel to or at right angles to building lines.
 - 3. Do not route conduits:
 - a. Through areas of high ambient temperature or radiant heat.
 - b. In suspended concrete slabs.
 - c. In concrete members including slabs, slabs on grade, beams, walls, and columns unless specifically located and detailed on structural Drawings..
 - 4. Locate sleeves or conduits penetrating floors, walls, and beams so as not to significantly impair the strength of the construction. Do not place conduit penetrations in columns.
 - 5. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
 - 6. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 degrees of bends in the conduit run or in long straight runs to limit pulling tensions.

- B. All conduits within a structure shall be installed exposed except as follows:
 - 1. As indicated on the Drawings.
 - 2. Concealed above gypsum wall board or acoustical tile suspended ceilings.
 - 3. Conduits in architecturally finished areas shall be concealed.
- C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 feet:
 - 1. Between instrumentation and telecommunication: 1 inch.
 - 2. Between instrumentation and 125 V, 48 V and 24 VDC, 2 inches.
 - 3. Between instrumentation and 600 V and less AC power or control: 6 inches.
 - 4. Between instrumentation and greater than 600 VAC power: 12 inches.
 - 5. Between telecommunication and 125 V, 48 V and 24 VDC, 2 inches.
 - 6. Between telecommunication and 600 V and less AC power or control: 6 inches.
 - 7. Between telecommunication and greater than 600 VAC power: 12 inches.
 - 8. Between 125 V, 48 V and 24 VDC and 600 V and less AC power or control: 2 inches.
 - 9. Between 125 V, 48 V and 24 VDC and greater than 600 VAC power: 2 inches.
 - 10. Between 600 V and less AC and greater than 600 VAC: 2 inches.
 - 11. Between process, gas, air and water pipes: 6 inches.
- D. Conduits shall be installed to eliminate moisture pockets.
 - 1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.
- E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.
- F. Where sufficient room exists within the housing of roof-mounted equipment, the conduit shall be stubbed up inside the housing.

3.3 RACEWAY APPLICATIONS

- A. Permitted Raceway Types Per Wire or Cable Types:
 - 1. Power wire or cables: All raceway types.
 - 2. Control wire or cables: All raceway types.
 - 3. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.
 - 4. Motor leads from a VFD: RGS, RAC or shielded VFD cables in all other raceways.
 - 5. Telecommunication cables: All raceway types.
- B. Permitted Raceway Types Per Area Designations:
 - 1. Dry areas:
 - a. RGS.
 - b. RAC.
 - 2. Wet areas:
 - a. RGS.
 - b. RAC.
 - c. Fiberglass (above grade rated).
 - 3. Corrosive areas:
 - a. PVC-RGS.
 - b. RAC.
 - c. Fiberglass (above grade rated).
 - 4. Highly corrosive areas:

- a. PVC-RGS.
 - b. PVC-80.
 - c. Fiberglass (above grade rated).
- 5. NFPA 70 hazardous areas:
 - a. RGS.
 - b. RAC when required by other area designations.
- C. Permitted Raceway Types Per Routing Locations:
 - 1. In stud framed walls:
 - a. EMT.
 - 2. In concrete block or brick walls:
 - a. PVC-40.
 - 3. Above acoustical tile ceilings:
 - a. EMT.
 - b. NEMA 1 rated wireway.
 - 4. Embedded in poured concrete walls and floors:
 - a. PVC-40.
 - b. Fiberglass (above or below grade rated).
 - c. Fiberglass (above grade rated) when emerging from concrete into areas designated as wet, corrosive or highly corrosive.
 - d. PVC-RGS when emerging from concrete into areas designated as wet, corrosive or highly corrosive.
 - 5. Beneath floor slab-on-grade:
 - a. PVC-40.
 - b. Fiberglass (above or below grade rated).
 - c. Fiberglass (above grade rated) in areas designated as wet, corrosive or highly corrosive.
 - d. PVC-RGS in areas designated as wet, corrosive or highly corrosive.
 - 6. Direct buried conduits and ductbanks:
 - a. PVC-80.
 - b. Fiberglass (above or below grade rated).
 - c. 90 degrees elbows for transitions to above grade:
 - 1) PVC-RGS.
 - 2) Fiberglass (above grade rated).
 - d. Long sweeping bends greater than 15 degrees:
 - 1) PVC-RGS.
 - 2) Fiberglass (above or below grade rated).
 - 7. Concrete encased ductbanks:
 - a. PVC-40.
 - b. PVC-EB.
 - c. Fiberglass (above or below grade rated).
 - d. 90 degree elbows for transitions to above grade:
 - 1) PVC-RGS.
 - 2) Fiberglass (above grade rated).
 - e. Long sweeping bends greater than 15 degrees:
 - 1) RGS for sizes 2 inches and larger.
 - 2) Fiberglass (above or below grade rated).

- D. FLEX conduits shall be installed for connections to light fixtures, HVAC equipment and other similar devices above the ceilings.
 - 1. The maximum length shall not exceed:
 - a. 6 feet to light fixtures.
 - b. 3 feet to all other equipment.
- E. FLEX-LT and FLEX-NM conduits shall be installed as the final conduit connection to light fixtures, dry type transformers, motors, electrically operated valves, instrumentation primary elements, and other electrical equipment that is liable to vibrate.
 - 1. The maximum length shall not exceed:
 - a. 6 feet to light fixtures.
 - b. 3 feet to motors.
 - c. 2 feet to all other equipment.
- F. HAZ-FLEX coupling shall be installed as the final conduit to motors, electrically operated valves, instrumentation primary elements and electrical equipment that is liable to vibrate.
 - 1. The maximum length shall not exceed:
 - a. 3 feet to motors.
 - b. 2 feet to all other equipment.
- G. NEMA 1 Rated Wireway:
 - 1. Surface mounted in electrical rooms.
 - 2. Surface mounted above removable ceilings tiles of an architecturally finished area.
- H. NEMA 3R Wiring Trough:
 - 1. Surface mounted in exterior locations.
- I. NEMA 4X Rated Wireway:
 - 1. Surface mounted in areas designated as wet and or corrosive.
- J. NEMA 12 Rated Wireway:
 - 1. Surface mounted in areas designated as dry in architecturally and non-architecturally finished areas.
- K. Underground Conduit: See Specification Section 26 05 43.

3.4 CONDUIT FITTINGS AND ACCESSORIES

- A. Conduit Seals:
 - 1. Installed in conduit systems located in hazardous areas as required by the NFPA 70.
 - 2. Fill plug and drain shall be accessible.
 - 3. Pour the conduit seals in a two-step process.
 - a. Pour the seal and leave cover off.
 - b. After seal is dry, inspect for proper sealing, install cover and mark (for example, paint or permanent marker) as complete.
- B. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.
 - 1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.
- C. Install Expansion Fittings:
 - 1. Where conduits are exposed to the sun and conduit run is greater than 200 feet.
 - 2. Elsewhere as identified on the Drawings.
- D. Install Expansion/Deflection Fittings:

1. Where conduits enter a structure.
 - a. Except electrical manholes and handholes.
 - b. Except where the ductbank is tied to the structure with rebar.
 2. Where conduits span structural expansions joints.
 3. Elsewhere as identified on the Drawings.
- E. Threaded connections shall be made wrench-tight.
- F. Conduit joints shall be watertight:
1. Where subjected to possible submersion.
 2. In areas classified as wet.
 3. Underground.
- G. Terminate Conduits:
1. In metallic outlet boxes:
 - a. RGS and IMC and RAC:
 - 1) Conduit hub and locknut.
 - 2) Insulated bushing and two locknuts.
 - 3) Use grounding type locknut or bushing when required by NFPA 70.
 - b. EMT: Compression type connector and locknut.
 2. In NEMA 1 rated enclosures:
 - a. RGS and IMC and RAC:
 - 1) Conduit hub and locknut.
 - 2) Insulated bushing and two locknuts.
 - 3) Use grounding type locknut or bushing when required by NFPA 70.
 - b. EMT: Compression type connector and locknut.
 3. In NEMA 12 rated enclosures:
 - a. Watertight, insulated and gasketed hub and locknut.
 - b. Use grounding type locknut or bushing when required by NFPA 70.
 4. In NEMA 4 and NEMA 4X rated enclosures:
 - a. Watertight, insulated and gasketed hub and locknut.
 5. In NEMA 7 and NEMA 9 rated enclosures:
 - a. Into an integral threaded hub.
 6. When stubbed up through the floor into floor mount equipment:
 - a. With an insulated grounding bushing on metallic conduits.
 - b. With end bells on nonmetallic conduits.
- H. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

3.5 CONDUIT SUPPORT

- A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:
1. Dry or wet and/or hazardous areas:
 - a. Galvanized system consisting of: Galvanized steel channels and fittings, nuts and hardware and conduit clamps.
 - b. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.
 2. Corrosive areas:

- a. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.
 - b. PVC coated steel system consisting of: PVC coated galvanized steel channels and fittings and conduit clamps with stainless steel nuts and hardware.
 - 3. Highly corrosive areas:
 - a. PVC coated steel system consisting of: PVC coated galvanized steel channels and fittings and conduit clamps with stainless steel nuts and hardware.
 - b. Fiberglass system consisting of: Fiberglass channels and fittings, nuts and hardware and conduit clamps.
 - 4. Conduit type shall be compatible with the support system material.
 - a. Galvanized steel system may be used with RGS and IMC[and EMT.
 - b. Stainless steel system may be used with RGS and IMC[and PVC-RGS and RAC.
 - c. PVC coated galvanized steel system may be used with PVC-RGS and RAC and PVC-40 and PVC-80 and Fiberglass.
 - d. Aluminum system may be used with RAC and PVC-RGS.
 - e. Fiberglass system may be used with PVC-40 and PVC-80 and PVC-RGS[and Fiberglass.
- B. Permitted single conduit support fasteners per area designations and conduit types:
- 1. Architecturally finished areas:
 - a. Material: Zinc plated steel, or steel protected with zinc phosphate and oil finish.
 - b. Types of fasteners: Spring type hangers and clips, straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - c. Provide anti-rattle conduit supports when conduits are routed through metal studs.
 - 2. Dry or wet and/or hazardous areas:
 - a. Material: Zinc plated steel, stainless steel and malleable iron.
 - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - 3. Corrosive areas:
 - a. Material: Stainless steel and PVC coat malleable iron or steel.
 - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - 4. Highly corrosive areas:
 - a. Material: PVC coat malleable iron or steel.
 - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - 5. Conduit type shall be compatible with the support fastener material.
 - a. Zinc plated steel, steel protected with zinc phosphate and oil finish and malleable iron fasteners may be used with RGS and IMC and EMT.
 - b. Stainless steel system may be used with RGS and IMC and PVC-RGS and RAC.
 - c. PVC coated fasteners may be used with PVC-RGS and RAC and PVC-40 and PVC-80.
 - d. Nonmetallic fasteners may be used with PVC-40, PVC-80 and fiberglass.
- C. Conduit Support General Requirements:
- 1. Maximum spacing between conduit supports per NFPA 70.
 - 2. Support conduit from the building structure.
 - 3. Do not support conduit from process, gas, air or water piping; or from other conduits.
 - 4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the manufacturer if the support is rated less than 25 pounds.

- a. Do not exceed maximum concentrated load recommended by the manufacturer on any support.
- b. Conduit hangers:
 - 1) Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.
- c. Do not use suspended ceiling support systems to support raceways.
- d. Hangers in metal roof decks:
 - 1) Utilize fender washers.
 - 2) Not extend above top of ribs.
 - 3) Not interfere with vapor barrier, insulation, or roofing.
- 5. Conduit support system fasteners:
 - a. Use sleeve-type expansion anchors as fasteners in masonry wall construction.
 - b. Do not use concrete nails and powder-driven fasteners.

3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

A. General:

- 1. Install products in accordance with manufacturer's instructions.
- 2. See Section 26 05 00 and the Drawings for area classifications.
- 3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
- 4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.

B. Outlet Boxes:

- 1. Permitted uses of metallic outlet boxes:
 - a. Housing of wiring devices:
 - 1) Recessed in all stud framed walls and ceilings.
 - 2) Recessed in poured concrete, concrete block and brick walls of architecturally finished areas and exterior building walls.
 - b. Pull or junction box:
 - 1) Above gypsum wall board or acoustical tile ceilings.
 - 2) Above 10 feet in an architecturally finished area where there is no ceiling.
- 2. Permitted uses of cast outlet boxes:
 - a. Housing of wiring devices surface mounted in non-architecturally finished dry, wet, corrosive, highly corrosive and hazardous areas.
 - b. Pull and junction box surface mounted in non-architecturally finished dry, wet, corrosive and highly corrosive areas.
- 3. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Section 26 05 00.
- 4. Set device outlet boxes plumb and vertical to the floor.
- 5. Outlet boxes recessed in walls:
 - a. Install with appropriate stud wall support brackets or adjustable bar hangers so that they are flush with the face of the wall.
 - b. Locate in ungrouted cell of concrete block with bottom edge of box flush with bottom edge of block and flush with the face of the block.
- 6. Place barriers between switches in boxes with 277 V switches on opposite phases.
- 7. Back-to-back are not permitted.
- 8. When an outlet box is connected to a PVC coated conduit, the box shall also be PVC coated.

C. Pull and Junction Boxes:

1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
 - a. Make covers of boxes accessible.
2. Permitted uses of NEMA 1 enclosure:
 - a. Pull or junction box surface mounted above removable ceiling tiles of an architecturally finished area.
3. Permitted uses of NEMA 4 enclosure:
 - a. Pull or junction box surface mounted in areas designated as wet.
4. Permitted uses of NEMA 4X metallic enclosure:
 - a. Pull or junction box surface mounted in areas designated as wet and/or corrosive.
5. Permitted uses of NEMA 7 enclosure:
 - a. Pull or junction box surface mounted in areas designated as Class I hazardous.
 - 1) Provide PVC coating in corrosive and highly corrosive areas when PVC coated conduit is used.
6. Permitted uses of NEMA 12 enclosure:
 - a. Pull or junction box surface mounted in areas designated as dry.

END OF SECTION

SECTION 26 05 43
UNDERGROUND WORK FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Manholes.
 - b. Handhole.
 - c. Underground conduits and ductbanks.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. .
 - 2.
 - 3. Section 26 05 26 - Grounding.
 - 4. Section 26 05 33 - Raceways and Boxes for Electrical Systems.
 - 1. Section 31 23 00 - Earthwork.

1.2 SECTION 31 23 33 – UTILITIES - TRENCHING AND BACKFILLING.QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. HB-17, Standard Specifications for Highway Bridges.
 - 2. ASTM International (ASTM):
 - a. A536, Standard Specification for Ductile Iron Castings.
 - 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 4. Society of Cable Telecommunications Engineers (SCTE):
 - a. 77, Specifications for Underground Enclosure Integrity.

1.3 DEFINITIONS

- A. Direct-Buried Conduit(s):
 - 1. Individual (single) underground conduit.
 - 2. Multiple underground conduits, arranged in one or more planes, in a common trench.
- B. Concrete Encased Ductbank: An individual (single) or multiple conduit(s), arranged in one or more planes, encased in a common concrete envelope.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - b. Provide signed and sealed design computations for manholes and handholes indicating compliance with design load rating.
 - 2. Fabrication and/or layout drawings:
 - a. Provide dimensional drawings of each manhole and handhole indicating all specified accessories and conduit entry locations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Prefabricated composite handholes:
 - a. Armorcast Products Company.
 - b. Quazite by Hubbell.
 - c. Synertech by Oldcastle Enclosure Solutions.
 - 2. Precast manholes and handholes:
 - a. Lister Industries Ltd.
 - b. Oldcastle Enclosure Solutions.
 - c. Jensen Precast and Utility Concrete Products.
 - 3. Manhole and handhole and ductbank accessories:
 - a. Cantex, Inc.
 - b. Condux International, Inc.
 - c. Neenah Enterprises, Inc.
 - d. Prime Conduit.
 - e. Thomas and Betts.
 - f. Underground Devices, Inc.
 - g. Unistrut by Atkore International, Inc.

2.2 MANHOLES AND HANDHOLES

- A. Prefabricated Composite Material Handholes:
 - 1. Handhole body and cover: Fiberglass reinforced polymer concrete conforming to all test provisions of SCTE 77.
 - 2. Minimum load ratings: SCTE 77 Tier 58.
 - 3. Solid bottom.
 - 4. Stackable design as required for specified depth.
 - 5. Cover:
 - a. Engraved legend of "ELECTRIC" or "COMMUNICATIONS".
 - b. Non-gasketed bolt down with stainless steel penta head bolts.
 - c. Lay-in non-bolt down, when cover is over 100 pounds.
 - d. One or multiple sections so the maximum weight of a section is 125 pounds.
 - 6. Cover lifting hook: 24 inches minimum in length.
- B. Precast Manholes and Handholes:
 - 1. Fiberglass reinforced polymer concrete or steel reinforced cement concrete structures:
 - 2. AASHTO live load rating: H-20 for full deliberate vehicle traffic.
 - 3. Mating edges: Tongue and groove type.
 - 4. Solid bottom with a 12 inches x 12 inches or 12 inches diameter french drain in the bottom of each manhole
 - 5. Cable pulling eyes opposite all conduit entrances.
 - a. Coordinate exact location with installation contractor.

2.3 CONCRETE MANHOLE AND HANDHOLE ACCESSORIES

- A. Cover and Frame:
 - 1. Cast ductile iron: ASTM A536.

2. AASHTO live load rating: H-20.
 3. Diameter: 30 inches.
 4. Cast the legend "ELECTRICAL" or "COMMUNICATIONS" into manhole and handhole covers.
- B. Cable Racks and Hooks:
1. Material: Heavy-duty nonmetallic (glass reinforced nylon).
 2. Hook loading capacity: 400 pounds minimum.
 3. Rack loading capacity: Four hooks maximum.
 4. Hook deflection: 0.25 inches maximum.
 5. Hooks: Length, as required, with positive locking device to prevent upward movement.
 6. Mounding hardware: Stainless steel.
- C. Cable Pulling Irons:
1. 7/8 inches diameter hot-dipped galvanized steel.
 2. 6000 pound minimum pulling load.
- D. Ground Rods and Grounding Equipment: See Specification Section 26 05 26.

2.4 UNDERGROUND CONDUIT AND ACCESSORIES

- A. Concrete and reinforcing steel: See Division 03 Specifications.
- B. Conduit: See Specification Section 26 05 33.
- C. Duct Spacers/Supports:
1. High density polyethylene or high impact polystyrene.
 2. Interlocking web or mesh design.
 3. Provide 3 inches minimum spacing between conduits.
 4. Accessories, as required:
 - a. Hold down bars.
 - b. Ductbank strapping.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERGROUND ELECTRICAL SYSTEMS - GENERAL

- A. Drawings indicate the intended location of manholes and handholes and routing of [ductbanks and direct buried conduit.
1. Field conditions may affect actual routing.
- B. Manhole and Handhole Locations:
1. Approximately where shown on the Drawings.
 2. As required for pulling distances.
 3. As required to keep pulling tensions under allowable cable tensions.
 4. As required for number of bends in ductbank routing.
 5. Shall not be installed in a swale or ditch.
 6. Determine the exact locations after careful consideration has been given to the location of other utilities, grading, and paving.
 7. Locations are to be approved by the Engineer prior to excavation and placement or construction of manholes and handholes.
- C. Install products in accordance with manufacturer's instructions.
- D. Install manholes and handholes in conduit runs where indicated or as required to facilitate pulling of wires or making connections.

- E. Comply with Specification Section 31 230 00 - Earthwork , Section 31 23 33 – Utilities - Trenching and Backfilling

3.2 MANHOLES AND HANDHOLES

A. Prefabricated Composite Material Handholes:

1. For use in areas subjected to occasional non-deliberate vehicular traffic.
2. Provide handhole on six-inch compacted layer of fill material in accordance with Section 31 23 00 - Earthwork and Section 31 23 33 – Utilities - Trenching and Backfilling] and six inches larger than handholes footprint on all sides.
3. Provide concrete encasement ring around handhole per manufacturers installation instructions (minimum of 10 inches wide x 12 inches deep).
4. Install so that the surrounding grade is 1 inch lower than the top of the handhole.
5. Size: As indicated on the Drawings or as required for the number and size of conduits.
6. Provide cable rails and pulling eyes as needed.

B. Precast Manholes and Handholes:

1. For use in vehicular and non-vehicular traffic areas.
2. Construction:
 - a. Grout or seal all joints, per manufacturer's instructions.
 - b. Support cables on walls by cable racks:
 - 1) Provide a minimum of two racks, install symmetrically on each wall of manholes and handholes.
 - a) Provide additional cable racks, as required, so that both ends of cable splices will be supported horizontally.
 - 2) Equip cable racks with adjustable hooks: Quantity of cable hooks as required by the number of conductors to be supported.
 - c. In each manhole and handhole, drive 3/4 inches x 10 feet long copper clad ground rod into the earth with approximately 6 inches exposed above finished floor.
 - 1) Drill opening in floor for ground rod.
 - 2) Connect all metallic components to ground rod by means of #8 AWG minimum copper wire and approved grounding clamps.
 - 3) Utilize a ground bar in the manhole or handhole if the quantity of ground wires exceeds three.
 - a) Connect ground bar to ground rod with a #2/0 AWG minimum copper wire.
3. Provide manholes and handholes on six-inch compacted layer of fill material in accordance with [Section 31 23 0 - EarthworkSection 31 23 33 – Utilities - Trenching and Backfilling] and six inches larger than manholes and handholes footprint on all sides.
4. Install so that the top of cover is 1 inch above finished grade.
 - a. Where existing grades are higher than finished grades, install sufficient number of courses of curved segmented concrete block between top of handhole and manhole frame to temporarily elevate manhole cover to existing grade level.
5. After installation is complete, provide and compact required fill materials around manholes and handholes.
6. Handhole size:
 - a. As indicated on the Drawings or as required for the number and size of conduits entering or as indicated on the Drawings.
 - b. Minimum floor dimension of 4 feet x 4 feet and minimum depth of 4 feet.
7. Manhole size:
 - a. As indicated on the Drawings or as required for the number and size of conduits entering or as indicated on the Drawings.
 - b. Minimum floor dimension of 6 feet x 6 feet and a minimum depth of 6 feet.

3.3 UNDERGROUND CONDUITS

A. General Installation Requirements:

1. Ductbank types per location:
 - a. Reinforced concrete ductbank:
 - 1) Under aircraft pavement.
 - 2) Under railroads.
 - 3) As indicated in the Ductbank Schedule.
 - b. Concrete encased ductbank:
 - 1) Under roads.
 - 2) Conduits containing medium voltage cables.
 - 3) Pad mounted transformer secondaries.
 - 4) Plant process equipment feeders and controls.
 - 5) As indicated in the Ductbank Schedule.
 - c. Direct-buried conduit(s):
 - 1) Area/Roadway lighting.
 - 2) As indicated in the Ductbank Schedule.
2. Do not place concrete or other required fill materials until conduits have been observed by Engineer.
3. Ductbanks shall be sloped a minimum of 4 inches per 100 feet or as detailed on the Drawings.
 - a. Low points shall be at manholes or handholes.
4. During construction and after conduit installation is complete, plug the ends of all conduits.
5. Provide conduit supports and spacers.
 - a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 inches and less: 3 feet.
 - 2) 1-1/4 to 3 inches: 5 feet.
 - 3) 3-1/2 to 6 inches: 7 feet.
 - b. Place supports and spacers for rigid steel conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 inches and less: 10 feet.
 - 2) 1-1/4 to 2-1/2 inches: 14 feet.
 - 3) 3 inches and larger: 20 feet.
 - c. Securely anchor conduits to supports and spacers to prevent movement during placement of concrete or other required fill materials.
6. Stagger conduit joints at intervals of 6 inches vertically.
7. Make conduit joints watertight and in accordance with manufacturer's recommendations.
8. Accomplish underground changes in direction of runs exceeding a total of 15 degrees by long sweep bends having a minimum radius of 10 feet.
 - a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
9. Furnish manufactured elbows at end of runs as the conduit transitions to above grade.
 - a. Minimum radius of 18 inches for conduits less than 3 inches trade size and 36 inches for conduits 3 inches trade size and larger.
10. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
11. After the conduit run has been completed:

- a. Prove joint integrity and test for out-of-round duct by pulling a test mandrel through each conduit.
 - 1) Test mandrel:
 - a) Length: Not less than 12 inches.
 - b) Diameter: Approximately 1/4 inches less than the inside diameter of the conduit.
 - b. Clean the conduit by pulling a heavy duty wire brush mandrel followed by a rubber duct swab through each conduit.
 - 12. Pneumatic rodding may be used to draw in lead wire.
 - a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.
 - b. Extend cord 3 feet beyond ends of conduit.
 - 13. Transition from rigid nonmetallic conduit to rigid metallic conduit, per Specification Section 26 05 33, prior to entering a structure or going above ground.
 - a. Except rigid nonmetallic conduit may be extended directly to manholes, handholes, pad mounted transformer boxes and other exterior pad mounted electrical equipment where the conduit is concealed within the enclosure.
 - b. Terminate rigid PVC conduits with end bells.
 - c. Terminate steel conduits with insulated bushings.
 - 14. Place warning tape in trench directly over ductbanks, direct-buried conduit, and direct-buried wire and cable.
 - 15. Placement of conduits stubbing into handholes and manholes shall be located to allow for proper bending radiuses of the cables.
- B. Concrete Encased Ductbank:
- 1. Ductbank system consists of conduits completely encased in minimum 3 inches of concrete and with separations between different cabling types as required in Specification Section 26 05 33 or as detailed on the Drawings.
 - 2. Install so that top of concrete encased duct, at any point:
 - a. Is not less than 24 inches below grade.
 - b. Is below pavement sub-grading.
 - 3. Where identified and for a distance 10 feet either side of the area, the concrete shall be reinforced.
 - a. The reinforcement shall consist of #4 bars and #4 ties placed 12 inches on center, in accordance with Division 03 Specification Sections or as detailed on the Drawings.
 - b. Conduit supports to be staggered to minimize weak vertical shear point.
 - 4. Conduit supports shall provide a uniform minimum clearance of 3 inches between the bottom of the trench and the bottom row of conduit.
 - 5. Conduit separators shall provide a uniform minimum clearance of 3 inches between conduits or as required in Specification Section 26 05 33 for different cabling types.
- C. Direct-Buried Conduit(s):
- 1. Install so that the top of the uppermost conduit, at any point:
 - a. Is not less than 30 inches below grade.
 - b. Is below pavement sub-grading.
 - 2. Provide a uniform minimum clearance of 3 inches between conduits or as required in Specification Section 26 05 33 for different cabling types.
 - a. Maintain the separation of multiple planes of conduits by one of the following methods:
 - 1) Provide multilevel conduits with conduit supports and separators to maintain required separations, and backfill with flowable fill in accordance with [Section 31 20 01 – Earth Moving] [Section 31 23 05 – Excavation and Fill] [Section 31 23 33 –

Trenching and Backfilling] or concrete in accordance with the Specifications of Division 03 - Concrete.

- 2) Install multilevel conduits one level at a time.
 - a) Each level shall be backfilled with required materials and compacted in accordance with [Section 31 23 00 – Earthwork and Section 31 23 33 – Utilities -Trenching and Backfilling, while maintaining required separations.

END OF SECTION

This page intentionally left blank.

SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Site clearing Work, including:
 - a. General provisions for site clearing Work.
 - b. Preparation for site clearing Work.
 - c. Clearing and grubbing.
 - d. Tree protection, selective removals, and selective trimming.
 - e. Disposal and cleaning.
 - f. Stripping and stockpiling of topsoil.

B. Related Requirements: Include but are not necessarily limited to:

1. Section 31 23 00- - Earthwork.
2. Section 31 23 33 – Utilities - Trenching and Backfilling.

1.2 REFERENCES

A. Terminology:

1. Terms indicated below are not defined terms indicated with initial capital letters but, when used in this Section, have the meanings indicated below:
 - a. "Arborist" means Subcontractor retained to perform Work requiring a specialist in trees, shrubs, brush, other vegetation of the types existing at the Site, and possessing not less than the required qualifications indicated in this Section.
 - b. "Clearing and grubbing" means removing and disposing of all: (1) trees, brush, and other vegetation, logs, and similar items ("clearing"); and (2) stumps, roots, logs, rubbish, and debris on or in the soil ("grubbing") after Clearing. Clearing and grubbing includes grinding and removing of stumps. When clearing and grubbing, topsoil stripping and stockpiling, and required demolition Work is complete, the Site will be ready for grading and other new construction.
 - c. "Demolition" means removal, whether in whole or in part, of existing human-made construction, such as removal of buildings, structures, and building systems; site work (such as pavement, curbs, sidewalks, gutters) and the like; Underground Facilities; and other existing construction.
 - d. "Selective removal" means removal of specific trees, shrubs, brush, and other vegetation, whether as shown or indicated in the Contract Documents or as directed at the Site by Engineer.
 - e. "Selective trimming" means removal of selected parts of trees, shrubs, brush, and other vegetation, performed by arborist, for the purpose of either: (1) allowing installation of new construction adjacent to or through the tree, shrub, brush, or vegetation, or (2) removing damaged or unhealthy growth, to allow balance of the subject tree, shrub, brush, or vegetation to continue normal, healthy growth.
 - f. "Site clearing" means all the Work required by this Section and related Drawings.
 - g. "Topsoil" means existing material at the Site, visible after clearing and grubbing, to be stripped, when such material is friable, clay loam, surface soil present in depth of not less than four inches. Topsoil shall be free of subsoil, clay lumps, stones, and other objects over two-inch diameter and other objectionable material. Topsoil required for planting and landscaping Work in the Specifications of Division 32 may differ from the meaning indicated in this Section.

B. Reference Standards:

1. ASTM International (ASTM):
 - a. C700, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
 - b. D448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
2. American National Standards Institute (ANSI):
 - a. A300, Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices.
3. International Society of Arboriculture (ISA):
 - a. Container Rootball Shaving.
 - b. Crown Correction.
 - c. Balled and Burlapped Root Correction.
 - d. Container Root Correction.
 - e. High Branched Crown Observation.
 - f. Low Branched Crown Observation.
 - g. Multiple Low Branches Crown Observation.
 - h. Balled and Burlapped Root Observation.
 - i. Container Root Observation - Tree.
 - j. Protection Maintenance.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Clearing Conference:

1. Prior to commencing site clearing Work, actively participate in conference regarding site clearing Work. Date and time of conference will be mutually established by Contractor and Engineer.
2. Participants:
 - a. Required Participants: Contractor's project manager, Contractor's site superintendent, arborist, Engineer,.
 - b. Potential Participants: Owner, facility manager (if applicable), and representative of properties (other than Owner) affected by site clearing Work,
3. Engineer will chair the conference, prepare and distribute an agenda, and prepare and distribute a record of the conference.
4. Participants shall be prepared to discuss:
 - a. Project requirements and the Contract requirements for site clearing Work.
 - b. Submittals required for site clearing Work.
 - c. Schedule for site clearing Work and availability of resources.
 - d. Locations and types of site clearing Work, with specific attention to areas of selective removals, selective trimming, and notable species. Limits of clearing and grubbing. Proposed locations for stockpiles and temporary storage of cuttings and debris.
 - e. Environmental and other conditions at the Site.
 - f. Growth, vegetation, and existing construction requiring protection.
 - g. Required observations and field quality control for site clearing Work.
5. If additional information affecting site clearing Work subsequently comes to light, reconvene the conference at earliest opportunity.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Arborist:

- a. Where selective removal, selective trimming, or both are required or necessary, retain the services of, and employ in the Work, accredited arborist, possessing qualifications acceptable to Engineer.
- b. Arborist shall be skilled, trained, and possess documented experience in successfully protecting, trimming, and restorative care of trees and shrubs of the types necessary for the Work.
- c. Certification: Arborist shall be certified by either International Society of Arboriculture (ISA) or American Society of Consulting Arborists (ASCA).
- d. Arborist shall use in selective removal and selective trimming Work only workers with specific skill and successful experience in this type of Work required. Such workers shall work under the direct, personal supervision of arborist.
- e. Submit to Engineer names, employer(s), certifications, other relevant qualifications and record of relevant experience, as indicated below, for not less than three successful projects involving same species of trees, shrubs, and vegetation as involved in the site clearing Work:
 - 1) Names and telephone numbers of site owners, architects or engineers responsible for projects.
 - 2) Approximate contract price of the selective removal and selective trimming of trees, shrubs, and vegetation.
 - 3) Approximate time of year work was performed on each referenced project.
 - 4) Approximate quantity and types of selective removal and selective trimming of performed.
 - 5) General indication of species of trees, shrubs, and vegetation involved.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Limits of Site Clearing Work: When limits of site clearing Work are not expressly shown on the Drawings, or where Contractor proposes alternative limits of site clearing Work, submit drawings, developed from the Drawings, clearly indicating proposed limits of site clearing Work, with dimensions indicated where appropriate.
- b. Where proposed limits of clearing and grubbing, selective removals, and topsoil stripping are not identical with each other, clearly and expressly indicate limits of each on the Shop Drawings. .

B. Informational Submittals: Submit the following:

1. Permits and Approvals:

- a. Submit copy of each permit required and obtained for site clearing Work, issued by authority having jurisdiction.
- b. Where Owner's permission or approval is required for selected site clearing activities, submit copy of Owner's written permission or approval for such activity.
- c. When approval of owner of property (other than Owner) is required for selected site clearing activity, submit to Engineer written copy of such approval.

2. Certificates:

- a. Arborist's certification that trees and shrubs shown or indicated to remain were protected during the site clearing Work in accordance with the Contract Documents.
- b. Where trees or shrubs (shown or indicated to remain) were damaged during site clearing Work, submit arborist's certification that such trees and shrubs were promptly and properly treated or, where successful treatment was not feasible, were replaced.

3. Qualifications Statements:

- a. Arborist qualifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Tree Wound Dressing:
 - 1. Provide tree wound dressing, waterproof, adhesive and elastic with an antiseptic, free from kerosene, coal tar, creosote, and other material injurious to life of tree or other plant.
- B. Drain Tile:
 - 1. Provide four-inch diameter, standard strength, perforated wall, bell-and- spigot clay pipe, in accordance with ASTM C700.
- C. Filter Fabric:
 - 1. In accordance with requirements for temporary erosion and sediment controls indicated in Section 01 57 05 - Temporary Controls.
- D. Drainage Fill:
 - 1. Selected crushed stone, or crushed or uncrushed gravel, washed .
 - 2. Size 24 (in accordance with ASTM D448), with 90 to 100 percent passing 2.5-inch sieve and not more than 10 percent passing 3/4-inch sieve.
- E. Burlap:
 - 1. Jute, not less than 7.2 ounces per square yard.
- F. For other materials needed for site clearing Work, such as stone, topsoil, or other, comply with requirements of the Contract Documents.

PART 3 - EXECUTION

3.1 SITE CLEARING – GENERAL

- A. Limits of Site Clearing Work:
 - 1. Limits of site clearing Work are shown and indicated on the Drawings.
- B. General Provisions for Site Clearing:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required to perform site clearing Work in accordance with the Contract Documents.
 - 2. Perform site clearing Work to avoid creating nuisances, pollution, and preventable adverse effects on the environment.
 - 3. Comply with Section 01 71 33 - Protection of the Work and Property, and this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".
 - 4. Excavation required for site clearing shall comply with [Section 31 23 00 - Earthwork, Section 31 23 33 – Utilities -Trenching and Backfilling].
 - 5. Requirements of Authorities Having Jurisdiction:
 - a. Perform site clearing Work in accordance with Laws and Regulations.
 - b. Obtain, pay for, and comply with permits required for site clearing Work. Obtain from authorities having jurisdiction and furnish copy of each permit as a Submittal.
 - 6. Traffic Control:
 - a. Where site clearing Work is along or adjacent to travelled ways subject to public traffic, comply with Section 01 55 26 - Traffic Control.
 - b. Establish such controls prior to and maintain in place throughout site clearing Work that has potential to affect traffic.
 - 7. Site clearing Work shall comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article, unless the Contract Documents indicate more-stringent requirements.

8. Demolition Work is indicated in Section 02 41 00 - Demolition, including removal of site improvements and Underground Facilities.

3.2 PREPARATION

A. Permits and Approvals:

1. Do not commence site clearing Work until necessary permits and approvals are obtained and copies furnished to Engineer as Submittals.

B. Delineation of Limits of Site Clearing Work Areas:

1. Locate and clearly flag at the Site:
 - a. Limits of site clearing Work.
 - b. Trees, shrubs, vegetation, and other materials to remain within limits of site clearing Work.
 - c. Trees, shrubs, and other vegetation to be selectively trimmed.
 - d. Trees, shrubs, and vegetation to be selectively removed.
 - e. Salvageable trees, shrubs, and vegetation (to be relocated) within limits of site clearing Work.
2. Flagging:
 - a. Flagging shall be high-visibility type. Where necessary, provide lath or stakes driven into the ground, with flagging, to clearly delineate limits.
 - b. Provide different-colored flagging for each type of delineation required by this Article.
 - c. Promptly replace lost, moved, or destroyed flagging until Engineer concurs that flagging is no longer needed.
3. Review with Engineer:
 - a. Before starting site clearing Work, other than flagging, review at the Site with Engineer.
 - b. Make corrections as necessary.
 - c. Review all trees, 12-inch diameter (measured one foot above ground) and larger, to be removed or selectively trimmed.
 - d. Review with Engineer at the Site trees and shrubs to be selectively trimmed, to reach mutual agreement on extent of selective trimming required.

C. Protection: Establish protection of trees, shrubs, and vegetation to remain, in accordance with this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming", and other applicable provisions of the Contract Documents.

D. Temporary Erosion and Sediment Controls:

1. Provide applicable temporary erosion and sediment controls before commencing clearing and grubbing and topsoil stripping Work.
2. Comply with temporary erosion and sediment control requirements of Section 01 57 05 - Temporary Controls.
3. Continue providing temporary erosion and sediment controls as clearing and grubbing and topsoil stripping and stockpiling Work progresses into previously uncleared, ungrubbed areas of the Site...

3.3 CLEARING AND GRUBBING

A. Clearing and Grubbing – General:

1. Remove and dispose of all materials constituting clearing and grubbing Work within limits shown and indicated in the Contract Documents.
2. After grubbing Work is complete, properly fill holes resulting from grubbing before commencing site grading Work.

B. Trees and Shrubs Improperly Destroyed or Damaged:

1. Refer to this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".
- C. Trees and Shrubs to Remain:
1. Trees and shrubs to remain shall be protected, and trimmed where necessary or required, in accordance with this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".

3.4 TREE PROTECTION, SELECTIVE REMOVALS, AND SELECTIVE TRIMMING

- A. General Provisions for Tree Protection, Selective Removals, and Selective Trimming:
1. Provide temporary fencing, barricades, or guarding measures, as recommended by arborist, outside drip line of trees and shrubs to remain.
 2. Protect root systems from damage caused by noxious materials, storm water runoff, site clearing, planting and landscaping, other Work, and storage of materials and equipment. Protect root systems from flooding, erosion, and excessive wetting resulting from dewatering of excavations, drainage of tanks, and other construction activities.
 3. Fires are not allowed under or adjacent to trees, shrubs, and other vegetation to remain.
 4. Do not store matter resulting from site clearing or demolition, topsoil, or other excavated material within drip line of trees and shrubs to remain. Vehicles are not allowed within drip line. Restrict foot, vehicle and equipment traffic to prevent compaction of soil over root systems. Where such activities are unavoidable, and only as acceptable to Engineer, provide temporary, continuous, heavy-duty wood planking effectively fastened together and capable of distributing loads from such activities. Temporary planking shall be underlaid by layer of filter fabric covered with two-inch layer of gravel.
 5. Cut branches and roots, when necessary, with sharp pruning instruments; do not break or chop. Fully paint cuts 1/2-inch and larger in size with tree wound dressing.
- B. Excavation and Protection of Trees and Shrubs:
1. Excavate within drip line of trees only where shown.
 2. Where trenching for utilities is required within drip line, tunnel under or around main lateral feeder roots by drilling, auger boring, pipe jacking, or digging by hand under supervision of arborist. Do not cut main lateral roots or tap roots; cut smaller roots, which interfere with installation of the Work.
 3. Where excavation for the Work is required within drip line of trees or shrubs, hand excavate to minimize damage to root systems. Perform excavation under supervision of arborist. Provide temporary shoring or other protective support systems at excavations, to minimize sloping and benching of excavations. Use narrow tine spading forks and comb excavated material to expose roots.
 4. Relocate roots in backfill areas wherever possible. If large, main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking. If encountered immediately adjacent to location of construction and relocation is not practical, cut roots approximately three inches back from construction.
 5. Do not allow exposed roots to dry out before permanent backfill is provided; provide temporary earth cover. Water and maintain in moist condition and temporarily support and protect from damage until permanently relocated and covered with earth.
- C. Grade Adjustments and Tree Protection:
1. Maintain existing grade within drip line of trees, unless otherwise shown or indicated.
 2. Lowering of Preconstruction Grade:
 - a. Where required finish grade is below preconstruction grade around trees and shrubs, grade beyond drip line. Maintain preconstruction grade within drip line of trees and shrubs.

- b. Prune tree and shrub roots exposed during grade lowering, or provide permanent protections as recommended by arborist. Do not cut main or lateral roots or tap-roots; cut only smaller roots.
 - c. Compensate for loss of roots and prune branches to stimulate root growth.
 - d. Provide extended service through completion of the Contract correction period as recommended by arborist.
- 3. Minor Fills:
 - a. Where preconstruction grade is six inches or less below elevation of finish grade shown, fill with topsoil complying with quality requirements of Specifications for finish grading and landscaping.
 - b. Place in single layer and do not compact.
 - c. Hand-grade to required finish elevations.
- 4. Moderate Fills:
 - a. Where preconstruction grade is more than six inches, but less than 16 inches, below finish grade elevation, provide layer of drainage fill and filter fabric on preconstruction grade prior to placing topsoil that complies with quality requirements of Specifications on finish grading and landscaping.
 - b. Carefully place drainage fill against trunk of tree or shrub approximately two inches above elevation of finish grade and extend not less than 1.5 feet from tree or shrub trunk on all sides.
 - c. Provide filter fabric with edges overlapping by 6 inches, minimum.
 - d. Place fill layer of topsoil to finish grade elevation.
 - e. Do not compact stone, gravel or topsoil layers. Hand-grade to required finish elevations.
- 5. Deep Fills:
 - a. Provide an open dry circular well of durable, unmortared stone, located not less than two feet s from trunk of associated tree or shrub.
 - b. To facilitate proper drainage, provide eight to 10 continuous runs of four-inch drain tiles horizontally on the preconstruction ground surface under the complete spread of branches in radial pattern around the tree or shrub.
 - c. Slope drain tiles away from tree or shrub.
 - d. Provide drainage fill on preconstruction ground surface in depth of two inches under and six inches over drain tiles.
 - e. Provide filter fabric over entire top surface of drainage fill.
 - f. Provide eight to 10 drainage tiles, each four-inch diameter, vertically in radial pattern around tree or shrub, located five feet from trunk of tree or shrub. Extend vertical drainage tiles from the filter fabric layer above the horizontal drainage tiles to postconstruction finished grade
 - g. Hold drainage tiles in place with drainage fill.
 - h. Hand-grade to required finish grade elevation.
- D. Tree and Shrub Pruning (Selective Trimming):
 - 1. Perform pruning and selective trimming under the supervision of arborist.
 - 2. Remove branches from trees and shrubs to remain only after Engineer's concurrence, only to extent necessary to clear location of permanent construction, using branch removal methods in accordance with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
 - 3. Extend pruning operation to restore natural shape of entire tree or shrub where pruning is approved by Engineer and as recommended by arborist.
 - 4. Prune branches to balance loss to root system caused by damage or cutting of root system.

5. Chip branches removed from trees and shrubs. Stockpile and spread chips as directed by Engineer, with arborist's recommendation.
- E. Selective Trimming:
1. In addition to pruning (as required above), perform other selective trimming under direction of arborist.
 2. Comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
 3. Where shown or indicated, and as directed by Engineer with arborist's recommendation, carefully remove larger branches, when necessary, using appropriate methods.
 4. Repair cut branches in accordance with this Section.
 5. During selective trimming, avoid damaging healthy (to remain) elements of trees and shrubs.
 6. Dispose of trimmings as indicated in this Section's "Disposal and Cleaning" Article.
- F. Selective Removals:
1. Perform selective removals under direction of arborist.
 2. Comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
 3. Fully remove trees and shrubs shown or indicated for selective removal.
 4. Remove stumps to not less than one foot below preconstruction ground surface.
 5. During selective removals, avoid damaging adjacent trees and shrubs to remain, and other property.
 6. Remove larger branches before cutting the trunk of tree or shrub being selectively removed.
 7. Dispose of trees and shrubs selectively removed as indicated in this Section's "Disposal and Cleaning" Article.
- G. Repair and Replacement of Trees and Shrubs:
1. Perform tree and shrub repair under direction of arborist.
 2. Cavity Repair:
 - a. Remove decayed areas to depth that exposes healthy tissue.
 - b. Shape cavities to provide drainage.
 - c. Paint inside of cavity with antiseptic tree wound dressing material.
 - d. Do not fill cavities.
 - e. When cavity's cross-section exceeds 60 percent of cross-section of tree or shrub branch, selectively trim subject branch. When cavity's cross-section exceeds 60 percent of cross-section of trunk of tree or shrub, remove tree or shrub upon Engineer's authorization. Engineer will consider arborist's recommendation. Comply with this Section's requirements for selective trimming and selective removals.
 3. Repair trees and shrubs damaged by construction operations, or selectively trimmed, within 24 hours of occurrence of such damage or selective trimming. Treat damaged trunks, branches, and roots according to written instructions of arborist, in accordance with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
 4. Remove and replace trees and shrubs that are (1) dead or destroyed due to construction operations, or (2) damaged beyond reasonable hope of recovery (as determined by arborist) following repairs, or (3) damaged and determined by arborist to be incapable of resuming normal growth pattern after repairs.,
 5. Obtain opinion from arborist regarding whether damaged trees, shrubs, and other vegetation is repairable with reasonable chance of success. Submit arborist's certification required in this Section's "Submittals" Article.
 6. For each tree or shrub to remain but is destroyed or damaged (beyond repair) by Contractor:

- a. For trees 8 inches or more in diameter (measured one foot above preconstruction ground surface), provide two replacements of the same species. Each replacement shall be four inches diameter (measured one foot above top of root ball).
- b. For trees smaller than eight inches diameter, and for shrubs, provide one replacement for each, of same species. Replacements shall be equal in size to original, up to maximum of four inches (measured one foot above root ball).
- c. Provide replacement at locations at the Site as directed by Engineer.
- d. Provide replacements in accordance with the Contract Documents, including Specifications on planting and landscaping.

3.5 DISPOSAL AND CLEANING

A. Disposal – General:

1. Dispose of matter resulting from clearing and grubbing, selective removals, and selective trimming, at appropriate offsite location, unless otherwise expressly allowed by the Contract Documents or mutual agreement of Owner and Contractor.
2. Do not use cleared, grubbed, or trimmed material as fill, backfill, or in embankments.
3. Dispose of cleared, grubbed, and trimmed material, and other materials, rubbish, and debris, in accordance with Laws and Regulations.
4. Pay all costs associated with transporting and disposing of materials and debris resulting from site clearing Work.
5. Cleared lumber and trimmings from trees are Contractor's property and, at Contractor's option, may be sold or salvaged offsite.

B. Cleaning:

1. Perform progress cleaning and other cleaning Work, and disposal of resulting materials and debris, in accordance with Section 01 74 00 - Cleaning.

C. Burning:

1. Burning of trees, shrubs, brush, other vegetation, and other materials at, or adjacent to, the Site, whether in-place or cut, is prohibited unless: (a) burning is not prohibited by Laws or Regulations, and (b) required permits, if any, are obtained by Contractor from authorities having jurisdiction and are furnished to Engineer as Submittals; and (c) written approval of Owner is obtained and furnished to Engineer as a Submittal; and (d) when burning will be performed on lands at the Site not owned by Owner, obtain and submit to Engineer as Submittals written approval of owners of such properties.
2. Before burning, alert local fire department (both orally and in writing) not less than 72 hours before burning, and provide at location of burning appropriate emergency materials, tools, and equipment to contain and extinguish fires. Use such items and furnish necessary labor to prevent fire from burning other than intended trees, shrubs, brush, and vegetation.
3. If burning is allowed, exercise appropriate care and judgement. Do not perform burning in high wind conditions. Do not perform burning when areas adjacent to burning are of dryness that will foster wildfires.
4. Promptly and fully extinguish fires before they burn unintended areas or materials, and when burning is completed.
5. Dispose of ashes and burned materials off-site at appropriate location.

3.6 TOPSOIL STRIPPING AND STOCKPILING

A. Stripping:

1. Before commencing topsoil stripping:
 - a. Perform clearing and grubbing and selective removals.
 - b. Remove grass and other vegetation that may remain following clearing and grubbing.
 - c. Provide necessary and required temporary erosion and sediment controls.

2. Strip topsoil to depths encountered, in manner that prevents intermingling of topsoil with underlying subsoil and other objectionable material. Remove heavy growths of grass and vegetation and material below topsoil.
 3. Before stockpiling, separate objectionable material from topsoil.
 4. Do not strip topsoil from within drip line of trees and shrubs to remain as part of the completed Project.
- B. Stockpiling:
1. Construct and maintain topsoil stockpiles in accordance with Section 01 66 00 - Product Storage and Handling Requirements, at locations in accordance with Section 01 14 19 - Use of Site.
- C. Reuse of Stripped Topsoil:
1. Reuse in the finish grading and landscaping Work topsoil that complies with the Contract Documents for such Work.
 2. Where topsoil stripped from the Site does not comply with the Contract Documents relative to quality required for use in finish grading and landscaping Work, provide appropriate soil amendment material, properly and fully mixed into topsoil stripped from the Site, so that amended material complies with quality requirements for topsoil required for finish grading and landscaping Work.
- D. Disposal of Excess Topsoil:
1. Topsoil in excess of quantity required for finished Project becomes Contractor's property when Engineer indicates finish grading and landscaping Work is complete. Properly dispose of excess topsoil offsite. Contractor may sell excess topsoil at offsite location.

END OF SECTION

SECTION 31 23 00
EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Earthwork.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C33, Standard Specification for Concrete Aggregates.
 - b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 FT-LBF/FT³).
 - c. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 FT-LBF/FT³(2,700 kN-M/M³)).
 - d. D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - e. D3786, Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.
 - f. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - g. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - h. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - B. North Carolina Erosion and Sedimentation Control Planning and Design Manual, latest edition.
 - C. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR Part 1926.650, Safety and Health Regulations for Construction - Excavations, referred to herein as OSHA Standards.
 - D. Perform all Work in accordance with requirements of local and state codes, with requirements of OSHA, and in accord with federal regulations.

1.3 DEFINITIONS

- A. Borrow Material:
 - 1. Borrow shall consist of approved material required for the construction of embankments/fills or for other portions of the work and shall be obtained from either on-site borrow area(s) as designated by the Owner or approved offsite borrow sources. Refer to Section 32 91 13 Topsoiling and Finished Grading borrows source requirements.
 - 2. Off-site soil borrow, if required, must be obtained from borrow areas with a current valid NC mining permit, unless exempted by general statutes, or otherwise the soil must be tested for chemical contamination by a NC certified laboratory to demonstrate that it meets “unrestricted use standards” meaning concentrations of contaminants, if any, are acceptable for all uses per NCGS 130A-310.65. Analytical test results must show any contaminant of concern with a concentration less than or equal to that in the NC Industrial/commercial Health Base Preliminary Soil Remediation Goal (NC PSRG).

B. Fill and Embankment:

1. Proposed fill and embankment shall include controlled placement of all approved materials required to achieve the final subgrade elevations shown on the Drawings including preparation of the areas upon which materials are to be placed and backfill of authorized unsuitable materials excavation within the cell footprint. All approved fill and embankment materials shall be obtained from project excavations or excess materials stockpile area.

C. Construction Quality Assurance Plan (CQA Plan) refers to the CQA/CQC Plan, Catawba County Landfill – Unit IV, May 2025.

1. In the context of this Section, CQA Consultant and CQA Engineer are used interchangeably.
2. In the context of this Section, CQC Consultant and CQC Engineer are used interchangeably.
3. Contractor to employ an independent soils laboratory (CQC Consultant), in accordance with North Carolina General Statute 143-64.31 through 146-64.36 (the Minibrooks Act), to conduct the specified test to assure that all work complies with this specification.

D. Unsuitable Material:

1. Unsuitable materials excavation shall consist of the removal and satisfactory disposal of all unsuitable material located below finished liner subgrade elevations. Where excavation to the finished grade section shown results in a subgrade or slopes of unsuitable materials, the Contractor shall excavate such material to below the grade shown on the Drawings or as directed and in areas so excavated backfill with approved select borrow.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
3. CQC Certifications, Reports, Laboratory Data, Samples, etc.
4. Test Reports:
 - a. Soils inspection and testing results.
 - b. Materials inspection and testing results.
 - c. Sealed by a Professional Engineer.

B. Samples:

1. Submit samples and source of fill and backfill materials proposed for use.
2. Submit samples and source of borrow materials proposed for use.
3. CQC Consultant review and CQA Consultant approval required for all source(s) and materials.

C. Additional information as outlined in Section Topsoiling and Finished Grading and the accompanying CQA Plan.

1.5 SOILS/GEOTECHNICAL

- A. The Owner will provide for the on-site services of a CQA Consultant (Soils Engineer) to selectively test materials and monitor compliance with the requirements of these Specifications. This will be in addition to Construction Quality Control (CQC), provided and paid for by the

Contractor to be performed by the CQC Consultant in accordance with these Specifications and the CQA Plan.

- B. The Contractor will afford these representatives access to the job site for the performance of their duties as described in the Contract Documents.
- C. General Duties and Responsibilities of the Contractor's CQC Consultant: Under the direction of a qualified registered engineer or geologist:
 - 1. Perform stockpile and in-place testing of all soil and rock materials used in the work in conformance with these Specifications and the CQA Plan.
 - 2. Inspect subgrades and excavations and evaluate/determine suitability of materials encountered. Determine extent of any over-excavation required to remove unsuitable materials under roadways, structures, or other areas of construction.
 - 3. Document placement of fill materials and perform testing to confirm compliance with these Specifications.
 - 4. Evaluate the suitability of materials for use in construction of embankments and fills within the proposed grading shown on the Contract Drawings.
 - 5. Measure quantity of unsuitable materials under contract provisions for authorized over-excavation and backfill.
- D. General Duties and Responsibilities of Owner's CQA Consultant:
 - 1. Approve materials proposed for incorporation into the work as proposed by the CQC Consultant.
 - 2. Review subgrades and excavations and approve suitability of materials encountered as proposed by the CQC Consultant. Approve extent of any over-excavation required to remove unsuitable materials under roadways, structures, or other areas of construction, as proposed by the CQC Consultant.
 - 3. Observe placement of fill materials and testing by CQC Consultant for compliance with these Specifications.
 - 4. Review/approve the suitability of materials for use in construction of embankments and fills.
 - 5. Review construction operations and monitor for compliance with Contract Documents.
 - 6. Review/approve CQC Consultant quantity of unsuitable materials for payment on a unit price per basis under contract provisions for authorized over-excavation and backfill.
- E. Available Subsurface Information: Data provided in these Specifications on subsurface soil conditions are not intended as representations or warranties of the continuity of such conditions between borings or indicated sampling locations. It shall be expressly understood that neither the Owner nor the Engineer will be responsible for any interpretation of conclusion drawn therefrom by the Contractor. Data is made available for the convenience of the Contractor.
- F. Additional or supplementary soil borings or other exploratory operations may be made by the Contractor at no additional cost to the Owner. The Contractor shall provide the Owner with a copy of any data obtained/developed during such work. Such additional work shall be performed in a timely manner in accordance with and not impacting or changing the project schedule set forth in the Contract Documents.

1.6 TOLERANCES

- A. Grading shall be to a tolerance of +0.1 FT unless otherwise noted in the construction documents and then the stricter criteria shall be used.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill and Backfill:
 - 1. Selected material approved by Soils Engineer and Owner from site excavation or from site stockpile.

- B. Structural Fill: Structural fill should conform to the following. Any deviation from this requirement must be approved by the Engineer.

SIEVE SIZE	PERCENT FINER BY WEIGHT
3 IN	100
1/4 IN	30-70
No. 40	5-40
No. 200	0-10

- C. The Contractor shall conduct its own quantity and quality investigations and testing to determine availability and suitability of borrow materials, as allowed by the Owner.
- D. All earth materials proposed for use in the Work shall be adequately characterized prior to the Work by the CQC Consultant.
- E. Aggregate Base:
1. Granular Fill Material:
 - a. Clean, granular material.
 - b. Less than 5 PCT fines passing the No. 200 sieve.
 - c. ASTM D1241/AASHTO M147 Grading "B" or other material acceptable to Soils Engineer.
 - d. NCDOT:
 - 1) Standard Specification for Highway Construction

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect existing surface and subsurface features on-site and adjacent to site as follows:
1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.
 2. Protect and maintain benchmarks, monuments or other established reference points and property corners.
 - a. If disturbed or destroyed, replace at own expense to full satisfaction of Owner and controlling agency.
 3. Verify location of utilities.
 - a. Omission or inclusion of utility items does not constitute nonexistence or definite location.
 - b. Secure and examine local utility records for location data.
 - c. Take necessary precautions to protect existing utilities from damage due to any construction activity.
 - d. Repair damages to utility items at own expense.
 - e. In case of damage, notify Engineer at once so required protective measures may be taken.
 4. Maintain free of damage existing structures and pavement not indicated to be removed.
 - a. Any item known or unknown or not properly located that is inadvertently damaged shall be repaired to original condition.
 - b. All repairs to be made and paid for by Contractor.

5. Provide full access to premises and other points as designated by Owner to prevent interruption of landfill and ancillary operations.
 6. Maintain stockpiles and excavations in such a manner to prevent inconvenience or damage to structures on-site or on adjoining property.
 7. Avoid surcharge or excavation procedures which can result in heaving, caving, or slides.
- B. Construct erosion and sediment controls prior to commencing earthwork activities.
- C. Dispose of waste materials at locations on-site designated by Owner.

3.2 SITE EXCAVATION AND GRADING

- A. The Work includes all operations in connection with excavation, borrow, construction of fills and embankments, rough grading, and disposal of excess materials in connection with the preparation of the site(s) for construction of the proposed facilities.
- B. Excavation and Grading:
1. Perform as required by the Contract Drawings.
 2. Contract Drawings may indicate both existing grade and finished grade required for construction of Project.
 - a. Stake all units, structures, piping, and roads and establish their elevations.
 - b. Perform other layout work required.
 - c. Replace property corner markers to original location if disturbed or destroyed.
 3. Preparation of ground surface for embankments or fills:
 - a. Before fill is started, scarify to a minimum depth of 8 IN in all proposed embankment and fill areas.
 - b. Where ground surface is steeper than one vertical to four horizontal, plow surface in a manner to bench and break up surface so that fill material will bind with existing surface.
 4. Protection of finish grade:
 - a. During construction, shape and drain embankment and excavations.
 - b. Maintain ditches and drains to provide drainage at all times.
 - c. Protect graded areas against action of elements prior to acceptance of work.
 - d. Reestablish grade where settlement or erosion occurs.
- C. Borrow:
1. Provide necessary amount of approved fill compacted to density equal to that indicated in this Specification.
 2. Include cost of all borrow material in original Base Bid proposal.
 3. Fill material to be approved by CQC/CQA Consultants prior to placement.
- D. Construct embankments and fills as required by the Contract Drawings:
1. Construct embankments and fills at locations and to lines of grade indicated.
 - a. Completed fill shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed work.
 2. Provide approved fill material which is free from roots, organic matter, trash, frozen material, and stones having maximum dimension greater than 6 IN.
 - a. Ensure that stones larger than 4 IN are not placed in upper 6 IN of fill or embankment.
 - b. Do not place material in layers greater than 8 IN loose thickness.
 - c. Place layers horizontally and compact each layer prior to placing additional fill.
 3. Compact soils by sheepsfoot, pneumatic rollers, vibrators, or by other equipment as required to obtain specified density.
 - a. Control moisture for each layer necessary to meet requirements of compaction.

- E. Upon reaching subgrade elevations shown, proof-roll subgrade soils and obtain the CQC Consultant's review/recommendation and CQA Consultant's approval. If unsuitable materials are encountered at the subgrade elevation, repair as directed by the CQC Consultant and approved by the CQA Consultant to remove unsuitable materials. Excavation of unsuitable materials shall be preapproved by the CQC Consultant and CQA Consultant. Contractor shall proof-roll entire subgrade area.
- F. Proof-rolling shall be conducted with a pneumatic-tired vehicle of at least 20 tons Gross Vehicle Weight (GVW), approved by the CQC and CQA Consultants. An alternate approved by the CQA Consultant may be used in constricted areas.
- G. Where subgrade materials are determined to be unsuitable, such materials shall be removed to the lengths, widths, and depths directed by the CQC Consultant and approved by the CQA Consultant, and backfilled with suitable material unless further excavation or earthwork is required. Unsuitable material excavation beneath the finished subgrade shall be made on a unit price basis for over-excavation and backfill, only as approved by the CQA Consultant and Engineer. Unit price for over-excavation and backfill shall include disposal of unsuitable materials.
- H. The subgrade of areas to receive fill shall be smooth and free of all vegetation, sticks, roots, rocks, and debris.
- I. Dewatering (as required): Provide and maintain dewatering of all surface water and/or groundwater as required for excavation. Where groundwater is or is expected to be encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade below foundations and fill material to allow foundations, fill material, and structures/backfill to be placed in the dry, and maintain a stable excavation. Soils and hydro-geologic information may be reviewed before beginning excavation to determine where groundwater is likely to be encountered during excavation. Employ a dewatering specialist for selecting/designing, monitoring and operating the dewatering system as needed. Keep dewatering system in operation until dead load of structure exceeds possible buoyant uplift force on structure or fill material. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction as approved by the Owner. Install groundwater monitoring points as necessary. Shut off dewatering system at such a rate so as to prevent a quick upsurge of water that might weaken the subgrade. Installation, start-up monitoring maintenance, and shut-off of the dewatering system shall be at no additional cost to the Owner.
- J. Do not place fill when the subgrade to receive fill is frozen, wet, loose, or soft.
- K. Moisture Control: Moisture content of materials prior to and during compacting shall be uniform throughout each layer of material. Granular materials shall be thoroughly wetted during or immediately prior to compaction. Supplementary water shall be added as required to materials by sprinkling and mixing uniformly throughout layers. Materials too wet for placing shall be temporarily spread or aerated until moisture content is acceptable. If these materials cannot be processed in time to use, the Contractor shall excavate and backfill with materials acceptable to the CQC Consultant and the CQA Consultant at no additional cost to the Owner.
- L. All final borrow excavation back-slopes shall be maintained at a maximum slope of 2H:1V.

3.3 ROCK EXCAVATION

- A. Rock is defined as natural material that cannot be moved or ripped with a Caterpillar D9 equipped with a single tooth ripper or approved equal. A demonstration is required. The Contractor shall not remove rock until authorized by the Engineer.
- B. All rock excavation shall be under one classification.
 - 1. This classification shall include solid ledge rock in its natural location that requires systematic quarrying, drilling and/or blasting for its removal and also boulders that exceed 1/2 CY in volume.
- C. When rock is encountered, strip free of earth.

1. Employ an independent surveyor to determine rock quantities before removal operation begins.
2. In computing the volumetric content of rock excavation for payment, the pay lines shall be taken as follows:
 - a. For structures: 3 FT outside the exterior limits of foundations and from rock surface to 6 IN below bottom of foundations.
 - b. For piping and utilities: A width 18 IN wider than the outside diameter of the pipe or conduit and from rock surface to 6 IN below bottom exterior surface of the pipe or conduit.
 - c. For paving: 2 FT outside the exterior limits of paving and from rock surface to 6 IN below bottom of pavement subbase.
- D. The use of explosives shall be limited to the magnitude and location of the charge that will not cause damage to adjacent existing construction and utilities through shock vibrations or other stress loadings. Provide adequate blanket protection to ensure that there will not be fragments of rock or other debris flying through the air when discharging explosives. Any damage to existing construction or other features caused by blasting operations to be repaired and paid for by the Contractor.
 1. Explosive permits shall be obtained by the Contractor from the appropriate local authorities.
 2. The Contract unit price for rock excavation shall include all equipment and materials and other work necessary for excavation and hauling the rock from the site, and for furnishing and placing suitable replacement material as specified in its place.
 3. Rock to be used on site shall meet the rock gradations specified. No on-site materials shall be used for leachate collection stone.
- E. Where explosives and blasting are used, comply with all laws and ordinances of municipal, state and Federal agencies relating to the use of explosives. Use qualified personnel for blasting and take proper precautions to protect persons, property or the work from damage or injury from blast or explosion. Conduct pre-blast survey in the company of the CQA Consultant to aid in determining any damage caused by blasting. A blasting plan shall be submitted to the NCDEQ Solid Waste Section Hydrogeologist for a review and approval prior to blasting.

3.4 FIELD QUALITY CONTROL

- A. Moisture density relations, to be established by the CQC Consultant required for all materials to be compacted.
- B. Extent of compaction testing will be as necessary to assure compliance with the Specifications.
- C. Give minimum of 24 HR advance notice to CQC Consultant and CQA Consultant when ready for compaction or subgrade testing and inspection.
- D. Should any compaction density test or subgrade inspection fail to meet Specification requirements, perform corrective work as necessary.
- E. Pay for all costs associated with corrective work and retesting resulting from failing compaction density tests.

3.5 COMPACTION DENSITY REQUIREMENTS

- A. Obtain approval from Soils Engineer and CQA Engineer with regard to suitability of soils and acceptable subgrade prior to subsequent operations.
- B. Provide dewatering system necessary to successfully complete compaction and construction requirements.
- C. Remove frozen, loose, wet, or soft material and replace with approved material as directed by Soils Engineer.
- D. Stabilize subgrade with well graded granular materials as directed by CQC Engineer and approved by CQA Engineer.
- E. Assure by results of testing that compaction densities comply with the following requirements:

1. Perform testing at a minimum of 1 test per lift per 10,000 square feet unless otherwise noted in the CQA Plan. Refer to the CQA Plan for MSWLF subgrade, testing requirements.
2. Refer to Section Topsoiling and Finished Grading for specific compacting and testing requirements.
3. Sitework:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Cell Subgrade and Under Piping:		
Cohesive soils	95% per ASTM D698	+/- 3% of optimum
Cohesionless soils	75% relative density per ASTM D4253 and ASTM D4254	
Unpaved Areas (Outside of MSW Cell and Perimeter Berm):		
Cohesive soils	90% of ASTM D698	+/- 3% of optimum
Cohesionless soils	70% relative density per ASTM D4253 and ASTM D4254	

3.6 SPECIAL REQUIREMENTS

- A. Erosion Control:
 1. Conduct work to minimize erosion of site.
 2. Construct stilling areas to settle and detain eroded material.
 3. Remove eroded material washed off site.
 4. Clean roadways daily of any spillage of dirt, rocks or debris from equipment entering or leaving site.
- B. Comply with all state Erosion and Sedimentation Control regulations.

3.7 ACCEPTANCE OF WORK

- A. Obtain determination of excavations and pre-fill subgrade from the CQC Consultant and approval by the CQA Consultant before starting any construction. Approval may consist of satisfactory proof-roll observed by the CQC and CQA Consultants.
- B. Relative density compaction acceptance (of cohesionless soils) may be based on a visual observation of the non-movement of equipment by the CQC and CQA Consultants, in addition to meeting the requirements of 3.5-E above, as permitted by the CQA Consultant.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for temporary (during construction) dewatering of excavations including:
 - a. Qualifications of Contractor's design professional retained for designing temporary dewatering systems.
 - b. Contractor's additional investigations and evaluations necessary for designing temporary dewatering systems.
 - c. Performance criteria and general provisions for temporary dewatering systems.
 - d. Disposal of water discharged from temporary dewatering systems.
 - e. Operation, maintenance, and removal of temporary dewatering systems.

B. Related Requirements: Include, but are not necessarily limited to:

1. Section 31 23 00- - Earthwork.
2. Section 31 23 33 – Utilities - Trenching and Backfilling.

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment:

1. Dewatering of excavations is part of the Work associated with excavating and temporary control of water and water pollution. Include costs for dewatering of excavations under bid/pay items for excavating and related Work. No separate payment will be made for dewatering of excavations or temporary control of water and water pollution.

1.3 REFERENCES

A. Terminology:

1. Terminology indicated below are not defined terms and are not indicated with initial capital letters, but when used in this section have the meaning indicated below:
 - a. "Dewatering" means: Lowering of groundwater surface elevation and intercepting horizontal water seepage to prevent groundwater from entering excavations; removal of water accumulated within excavations; and conveyance of groundwater and water removed from excavations to proper discharge location.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with Section 01 41 26 - Stormwater Pollution Prevention Plan and Permit.
2. Comply with Section 01 57 05 - Temporary Controls, regarding permits and approvals of authorities having jurisdiction necessary for disposal of groundwater and water removed from excavations, and temporary erosion and sediment controls.
3. When Contractor intends to use temporary pumps equipped with gasoline- or diesel-fueled engines, obtain and comply with necessary permits and Laws and Regulations, and comply with Section 01 57 05 - Temporary Controls, regarding exhaust emissions, air pollution controls, and noise controls.

B. Qualifications:

1. Professional Engineer or Other Appropriate Design Professional:
 - a. Where necessary for performing the Work in accordance with this Section and when required by Laws or Regulations governing the practice of the associated design

discipline, retain the services of professional engineer or other appropriate design professional, licensed and registered in the same jurisdiction as the Site, to evaluate groundwater conditions and design temporary systems and equipment for temporary dewatering of excavations.

- b. Professional engineer or other appropriate design professional, as applicable, shall be appropriately licensed and registered for the professional services required by this Section, and shall be appropriately experienced in evaluating groundwater conditions and conductivity in subsurface conditions similar to those at the Site, and in designing and evaluating temporary dewatering systems of the type necessary for the Work.
- c. Responsibilities shall include:
 - 1) Evaluating existing subsurface data and information for the Site and adjacent areas, available to the Contractor.
 - 2) Advising Contractor regarding additional subsurface investigations necessary to provide temporary dewatering systems that will result in dewatering of excavations as required by this Section.
 - 3) Evaluating the potential effect of temporary dewatering system operation on existing facilities at and adjacent to the Site.
 - 4) Personally designing or supervising the design of temporary dewatering systems necessary for the Work, including preparing drawings, performance requirements, and specifications for temporary dewatering systems such as wells, pumps, and related systems.
 - 5) Sealing and signing instruments of service developed for the Work, including calculations, evaluation reports, recommendations of a technical nature, drawings, specifications, and similar documents.
 - 6) Assisting Contractor with obtaining permits and approvals necessary for temporary dewatering systems.
 - 7) Consulting with Contractor, including visiting the Site during construction as required by Contractor, during installation, operation, and removal of temporary dewatering systems.

1.5 SUBMITTALS

A. Informational Submittals: Submit the following:

- 1. Advisory on Dewatering Approach:
 - a. Furnish document regarding Contractor's proposed approach for temporary dewatering of excavations, indicating the following:
 - 1) General indication of Contractor's overall, intended approach for temporary dewatering of excavations; for example, indicate whether a system of temporary wells and pumps will be provided by Contractor, whether Contractor intends or proposes using existing wells and pumps for temporary dewatering of excavations, whether temporary dewatering will be accomplished only via temporary pumps placed in or adjacent to excavations, other approaches, or a combination thereof.
 - 2) Indication of whether Contractor or Subcontractor intends to retain services of a professional engineer or other appropriate design professional relative to temporary dewatering systems. When such individual or entity will be so retained, indicate name of entity and specific, individual design professional-in-responsible-charge, together with indication of type of license and registration and associated license and registration number and jurisdiction. If not previously furnished with Contractor's insurance documentation, furnish evidence that such professional engineer or other appropriate design professional (as applicable) possesses professional liability insurance in accordance with the Contract Documents, including indication of whether required coverage limits have been eroded during the current policy by prior claims.
 - 3) Contractor-proposed modifications to the permanent Work requested to accommodate temporary dewatering systems. In the event such changes are

proposed, approval, if any, of such changes will be only via an appropriate Contract modification. If no such changes or modifications are requested prior to start of the Work of this Section, Engineer will proceed on the premise that Contractor-proposed modifications are not intended.

- 4) When existing facilities, such as existing wells and pumps are proposed for use by Contractor, clearly indicate the specific facilities, expected start and end dates of use, anticipated level or extent of use (such as percentage of available pumping capacity), and proposed responsibility for operating and maintenance labor, parts, and costs during such use.
 - 5) Propose locations for discharges from temporary dewatering systems, together with indication of typical anticipated rate of discharge. Also indicate intended approximate locations of aboveground conveyance piping and how Contractor will mitigate effect on Owner, facility manager, and other property owners and occupants where such piping would restrict use or access to existing facilities or property.
 - 6) Anticipated start and end dates for temporary dewatering operations.
 - 7) Description of how temporary dewatering systems and operations will, or may, affect Owner, facility manager (if other than Owner), and other property owners and occupants.
 - 8) Indication of Contractor's proposed actions regarding temporary dewatering systems after temporary dewatering operations cease; for example, when temporary wells and pumps are provided by Contractor, indicate whether such items will remain in place and, if so, how they will be prepared for abandonment by Contractor.
- b. Engineer's (or Owner's) review, comments upon, acceptance, or other appropriate action on such Submittal does not, in any way, reduce or mitigate Contractor's sole responsibility for construction means, methods, techniques, procedures, sequences, and associated safety and protection measures.
 - c. Do not include in such Submittal: calculations, evaluation reports, recommendations, drawings, or specifications developed, sealed, and signed by Contractor or Subcontractor or by professional engineer or other appropriate design professional retained by Contractor or Subcontractor. However, in the event of alleged or potential effect of temporary dewatering systems on facilities or property, or in the event of disagreement between the parties concerning allegedly differing subsurface or physical conditions, promptly furnish such documents to Engineer and Owner upon request. Should such request be received by Contractor, furnishing such documents to Engineer and Owner will not, in any way, reduce or mitigate Contractor's sole responsibility for construction means, methods, techniques, procedures, sequences, or associated safety and protection measures.

1.6 FIELD CONDITIONS

A. Existing Conditions:

1. Refer to Section 31 23 00- - Earthwork and Section 31 23 33 – Utilities - Trenching and Backfilling.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT FOR TEMPORARY DEWATERING SYSTEMS

A. Description:

1. Provide temporary dewatering systems comprised of materials and equipment suitable for the intended purpose, service environment (including subsurface and groundwater conditions), and duration of use.
2. Contractor shall determine required capacities for elements of temporary dewatering systems necessary for compliance with requirements of this Section and other relevant provisions of the Contract Documents.

3. Provide temporary dewatering system materials and equipment in accordance with Laws and Regulations and generally accepted practices in the industry for temporary systems for dewatering of excavations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification, Evaluation, and Assessment of Existing Conditions:

1. Evaluate information and data available to Contractor regarding subsurface and physical conditions at the Site and adjacent areas relative to groundwater and temporary dewatering systems. Perform additional investigations as necessary to enable Contractor to provide appropriate temporary dewatering systems required to comply with this Section.
2. Such investigations and evaluations by Contractor may include excavating (and subsequently backfilling), test pits to visually observe subsurface conditions and groundwater, test borings, sampling and laboratory analyses, providing monitoring wells and obtaining measurements of groundwater surface elevations, performing drawdown tests using existing wells and pumping equipment, and determining capacities and operating characteristics of existing wells, pumping equipment, and related systems. Obtain and record data and perform evaluations necessary for Contractor to provide temporary dewatering systems as required.
3. Where applicable, Contractor should perform monitoring of adjacent structures for movements. Monitoring requirements should be included in dewatering submittal or as separate document.
4. As the Work progresses, evaluate performance of temporary dewatering systems as necessary and modify temporary dewatering systems as appropriate to comply with this Section and other provisions of the Contract Documents.

B. Installing the Work constitutes Contractor's approval of field conditions prevailing at the time of the Work and condition and operability of existing materials, equipment, and systems (if any) used by Contractor for temporary dewatering.

3.2 TEMPORARY DEWATERING DURING CONSTRUCTION

A. Performance Criteria:

1. Provide and maintain adequate drainage and dewatering equipment to remove and dispose of all surface water and ground water entering excavations, or other parts of the Work and work areas. Keep each excavation dry during excavation, subgrade preparation, and continually thereafter until temporary dewatering system is no longer required, in accordance with Article 3.3 of this Section.
2. Temporary dewatering systems shall depress and maintain groundwater surface level two feet below bottom elevation of each excavation during the Work.
3. Operation Relative to Existing Buildings, Structures, and Facilities:
 - a. Provide, operate, and maintain temporary dewatering systems to avoid settlement and damage to buildings, structures, Underground Facilities, and other facilities.
 - b. Prevent softening and disturbance of subgrade below new construction and fill material, to allow the Work to be constructed in dry conditions, and to maintain stable excavation side slopes and stable temporary supports of excavations.
4. If, in Engineer's opinion, groundwater surface elevations are not as required by the Contract Documents, provide additional or alternative temporary dewatering system components or elements as necessary, at no additional cost to Owner.
5. Groundwater surface elevation shall be lowered in advance of excavating for a sufficient period to allow dewatering of fine-grain soils.
6. Remove water from excavations as fast as water collects.

B. Related Work:

1. Provide temporary erosion and sediment controls in accordance with Section 01 57 05 - Temporary Controls.
2. Comply with Section 01 57 05 - Temporary Controls, regarding control of surface water, storm water runoff, water pollution, air pollution, noise, and others as applicable.
3. Comply with Section 01 41 26 - Stormwater Pollution Prevention Plan and Permit.

C. Temporary Dewatering Systems - General:

1. Design, provide, operate, and maintain temporary systems for dewatering of excavations in accordance with the Contract Documents, Laws and Regulations, and prevailing practice typical in the industry. In the event of conflict between such requirements, obtain interpretation or clarification from Engineer before proceeding.
2. Temporary dewatering systems, may include the following temporary elements: swales, sumps, pumps, hoses, piping, wells (whether dewatering wells, monitoring wells, or other wells), and similar facilities.
3. Furnish, either at the Site or within reasonably close proximity thereto, available standby items, such as pumps, piping, hoses, instrumentation, controls, and others, should elements of operating temporary dewatering system fail.
4. Locate elements of temporary dewatering systems to allow continuous dewatering operation without interfering with the Work, and the work of other contractors (if any), to the extent practicable.

D. Disposal of Water Removed by Dewatering System:

1. Water conveyed by temporary dewatering systems that includes oils, sediments, or Constituents of Concern that will reduce the quality of surface water or groundwater downstream of the point of discharge, shall not be directly discharged. Divert such waters through temporary settling basin, or filters before discharging to surface water, groundwater, or drainage routes.
2. Temporary dewatering systems shall not discharge across roadways, driveways, parking areas, other travelled ways, sidewalks, or overland across other property adjacent to the Site. Where hoses that are part of temporary dewatering system discharge to existing gutters or swales, such discharge shall not exceed capacity of such swales and gutters especially during precipitation and runoff events.
3. Contractor's temporary dewatering systems shall discharge to existing sediment basin location at or adjacent to the Site acceptable to Owner and Engineer, in accordance with Laws and Regulations.
4. Convey water from excavations in closed conduits or appropriate drainage swales. Do not use trench excavations as temporary drainage ditches.
5. Dispose of water removed from excavations in a manner that does not endanger health and safety, property, the Work, and other portions of the Project.
6. Dispose of water in manner that causes no inconvenience to Owner, others involved in the Project, and adjacent and downstream property owners and occupants.

3.3 OPERATION, MAINTENANCE, AND REMOVAL OF TEMPORARY DEWATERING SYSTEMS

A. Operation and Maintenance of Temporary Dewatering Systems:

1. Contractor shall operate temporary dewatering systems continuously, 24 hours per day, seven days per week, until such system is no longer necessary or required.
2. Not less than once per working day, visit and visually inspect temporary dewatering system, operating components, including pumps, instrumentation, and controls, and verify proper operation. At the same time, visually observe discharge location of temporary dewatering systems to verify operations. Establish and maintain written records of each location checked, observations made, readings and data taken or recorded (if any), and furnish copies of such records to Engineer upon request.

3. Contractor shall be responsible for condition of piping, conduits, and channels used for drainage and such piping, conduits, and channels shall be clean and free of oils, sediments, and Constituents of Concern.
4. Provide temporary electricity, temporary fuel, and other temporary facilities as necessary in accordance with Section 01 51 05 - Temporary Utilities.
5. Perform pumping of water from excavations in a manner that prevents carrying away of unsolidified concrete materials, and that avoids damaging the subgrade.
6. During construction, Contractor shall maintain all materials, equipment, and systems used for temporary dewatering regardless of whether such items were provided by Contractor or existed prior to commencement of temporary dewatering, in accordance with operating instructions and recommendations of manufacturer of the associated equipment and systems, Laws and Regulations, the Contract Documents, and practice typical in the industry. Perform routine, preventative, and troubleshooting maintenance. Where temporary dewatering system fails or becomes inoperable, immediately remedy the situation, whether by appropriate repairs or operation of standby equipment.

B. Criteria for Discontinuation of Temporary Dewatering Operations:

1. Operate and maintain temporary dewatering systems until building, structure, or other facility to be constructed in the excavation is completed to a sufficient extent and has achieved structural strength and integrity sufficient for discontinuation of operation of temporary dewatering systems, and backfilling Work is reasonably complete. Facilities constructed in excavations shall be able to withstand horizontal and vertical soil and water pressures from natural groundwater prior to discontinuation of temporary dewatering.
2. Control of ground water shall continue until the permanent construction provides sufficient dead load to withstand hydrostatic uplift of the normal groundwater, until concrete has attained sufficient strength to withstand earth and hydrostatic loads, and until waterproofing Work is completed.
3. Before discontinuing dewatering operations or permanently allowing rise in groundwater surface elevation, prepare computations to demonstrate that buildings, structures, Underground Facilities, and other facilities affected by the rise in groundwater surface elevation are protected by fill or other means to sustain uplift. Use a safety factor of not less than 1.25 when preparing such calculations. Submit such calculations to Engineer upon request. Maintain temporary dewatering systems in operation until Contractor's evaluations and calculations establish appropriate resistance of facilities against uplift and other damage caused by rising groundwater surface elevations.
4. Do not discontinue dewatering operations without first obtaining Engineer's concurrence for such discontinuation.
5. Shut off dewatering system at such a rate to prevent quick upsurge of water that might weaken the subgrade.

C. Removal of Temporary Dewatering Systems:

1. When temporary dewatering system is permanently deactivated, remove from the Site all elements of temporary dewatering system unless Owner (through Engineer) approves temporary dewatering system's, or part thereof, continuing existence at the Site after final payment.
2. Where wells provided by Contractor (whether for dewatering, monitoring, or other purpose) or piping are allowed to remain following permanent discontinuation of dewatering operations, accurately record their locations on the record drawings, in accordance with Section 01 78 39 - Project Record Documents.
3. When a well includes power supply for electric pump, remove and disconnect electrical power supply from well casing back to source. Where wells provided by Contractor will be abandoned in place, remove the well casing to not less than two feet below finished grade and provide secure, removeable cap on well casing. Provide stake, visible at finished grade but not protruding above finished grade, indicating location of well casing.

4. Restore disturbed areas in accordance with the Contract Documents. Where the Contract Documents do not indicate requirements for restoration, restore such areas in accordance with Section 01 71 33 - Protection of the Work and Property.

END OF SECTION

This page intentionally left blank.

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for excavating, filling, and other earth Work for linear, buried utility projects, including:
 - a. Field conditions.
 - b. Soil and aggregate materials.
 - c. Test pits.
 - d. Excavation.
 - e. Preparation of subgrades.
 - f. Filling and compacting.
 - g. Rough grading.
 - h. Disposal of excavated spoil materials.

B. Related Requirements Include, but are not necessarily limited to, the following:

1. Section 31 10 00 - Site Clearing.
2. Section 32 91 13 – Topsoiling and Finish Grading.
3. .
4. Section 31 23 19 - Dewatering.

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement:

1. Contractor shall provide all labor, materials, construction equipment and machinery, tools, and incidentals required or necessary for performing all trenching, backfilling, and related earth Work for the Contract, including all Work related to excavating, preparing subgrades, providing and stockpiling materials, filling with required materials, compacting, grading, proper disposal of excess spoil materials, and all other Work required by this Section. This Section includes trenching, backfilling, and related earth Work required for constructing: buried utilities, including piping and, where applicable, other Underground Facilities; site improvements (including pavement, sidewalks, curbs, and the like); subgrade preparation for other Work; and all other trenching, backfilling, and related earth Work required by the Contract Documents and not addressed under other Specifications sections.
2. Unless expressly indicated otherwise in the Contract Documents, such as Section 01 22 00 - Measurement and Payment, the Work of this Section is included in the various lump sum and unit price bid/pay items for the Contract.
3. All Work under this Section is unclassified and covered by this Section and the associated bid/payment item(s). No separate payment will be made for removing, handling, or disposing of rock (unless the Contract includes a separate bid/pay item specifically for rock excavation or rock removal), stones, concrete (whether or not reinforced), debris, stumps, and other material, regardless of moisture content, unless such material constitutes an unforeseen Hazardous Environmental Condition and Work associated with such Hazardous Environmental Condition is not included in the Contract.
4. Where excavation of test pits is required by the Contract Documents or Engineer, payment for such test pits will be in accordance with Paragraph 3.2.B of this Section and other applicable provisions of the Contract Documents.

1.3 REFERENCES

A. Terminology:

1. The following terms are not defined and are not indicated with initial capital letters but, when used in this Section, have the following meaning:
 - a. "Borrow" means material required for trenching, backfilling, and related earth Work in excess of quantity of suitable material available from required grading, cuts, and excavations at the Site. Borrow may be necessary even though not otherwise expressly required by the Contract Documents.
 - b. "Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical or near-vertical sideslopes, and is plastic when moist. Cohesive soil is difficult to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.
 - c. "Cohesionless soil" means fill material that does not clump together; its grains remain separate and apart from each other. Cohesionless soils typically have a low proportion of fine (no. 200 mesh size and less) particles and may be soil material or granular material. The terms "cohesionless soils", "cohesionless materials", "non-cohesive soils", and the like have the same meaning.
 - d. "Fill" means soil material, granular material, or other material indicated in this Section required for backfilling excavations or as material for achieving required rough grading. Unless indicated otherwise in the context of a specific provision, the terms "fill" and "backfill" have the same meaning, as do derivative terms such as, "filling" and "backfilling". When used by itself, the term "backfill" means material required for refilling an excavation.
 - e. "Foundations" means bottoms of manholes, chambers, vaults, and similar structures; base slabs (slabs-on-grade); bearing directly on soil, granular material, or rock.
 - f. "Granular material" means gravel, sand, or silt, (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry. The terms "granular material", "aggregate material", and "granular soil" have the same meaning. Detailed requirements for specific types of granular material are indicated in Article 2.1 of this Section.
 - g. "Rock" means: igneous, metamorphic, or sedimentary rock or stone; boulders over two cubic yards in volume in open areas and boulders over one cubic yard in volume in trenches; and mass concrete; that cannot be removed using rippers and therefore requires drilling and blasting or use of large excavator-mounted pneumatic breakers. If rock is encountered during the Work, promptly furnish notice of differing subsurface condition in accordance with the General Conditions (as may be modified by the Supplementary Conditions); when necessary, Engineer will furnish requirements for rock removal via appropriate Contract modification. The following do not qualify as rock:
 - 1) Soft, weathered or disintegrated rock that can be removed by normal excavating equipment, including bulldozers with rippers and large trackhoes with rock teeth or rock buckets.
 - 2) Loose or previously blasted rock.
 - 3) Broken stone in rock fills.
 - 4) Rock or stone that falls into the excavation from outside limits of excavation shown or indicated in the Contract Documents.
 - 5) Boulders that can be removed without drilling, blasting, or pneumatic breakers.
 - 6) Pavements, sidewalks, and gutters of concrete, asphalt, or masonry.
 - h. "Subgrade" means the uppermost surface of native soil material unmoved from cuts; the bottom of excavation.
 - i. "Trenching" means excavating for buried utilities, other Underground Facilities, and related excavation Work. In this Section, the words, "trenching" and "excavating" have

the same meaning. In this Section, the word “excavation”, whether singular or plural, is general and includes trenching.

- j. “Unauthorized excavation” means removing materials beyond limits shown or indicated in the Contract Documents or otherwise directed by Engineer.
 - k. “Unclassified”, when used in referring to trenching, excavating, or excavations, means excavation and disposal of all materials, of any description whatsoever, encountered in performing the Work, unless otherwise shown or indicated in the Contract Documents.
 - l. “Unsuitable soil materials” means soil or other materials encountered at or below subgrade elevation of insufficient strength, stiffness, or characteristics to support the Work in accordance with the Contract Documents or as determined by Engineer. The terms “unsuitable soil material”, “unsuitable soil”, and “unsuitable material” have the same meaning.
- B. Reference Standards: Standards referenced in this section include, but are not necessarily limited to, the following:
- 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. AMRL R18 - AASHTO Accreditation Procedure Manual.
 - 2. ASTM International (ASTM):
 - a. C33/C33M - Standard Specification for Concrete Aggregates.
 - b. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - c. D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
 - d. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - e. D2166 - Standard Test Method for Unconfined Compressive Strength of Cohesive Soil.
 - f. D2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.
 - g. D2434 - Standard Test Methods for Measurement of Hydraulic Conductivity of Coarse-Grained Soils.
 - h. D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - i. D2850 - Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils.
 - j. D3740 - Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - k. D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - l. D4254 - Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - m. D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - n. D6913 - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
 - o. D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 - p. D7928 - Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis.
 - q. E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with Section 01 14 33 - Work in Rights-of-Way.

B. Qualifications:

1. Contractor's Testing Laboratory:

- a. Retain the services of independent testing laboratory to perform testing and determine compliance with the Contract Documents of materials specified in this Section.
- b. When Contractor is expressly required, by this Section's "Field Quality Control" Article or elsewhere in the Contract Documents, to retain testing laboratory for tests required under this Section's "Field Quality Control" Article, retain one testing laboratory for quality assurance testing and field quality control testing.
- c. Testing laboratory shall possess current, valid accreditation from the AASHTO Materials Reference Laboratory (AMRL), in accordance with AASHTO AMRL R18, for ASTM D3740, for tests required for quality assurance testing indicated in this Article and field quality control testing indicated to be Contractor's responsibility.
- d. Testing laboratory shall comply with ASTM E329.
- e. Testing laboratory shall be experienced in the types of testing required.
- f. Selection of testing laboratory is subject to Engineer's acceptance. Upon Engineer's request, submit qualifications statement for testing laboratory, including name of entity, location, copies of applicable certifications, summary of entity's experience, and names and qualifications of personnel who will perform the subject sampling and testing.

C. Quality Assurance Testing:

1. Quality assurance testing, which may also be regarded as source quality control testing, is in addition to field quality control testing required by this Section's "Field Quality Control" Article.
2. Materials used in the Work may require testing and retesting, as directed by Engineer, during the Project. Allow free access to onsite material stockpiles, borrow sources, and other sources of aggregate and soil materials at all times. Tests not specifically indicated to be performed at Owner's expense (if any), including retesting of defective materials and defective Work, shall be at Contractor's cost.
3. Contractor's Testing Laboratory Scope for Quality Assurance Sampling and Testing:
 - a. Obtain samples and perform testing of proposed fill materials in the laboratory, at the Site, and at borrow locations (if any) to provide assurance that the Work will comply with the Contract Documents.
 - b. Testing laboratory shall perform testing required to obtain data for selecting moisture content for placing and compacting fill materials.
 - c. Submit to Engineer, via Contractor, written results of each test.
4. Required Quality Assurance Material Testing by Contractor's Testing Laboratory:
 - a. Perform the following quality assurance tests on materials to be incorporated into the Work. Submit results of such tests to Engineer and obtain Engineer's acceptance thereof prior to incorporating the subject materials into the Work.
 - b. Gradation in accordance with ASTM D6913 and ASTM D7928. Perform one test for every 1,000 cubic yards of each material to be incorporated into the Work.
 - c. Atterberg limits in accordance with ASTM D4318. Perform one test for every 1,000 cubic yards of the following types of materials to be incorporated into the Work: suitable soil material, and soil structural fill.
 - d. Moisture/density relations for fill in accordance with ASTM D698, ASTM D1557, ASTM D4253, or ASTM D4254, as applicable. Perform one test for every 1,000 cubic yards of each material to be incorporated into the Work.

- e. Moisture content of stockpiled or borrow material in accordance with ASTM D2216. Perform one test for every 1,000 cubic yards of each material to be incorporated into the Work.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

- 1. Shop Drawings:
 - a. Schedule (table or written narrative) indicating, for each specific area of the Work, type of fill materials proposed, together with indication of whether source of materials is onsite or borrow source. Identification of each type of material shall employ material names/designations identical to those in the Contract Documents.
- 2. Product Data:
 - a. Borrow Soil Materials: Name and address of Supplier of borrow soil materials, gradation, and Supplier's certification that materials are sufficiently free of Constituents of Concern so that a Hazardous Environmental Condition will not be created or exacerbated. If no soil materials will be obtained from any borrow location, expressly so indicate to Engineer in writing.
 - b. Aggregate: Supplier's published description of aggregate materials, including name and address of Supplier, certification of material's compliance with AASHTO and state department of transportation standards, and gradation.

B. Informational Submittals: Submit the following:

- 1. Procedure Submittals:
 - a. Excavation plan indicating:
 - 1) Excavation Method(s): Indicate high-level methods to be used for excavating, such as use of backhoe or other earth moving construction equipment, use of explosives in excavating (when allowed), trenchless excavating methods, micro-trenching, hydro-excavating (when allowed), air vacuum excavating (when allowed), or other. Where different methods will be used, indicate locations of each in the Work. Purpose of indicating high-level excavating methods is for Owner's information regarding effect of excavating method on Owner's or facility manager's (if other than Owner) property and operations.
 - 2) Copies of permits and approvals required for trenching, backfilling, and related earth Work, obtained from authorities having jurisdiction, including owners of affected utilities and transportation facilities, for excavation methods proposed.
 - b. Compaction procedure and compaction equipment proposed for use. Where different procedures or equipment will be used for compacting different types of material or at different locations at the Site, indicate where each procedure and equipment item will be used.
 - c. Engineer's acceptance of excavation plan does not, in any way, modify Contractor's sole responsibility for complying with the Contract Documents, construction means, methods, procedures, techniques, or sequences, and safety and protection measures incident thereto.
- 2. Quality Assurance Test Results Submittals:
 - a. Submit results of quality assurance testing performed in accordance with this Section's "Quality Assurance" Article, unless included as part of another submittal under this Section. Submit results for the following quality assurance testing:
 - 1) Tests on materials from onsite and borrow sources.
 - 2) Optimum moisture – maximum dry density curve for each type of fill material.
- 3. Field Quality Control Submittals:
 - a. Submit results of testing and inspection performed in accordance with the field quality control Article in Part 3 of this Section, including:
 - 1) Indication of soil classification in accordance with ASTM D2487.

- 2) Field density testing.
- 3) Proctor Compaction Test to determine optimum moisture for soil and maximum dry density.
4. Qualifications Statements:
 - a. Quality assurance testing laboratory, when requested by Engineer.

1.6 FIELD CONDITIONS

A. Existing Conditions:

1. Subsurface Conditions:
 - a. Subsurface Information: The Supplementary Conditions indicate information (if any) that is Technical Data on subsurface conditions at the Site. Such information and data are not intended as a representation or warranty of continuity of conditions between soil borings or test pits, nor of groundwater levels at dates and times other than date and time when measured, nor that purpose of obtaining the information and data were appropriate for use by Contractor. Owner and Engineer are not responsible for interpretations or conclusions drawn therefrom by Contractor.
 - b. Contractor's Explorations: Soil borings and other exploratory operations may be made by Contractor, at no additional cost to Owner. Coordinate Contractor-performed test borings and other exploratory operations with Owner, utility owners, and owners of transportation facilities as appropriate. Perform such explorations without disrupting or otherwise adversely affecting operations of Owner and others.
2. Where subsurface conditions or locations of Underground Facilities and structures are unforeseen or differ substantively from that shown or indicated in the Contract Documents, comply with Contract requirements for giving notice and other actions.
3. Existing Structures and Underground Facilities:
 - a. The Contract Documents show or indicate certain structures and Underground Facilities adjacent to the Work. Such information was obtained from existing records and is not guaranteed to be correct or complete. Contractor shall explore ahead of the excavation to determine the exact location of all existing structures and Underground Facilities. Existing structures and Underground Facilities shall be supported and protected from damage by Contractor. Immediately repair and restore existing structures and Underground Facilities damaged by Contractor without additional cost to Owner.
 - b. Movement or operation of construction equipment and machinery over Underground Facilities shall be at Contractor's sole risk. When required by owner of the Underground Facility, prepare and submit to owner of such Underground Facility, and obtain their acceptance, of Contractor's plan presenting Contractor's analysis of the loads to be imparted during construction (including transient loading by construction equipment, machinery, and vehicles) and Contractor's proposed measures to protect structures and Underground Facilities during the Work.
 - c. Acceptance of or approval by utility owner or Engineer of Contractor's proposed evaluation and method(s) for protecting Underground Facilities in no way modifies or reduces Contractor's sole responsibility for complying with the Contract Documents, means, methods, procedures, techniques, and sequences of construction, and the safety and protection measures incident thereto.
 - d. Coordinate with utility owners for shut off of services in active piping and conduits. When required by utility owner, Owner will assist Contractor with utility owner notifications. Completely remove buried piping and conduits indicated for removal and not otherwise indicated as being abandoned or to remain in place.
 - e. In general, service lines and laterals to individual residences, businesses, buildings, and structures, are not shown; however, Contractor shall assume that a service exists for each utility owner to each residence, business, building, structure, and property.
 - f. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when such interruption is indicated in the Contract Documents or when

allowed in writing by Engineer after acceptable temporary utility services are provided by Contractor for the affected structure or property.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Provide granular under-slab fill under foundations, manholes, chambers, vaults, handholes, and similar Work unless other under-slab material is required by the Contract Documents.
 2. ASTM C33/C33M gradation size no. 67, or other material acceptable to Engineer.
 3. Material shall be uniformly-graded, washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, free of organic and deleterious material, complying with the following:
 - a. 100 percent passing a 1.5-inch sieve.
 - b. Not more than five percent passing a no. 4 sieve.
- B. Granular Structural Fill:
1. Granular structural fill, sometimes called "select granular fill", is required for improving subgrade (after removal of unsuitable material), as backfill for excavations in areas that, after restoration, will be subject to vehicular traffic, and at other locations shown or indicated for such material in the Contract Documents.
- C. Soil Structural Fill:
1. At Contractor's option, soil structural fill may be low-volume change cohesive soil material or granular soil material.
 2. Free of organic and deleterious matter, frozen material and debris.
 3. Low-volume change cohesive soil material:
 - a. ASTM D2487 classification: CL-ML or CL.
 - b. Liquid limit: Less than 45.
 - c. Maximum plasticity index: 20.
 4. Granular soil material:
 - a. ASTM D2487 classification: GW, GP, GM, GC, SW, SP, SM or SC.
 5. Previously excavated materials complying with the Contract Documents requirements for soil structural fill may be used for soil structural fill.
 6. When onsite materials are unsuitable for use as soil structural fill, provide granular structural fill or approved borrow material as soil structural fill. Prior to using borrow material as soil structural fill, furnish product data Submittal and quality assurance Submittal for proposed material and obtain Engineer's approval and acceptance (as applicable) of the proposed material.
- D. Suitable Soil Material as Non-Structural Fill:
1. Provide suitable soil material as fill for the Work, unless other material is required.
 2. Material shall be:
 - a. Free of rock larger than three inches in any dimension, debris, waste, frozen materials, organic material, and other deleterious material.
 - b. ASTM D2487 classification: GW, GP, GM, GC, SC, SW, SP, SM, CL-ML or CL.
 - c. Liquid limit: Not greater than 45.
 - d. Plasticity index: not greater than 20.
 3. Previously-excavated materials complying with the Contract Documents requirements for suitable soil material may be used for suitable soil material.
 4. When onsite materials are unsuitable for use as suitable soil material, provide soil structural fill or approved borrow material as suitable soil material. Prior to using borrow material as suitable soil material, furnish product data Submittal and quality assurance Submittal for

proposed material and obtain Engineer's approval and acceptance (as applicable) of the proposed material.

E. Subbase Material:

1. Subbase material is granular material underlying pavement, sidewalks, and other surfaces expressly indicated in the Contract Documents.
2. Material shall be naturally- or artificially-graded mixture of natural or crushed gravel, crushed stone, or natural or crushed sand. Slag is unacceptable.
3. Material shall comply with the following gradation requirements:

Sieve Sizes (Square Openings)	Percentage by Weight Passing Sieve.
2-inch	100
1-inch	70 to 100
3/4-inch	50 to 90
No. 4	30 to 60
No. 40	5 to 40
No. 200	0 to 15

F. Pipe Bedding Material:

1. Materials: Unless otherwise expressly required in the Contract Documents, pipe bedding material shall be crushed stone and gravel, free of: rock or gravel larger than one-inch in any dimension, debris, waste, frozen materials, organic material and other deleterious matter.
2. Sand:
 - a. Where expressly required or allowed by the Contract Documents, provide sand as pipe bedding material.
 - b. Sand material, where used, shall consist of natural or manufactured granular material and shall contain no organic material.
 - c. Sand shall be non-plastic, when tested in accordance with ASTM D4318.
 - d. Gradation: 100 percent shall pass a no. 4 sieve and not more than five percent shall pass a No. 200 sieve.

G. Flowable Fill, also known as Controlled Low Strength Material (CLSM):

1. Unless expressly required otherwise by the Contract Documents, flowable fill may be used, at Contractor's option (following Engineer's approval), for backfilling in lieu of the following materials: pipe bedding material, soil structural fill, suitable soil material used as non-structural fill, and subbase material.
2. Material provided shall be excavatable by ordinary mechanical excavation equipment, such as backhoes.

2.2 SOURCE QUALITY CONTROL

A. Tests and Inspections at Source of Supply:

1. Perform quality assurance testing, and submit results to Engineer, in accordance with the "Quality Assurance" Article in Part 1 of this Section.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Provide Engineer with sufficient notice and with means to examine areas and conditions under which trenching, backfilling, other related earth Work, and grading will be performed. Engineer will advise Contractor in writing when Engineer is aware of conditions that may be detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.
 2. This Article, however, in no way modifies or reduces Contractor's sole responsibility for complying with the Contract Documents, for construction means, methods, procedures, techniques, and sequences, and for the safety and protection measures incident thereto.
 3. Nothing in this Article, including action by Engineer or Resident Project Representative (if any), is for benefit of Contractor.
- B. Installing the Work constitutes Contractor's approval of underlying work, subgrades, and field conditions prevailing at the time of the Work.

3.2 TEST PITS

A. Test Pits - General:

1. Test Pit Locations Not Shown or Indicated in the Contract Documents and Test Pits Not Part of a Dedicated Bid/Pay Item:
 - a. In advance of other construction, excavate test pits, make observations and measurements, and promptly fill test pits.
 - b. Purpose of test pits is to determine existing subsurface conditions and locations of Underground Facilities and structures.
 - c. Perform all work required in connection with excavating, stockpiling, maintaining, temporarily supporting excavations, filling, and replacing pavement for test pits. Contractor is responsible for the definite location of each existing Underground Facility involved within the area of excavation for the Work. Exercise care during such location work to avoid damaging and disrupting affected Underground Facility or structure. Contractor is responsible for repairing, at Contractor's cost, damage to Underground Facilities or structure caused during the Work.

B. Payment for Test Pits:

1. All payment for test pits shown or indicated in the Contract Documents will be part of the associated Unit Price Work bid/pay item Contract Price.

C. Results of Test Pits:

1. Document results of all test pits excavated by Contractor.
2. Submit to Engineer written results of test pits expressly required by the Contract Documents or directed by Engineer. Furnish such Submittal within three days of excavation of associated test pit, unless Engineer allows more time. When Engineer requests written results of test pits performed for Contractor's own use, promptly furnish such information as Informational Submittal.
3. Required documentation of test pits shall include:
 - a. Identification of Project, Site, and Contractor.
 - b. Date and time of test pit excavation, indication of weather conditions, and names of personnel present and employer of each.
 - c. Detailed description of location of test pit, including, where necessary, measurements to landmarks shown on the Drawings. Where appropriate, include sketch of location from the Drawings.
 - d. Indication of approximate dimensions of test pit, including length, width, and depth.
 - e. Verbal (written) description of observed subsurface conditions, including apparent strata, rock (if any), groundwater conditions, and approximate depth at which each was observed.

- f. Verbal (written) description of unusual conditions observed, including potential existence of Hazardous Environmental Condition, if any. Include pertinent data, such as readings from instrumentation used.
- g. Description and sketch, with appropriate dimensions, of Underground Facilities and structures in the test pit. Sketches shall be clearly legible with clear, well-written annotations and dimensions.
- h. Other pertinent information and data from observations made while test pit was open.
- i. Brief written description of backfilling and restoration of test pit, including time operations were completed.

3.3 PREPARATION

A. Site Preparation:

- 1. Comply with Section 31 10 00 - Site Clearing.
- 2. Comply with this Section's "Erosion and Sediment Control During Construction" Article.

B. Dust Control:

- 1. Relative to controlling dust during construction, comply with Section 01 57 05 - Temporary Controls and Section 01 74 00 - Cleaning.

C. Maintenance and Protection of Traffic:

- 1. Comply with Section 01 55 26 - Traffic Control.

3.4 EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION

A. Temporary Erosion and Sediment Controls – General:

- 1. Provide temporary erosion and sediment controls in accordance with Section 01 57 05 - Temporary Controls, and other requirements of the Contract Documents.
- 2. When applicable, also comply with requirements of the erosion and sediment control plan approved by authorities having jurisdiction and the Project's storm water pollution prevention plan and permit, if any.

3.5 EXCAVATION

A. Excavation – General:

- 1. Perform all excavation Work, including trenching and backfilling, required to complete the Work as shown, specified, and required. Excavating Work includes removing, handling, and proper disposal of earth, sand, clay, expansive-type soils, other unsuitable soil materials, gravel, hardpan, soft, weathered or decomposed rock, concrete and masonry (reinforced or unreinforced), pavements, rubbish, debris, stumps, and other materials, regardless of moisture content, within the excavation limits.
- 2. Trenching and backfilling Work shall comply with the Contract Documents, including required grades, elevations, general dimensions, and alignment shown or indicated on the Drawings including cuts and fills, as applicable.
- 3. Protect existing buildings and structures against undermining and destabilization. If adjacent trenching affects foundations of one or more buildings or structures, promptly advise Engineer in writing.
- 4. If unsuitable material and obstructions are encountered during excavation, remove material and replace as directed by Engineer.

B. Excavation Methods:

- 1. Traditional Excavation Methods: Excavation via traditional methods, such as backhoe, bulldozer, other earth moving construction equipment or machinery, or excavation using hand tools, is acceptable for all excavating Work.
- 2. Use of Explosives:
 - a. Use of explosives is not allowed.

3. Micro-trenching: Installation of buried utilities using micro-trenching equipment and techniques is acceptable when the associated Underground Facility is of a size and depth appropriate for such construction method. Submit to Engineer request for interpretation or clarification for requirements for resin backfilling of micro-trenches. Engineer will issue such requirements via Field Order.
 4. Trenchless: Where Contractor proposes trenchless construction techniques, such as directional drilling, micro-tunneling, or others, comply with the Contract Documents regarding such construction methods. When the Contract Documents do not include requirements for the proposed trenchless construction method, submit to Engineer request for interpretation or clarification to obtain appropriate requirements, which will be issued via appropriate Contract modification.
 5. Hydro-excavating (also known as Hydro-Vacuum Excavating):
 - a. Hydro-excavating is acceptable for all excavating Work].
 - b. Avoid creating nuisances, unsafe conditions, and inconvenience to Owner, [facility manager,] owners and occupants of adjacent property, and the public when hydro-excavating is allowed and used.
 6. Air Vacuum Excavating:
 - a. Air vacuum excavating acceptable for all excavating Work.
 - b. Avoid creating sandblasting outside of excavations, dust emissions, other nuisances, unsafe conditions, and inconvenience to Owner, [facility manager,] owners and occupants of adjacent property, and the public when air vacuum excavating is allowed and used.
- C. Excavation Protection:
1. Provide excavation protection system(s) in accordance with Laws and Regulations to prevent injury to persons and property, including Underground Facilities.
 2. Provide safe access to excavations, including emergency exit, and safe access for construction equipment and machinery, where applicable, in accordance with laws and Regulations.
 3. Comply with OSHA requirements for temporary support of excavations, regarding temporary support of excavations during construction.
 4. Comply with Section 31 23 19 - Dewatering, regarding dewatering of excavations and related matters.
- D. Excavations for Manholes, Chambers, and Vaults:
1. Refer to this Section, Section 01 22 00 - Measurement and Payment, and applicable details (if any) on the Drawings for requirements on excavation pay limits for manholes, chambers, vaults, and similar items.
 2. Elevation of bottom of manholes, chambers, and vaults may be changed only via duly issued Contract modification. Such modifications may be directed by Engineer to ensure a stable bearing surface. Elevations of piping, conduit, and similar other Underground Facilities shall be as shown or indicated on the Contract Documents.
 3. Extend excavations sufficiently on each side of manholes, chambers, vaults, or similar construction only as necessary for installing precast concrete structures and appurtenances, including temporary supports of excavations, observation and inspection of the Work, and safe sloping of sides of excavations, as necessary.
- E. Subgrades – General:
1. Provide firm, dense, thoroughly compacted, consolidated subgrades, free of mud, muck, and other soft and unsuitable materials. Subgrades shall remain firm and intact under all construction operations. Reinforce subgrade by providing granular structural fill on subgrades that are otherwise solid but become soft or muddy on top due to construction operations. Finished elevation of stabilized subgrades shall not be above subgrade elevations shown on the Drawings, unless bottom of trench is rock below required bottom

elevation of pipe, manhole, chamber, or vault, and above required bottom of excavation elevation.

2. If, in Engineer's opinion, subgrade becomes soft, muddy, or both, because of construction delays, failure to dewater properly, or other cause within Contractor's control, excavate subgrade to firm material, trim the subgrade, and backfill with granular structural fill material at Contractor's cost.
3. Remove unsuitable subgrade materials below foundations. Limits of required removal of unsuitable material, when not otherwise expressly shown or indicated in the Contract Documents, shall be outside exterior limits of foundations around perimeter of manhole, chamber, vault, or similar item, by not less than the greater of the following horizontal distances:
 - a. Distance equal to depth of required removal of unsuitable material, below bottom of foundations.
 - b. Three feet, or.
 - c. As directed by Engineer, in consultation with geotechnical engineering consultant (if any).
4. Preparation of Subgrades for Subsequent Work:
 - a. Level off subgrades to receive foundations or compacted fill.
 - b. Where subgrades are to receive subsequent fill or manholes, chambers, vaults, or similar items, remove loose materials and bring subgrades into compliance with the Contract Documents.
 - c. Where compacted fill material is required to bring subgrade up to underside of construction, scarify existing subgrade upon which fill material will be placed to depth of six inches and then compact to density required in this Section before fill material is placed thereon.
 - d. Do not excavate lower than required for buried piping or foundations, unless directed otherwise by Engineer.
 - e. Where excavation extends below required elevation without authorization, promptly advise Engineer and remedy unauthorized excavation in accordance with the Contract Documents. Corrections may include:
 - 1) Under soil-supported foundations or soil-supported retaining walls:
 - a) Filling entire vertical distance between excavated subgrade and material required under foundation or other structure with compacted granular structural fill.
 - b) Concrete fill is acceptable for bringing elevations to proper position.
 - 2) For locations other than those indicated above including slabs-on-grade:
 - a) Backfill and compact unauthorized excavations as indicated for authorized excavations of same classification, unless otherwise directed by Engineer.
 - 3) Contractor is not eligible for change in Contract Price or Contract Times for remedying unauthorized excavations.
5. Evaluation and Protection of Subgrade:
 - a. Advise Engineer as soon as excavation is completed for Engineer's observation of subgrades and, where necessary or required, inspection and testing of subgrades.
 - b. If Engineer determines that bearing materials at required subgrade elevations are unsuitable, provide subgrade stabilization as indicated in this Article.
 - c. Do not commence further construction until subgrade under compacted fill material, under foundations and retaining walls is acceptable (in accordance with the Contract Documents) to Engineer, who may consider results of required testing, and who may elect to consult with geotechnical consultant (if any).
 - d. Engineer shall have sufficient opportunity to observe subgrade, after successful completion of tests and inspections required by the Contract Documents.

- e. Place fill material and perform subsequent construction after subgrade is acceptable in accordance with the Contract Documents.
 - f. Protect subgrade from becoming loose, wet, frozen, or soft due to weather, construction operations, or other reasons.
6. Subgrade stabilization:
- a. If subgrade under foundations or fill material, is frozen, loose, wet, or soft before construction is placed thereon, remove frozen, loose, wet, or soft material and replace with approved compacted material as directed by Engineer, who may consult with geotechnical consultant.
 - b. Loose, wet, or soft materials, when approved by Engineer, may be stabilized by a compacted working mat of well graded crushed stone.
 - c. Stabilization shall be in accordance with the Contract Documents. Where the Contract Documents do not address subgrade stabilization, promptly submit to Engineer written request for clarification or interpretation, or other written instrument in accordance with the Contract Documents. In such event, do not proceed until response is obtained from engineer.

F. Pipe Trench Preparation:

- 1. Not more than 150 feet of trench may be opened in advance of installing pipe in trench.
- 2. Trench width shall be minimized to greatest extent practical, and shall comply with the following:
 - a. Trench width shall be sufficient to provide space for installing, jointing and inspecting piping. The Drawings show additional requirements for trenches. In no case shall trench be wider at top of pipe than pipe barrel's outside diameter (OD) plus [two] feet, unless otherwise shown or indicated.
 - b. Enlargement of trench width at pipe joints may be made when required and approved by Engineer.
 - c. For excavating and backfilling for manholes, chambers, and vaults associated with buried piping, excavation at widest point of manhole, chamber, or vault shall be not wider than two feet greater than widest outside dimension (including bottom footings or flanges, if any, of precast concrete structures) of the associated manhole, chamber, or vault.
 - d. Trench width shall be sufficient for Contractor's means of temporarily supporting the excavation and dewatering.
 - e. Trench width shall be sufficient to allow thorough compaction of fill adjacent to bottom half of pipe.
 - f. Do not use construction equipment or machinery that necessitates trench to be excavated to excessive width.
- 3. Depth of trench shall be as shown or indicated in the Contract Documents. If required and approved by Engineer in writing (such as a duly issued Contract modification), depths may be revised.
- 4. Where Engineer considers existing subgrade (beneath intended bedding material) unsuitable, remove and replace such unsuitable material with granular structural fill material for full width of trench, down to suitable material.

G. Freeze Protection:

- 1. Do not place foundations or fill material on frozen subgrade.
- 2. When freezing temperatures are expected, based on widely recognized, reputable source for weather forecasts at or near the Site, do not excavate to full depth indicated, unless foundations or fill material can be placed immediately after excavation has been completed and is acceptable in accordance with the Contract Documents.
- 3. Protect from freezing excavation, subgrade, and fill materials when subsequent Work thereon is delayed.

H. Construction Traffic on Soils:

1. Furnish and use appropriate backhoe or other low-contact pressure equipment to remove existing materials.
2. Minimize construction traffic on existing materials and saturated soils and avoid soil disturbance.
3. Repair disturbed subgrade materials prior to performing subsequent Work. Remedial work shall be in accordance with the Contract Documents. When not addressed in the Contract Documents, remedial Work shall be as directed by Engineer via appropriate Contract modification.
4. Allow only minimal foot traffic on bearing soils prepared for subsequent installation of fill or foundations.

3.6 FILLING AND COMPACTING

A. Filling and Compacting – General:

1. Provide and compact all fill required for the finished grades as shown and as indicated in this Section.

B. Place fill as promptly as progress of the Work allows, but not until completing the following:

1. Obtaining Engineer's concurrence, after observation by Engineer or Resident Project Representative (if any) of construction below finish grade, including removal of trash and debris from excavations, waterproofing (where required), and related Work.
2. Successful completion of required field quality control activities for Work that will be covered or concealed by filling, including field quality control testing of buried piping, conduits that will convey fluid or gas, and exfiltration testing (where performed or required) of manholes, chambers, vaults, and similar items. For manholes, chambers, and vaults, where infiltration testing or vacuum testing is performed or required, such testing may be performed following backfilling.
3. Completion of proper documentation of as-constructed conditions and existing conditions (such as locations of Underground Facilities) in accordance with Section 01 78 39 - Project Record Documents.
4. Removal of temporary supports of excavations.
5. Remove fill that includes organic materials or other unacceptable material and replace with fill material complying with the Contract Documents.

C. Placement – General:

1. Place fill to the grades shown or indicated. Bring up evenly on all sides fill around manholes, chambers, vaults, and similar items, and Underground Facilities.
2. Management of Moisture Content:
 - a. Place fill materials at moisture content and density as indicated in this Article's requirements on compaction density. Prior to placing fill material, optimum moisture and maximum density properties for proposed material shall be obtained from Engineer, who may consult with geotechnical consultant, if any. Furnish and use construction equipment and machinery capable of adding measured amounts of water to fill materials to bring fill materials to a condition within required moisture content range. Control moisture for each lift necessary for required compaction.
 - b. Furnish and use construction equipment and machinery capable of discing, aerating, and mixing fill materials to ensure reasonable uniformity of moisture content throughout fill materials, and to reduce moisture content of borrow materials by air drying, when necessary.
 - c. When subgrade or fill materials requires moisture-conditioning before compaction, fill material shall be sufficiently mixed or worked on the subgrade to ensure uniform moisture content throughout the lift of material to be compacted.
 - d. Materials at moisture content in excess of specified limit shall be dried by appropriate means, such as aeration or stockpiling for gravity drainage and air drying.

3. Compaction:
 - a. Compaction Equipment:
 - 1) Perform compaction with construction equipment and machinery suitable for the type of fill material placed. Unless otherwise required, compact cohesive soils using sheepsfoot compactor, and compact granular materials using pneumatic rollers, vibrators, or other construction equipment or machinery to obtain required density.
 - 2) Select and use equipment capable of providing the minimum density required in the Contract Documents.
 - 3) Use light compaction equipment and machinery, with equipment or machinery gross weight not exceeding 7,000 pounds within horizontal distance of 10 feet from the wall of completed, below-grade manholes, chambers, vaults, and similar items, and walls of adjacent buildings or structures.
 - 4) Furnish and use construction equipment and machinery capable of compacting in restricted areas next to structures and around piping and Underground Facilities.
 - b. Compaction Test Area:
 - 1) Effectiveness of construction equipment and machinery selected by Contractor for compacting, shall be tested at start of compacted fill Work by constructing a small section of fill within the area where fill will be placed.
 - 2) If tests on the test section of fill indicate that required compaction is not obtained, do one or more of the following: increase the quantity of coverages, decrease the lift thicknesses, or use different compactor equipment or machinery.
4. Placement of Lifts and Compaction:
 - a. Place fill materials in horizontal, loose lifts, not exceeding specified thickness prior to compacting.
 - b. Place fill in manner ensuring uniform lift thickness after placing.
 - c. Preparation of surfaces for placement of fill:
 - 1) Before commencing placing of fill, scarify underlying material to depth of six inches.
 - 2) Where ground surface is steeper than one vertical to four horizontal ("1V:4H"), plow surface to bench and break up surface so that fill material will bind with existing surface. For slopes steeper than 1V:4H and less than 1V:1.5H, bench shall be six feet wide. For slopes steeper than or equal to 1V:1.5H and less than 1V:0.5H, bench shall be four feet wide.
 - d. Mechanically compact each lift, by not less than two complete coverages of compactor. One coverage is defined as the conditions reached when all portions of the fill lift have been subjected to the direct contact of compactor's compacting surface.
 - e. Compaction of fill materials by inundation with water is unacceptable.
5. Restrictions:
 - a. Do not place fill materials when standing water is present on surface of area where fill will be placed.
 - b. Do not compact fill when standing water is present on the fill to be compacted.
 - c. Do not place or compact fill in frozen condition or on top of frozen material.
 - d. Fill containing organic or deleterious materials or other unacceptable material previously described shall be removed and replaced prior to compaction.
6. If required densities are not obtained because of improper control of placement or compaction procedures, or because of inadequate or improperly functioning compaction equipment or machinery, perform all work necessary to provide required densities. Such work shall include, at no additional cost to Owner, complete removal of unacceptable fill areas and replacement and re-compaction until acceptable fill is provided.
7. Repair, at Contractor's cost, observed or measured settlement. Make repairs and replacements as necessary and required within 30 days after being so advised by Engineer, unless more-timely action is necessary to avoid or reduce the potential for safety hazards or damage to property.

D. Fill Placed in Pipe Trenches:

1. Piping trenches may be backfilled prior to testing of piping, unless nature of test requires observation of pipe or manholes, chambers, vaults, or similar items during testing. Do not construct building or structure over piping until piping has been successfully tested and passed.
2. Pipe Bedding: Pipe bedding material shall be as follows:
 - a. Unless otherwise shown or indicated, install buried piping on not less than six-inch layer of aggregate pipe bedding material underneath piping.
 - b. Pipe bedding material shall extend upward from elevation required immediately above to horizontal centerline of associated buried piping.
 - c. Pipe bedding material shall be spread and the surface graded to provide a uniform and continuous support beneath piping at all points between bell holes or pipe joints.
 - d. Install initial layer of pipe bedding material on prepared subgrade and compact as required. Provide appropriate divot in the bedding material to accommodate each pipe bell or joint. Install piping so that pipe barrel carries the weight of each pipe segment, rather than pipe bells or joints bearing the pipe's weight.
 - e. Slight disturbance of installed pipe bedding material surface during withdrawal of pipe slings or other lifting tackle is acceptable.
 - f. After each pipe's bedding material has been graded, and the piping has been aligned, joined in accordance with the Contract Documents, and placed in final position on bedding material, provide and compact sufficient pipe trench fill material under and around each side of pipe and back of bell or end thereof to hold piping in proper position and maintain alignment during subsequent pipe jointing and embedment operations.
 - g. Subsequent to forming pipe joint, place additional pipe bedding material, in required lifts, to required top elevation of pipe bedding material. Ensure bedding material is properly and fully placed under pipe "haunches" for proper support of piping. Compact lifts of pipe bedding material in accordance with this Article prior to placing subsequent backfill material.
3. Placing and Compacting Pipe Trench Fill: Unless otherwise shown, placing and compacting of pipe trench fill materials shall comply with the following:
 - a. Deposit and compact pipe trench fill material uniformly and simultaneously on each side of piping to prevent lateral displacement of piping.
 - b. Each layer of pipe trench fill material shall be compacted by not less than two complete coverages of all portions of surface of each lift using appropriate compaction equipment or machinery.
 - c. Method of compaction and compaction equipment and machinery used shall be appropriate for material to be compacted and shall not transmit damaging shocks to piping.

E. Installation of Flowable Fill, also known as Controlled Low Strength Material (CLSM):

1. Discharge flowable fill from ready-mix delivery vehicle into excavation, or other space to be backfilled with such material, via chutes, pumping, or hand-carried in buckets, in accordance with the Contract Documents and requirements of flowable fill ready-mix Supplier.
2. Subgrade on which flowable fill is placed shall be free of disturbed or softened material and water.
3. Place flowable fill in lifts not greater than four feet depth.
4. Placing of each lift of flowable fill shall be a continuous operation, to the extent practicable.
5. Place flowable fill in manner that prevents flotation of piping or other damage to the Work, other Underground Facilities, and adjacent property.
6. Cold Weather Placing:
 - a. Do not place flowable fill on frozen subgrade.

- b. Flowable fill batching, mixing, and placing may be performed when weather conditions are favorable, and ambient air temperature is 34 degrees F and rising.
 - c. At the time of placing, flowable fill must have a temperature of not less than 40 degrees F.
 - d. Discontinue placing flowable fill when ambient air temperature is 38 degrees F or less and falling.
 - 7. After placing flowable fill, allow not less than 12 hours before placing subsequent lift or approved otherwise by Engineer.
 - 8. Prevent contact with flowable fill by construction vehicles and equipment, or other traffic, for not less than 24 hours after placing, or until flowable fill is sufficiently hard to prevent rutting or other damage by vehicles and construction equipment.
- F. Fill Required Under Subbase for Pavement and Other Traveled Ways:
- 1. Where bottom of pavement or surfacing of other traveled way will be at elevation equal to or less than preconstruction ground surface, after required excavation and preparation of subgrade, provide required subbase material to required depth. At underside of pavement or other surfacing of traveled way, subbase material shall extend horizontally six inches beyond edges of pavement or other surfacing. Exterior edges of subbase material shall be placed and compacted at uniform slope of one foot vertical-to-one foot horizontal away from top edge of subbase down to subgrade.
 - 2. Where bottom of pavement or surfacing of other traveled way will be at elevation greater than preconstruction ground surface, after required preparation of subgrade, provide required fill material and subbase material to required depth. At underside of pavement or other surfacing of traveled way, subbase material shall extend horizontally six inches beyond edges of pavement or other surfacing. Exterior edges of subbase material and fill material shall be placed and compacted at uniform slope of one foot vertical-to-one foot horizontal away from top edge of subbase down to subgrade.
- G. Temporary Pavement:
- 1. Provide not less than 1.5 inches of temporary bituminous pavement immediately after filling excavations in paved roads and other pavement subject to vehicular traffic, where such pavement will remain permanently.
 - 2. Maintain surface of paved area over the fill in good and safe condition during progress of the Work, and promptly fill depressions over and adjacent to the fill area caused by settlement of fill.
 - 3. Permanent replacement pavement shall be equal to that of the existing roadways, unless otherwise shown or specified.
- H. Compaction Density Requirements:
- 1. Compaction Requirements for Sitework (including civil, grading, and Underground Facilities):

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Under Perimeter Roadway, Landfill Cell , , and Buried Utilities (including manholes, chambers, vaults, and similar items):		
Cohesive soils	95% per ASTM D698	-2 to +3% of optimum
Cohesionless soils	75% relative density per ASTM D4253 and ASTM D4254	
Sitework Not Covered by the Above Category or Classification:		
Cohesive soils	90% of ASTM D698	-2 to +3% of optimum
Cohesionless soils	65% relative density per ASTM D4253 and ASTM D4254	

2. Compaction Requirements for Materials Supporting Foundations and Adjacent to Buildings and Structures:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Fill supporting foundations and slabs and fill adjacent to exterior of buildings and structures, adjacent to walls, piers, and columns		
Cohesive Soils	95% per ASTM D698	-2 to +3% of optimum
Cohesionless Soils	75% relative density per ASTM D4253 and ASTM D4254	

3. Compaction Density and Moisture Requirements for Specific Areas:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Outside buildings and structures, not under slabs-on-grade		
Cohesive Soils	85% per ASTM D698	-2 to +3% of optimum
Cohesionless Soils	40% relative density per ASTM D4253 and ASTM D4254	

4. Fill Lift Thickness:

- a. Unless expressly shown or indicated otherwise, place fill in trenches, below piping, below foundations, or under paved areas in horizontal uncompacted layers not exceeding six eight inches deep, and thoroughly compact each before next layer is placed.
 - b. In pipe trenches, above elevation of bottom of pipe, horizontal uncompacted layers shall be six inches deep.
5. Fill Moisture Content: Fill shall be wetted and thoroughly mixed to achieve moisture content to within the required range indicated in the applicable table, above, with the following exception(s):
- a. On-site clayey soils: Optimum to plus three percent (moisture less than optimum is unacceptable).
6. Replace natural, undisturbed soils or compacted soil subsequently disturbed or removed by construction operations with materials compacted as indicated.
7. Field quality control testing for density; to verify that specified density was obtained, will be performed during each day of compaction Work. Responsibility for field quality control testing is indicated in this Section's "Field Quality Control" Article.
8. When field quality control testing indicates unsatisfactory compaction, provide additional compaction necessary to obtain the required compaction. Perform additional compaction Work at no additional cost to Owner until required compaction is achieved. Such work includes complete removal of unacceptable (as determined by Engineer) fill areas and replacement and re-compaction until acceptable fill is provided in accordance with the Contract Documents.
- I. Replacement of Unacceptable Excavated Materials: In cases where over-excavation to replace unacceptable soil materials is required, backfill the excavation to required subgrade with granular structural fill material and thoroughly compact in accordance with applicable table in this provision. Slope the sides of excavation in accordance with the maximum allowable inclinations specified for each element of the Work.

3.7 UNAUTHORIZED EXCAVATION

A. Unauthorized Excavation – General:

1. Excavations outside lines and grades shown or indicated and that are not approved by Engineer (including excavations below required subgrade elevation, unless Engineer directs removal of unsuitable subgrade material), together with removing and disposing of the associated material, shall be at Contractor's cost and risk.
2. Fill unauthorized excavations with properly compacted granular structural fill material at Contractor's cost.

3.8 PAVEMENT SUBBASE COURSE

A. Pavement Subbase – General:

1. Place subbase material, in layers of specified thickness, over subgrade to support pavement base course.
2. Prepare subgrade underlying subbase course in accordance with this Section's general requirements for subgrades.

B. Grade Control:

1. During construction, maintain lines and grades including crown and cross-slope of subbase course.
2. Comply with Section 01 71 23 - Field Engineering, regarding staking and elevation controls.

C. Placing of Pavement Subbase Course:

1. Provide subbase material where required to the limits shown or indicated.
2. Place subbase course material on prepared subgrade in layers of uniform thickness, in accordance with indicated cross-section and thickness. If the Contract Documents do not show or indicate required section of replacement paving, replacement subbase course shall be of thickness equal to existing subbase course.
3. Maintain optimum moisture content for compacting subbase material during placing operations.
4. After completing compaction, other than that necessary for bringing material for the next course, do not haul or drive over compacted subbase.
5. To prevent softening of subgrade, do not install pavement subbase in excess of 500 feet in length without compacting.
6. If subgrade material becomes churned up into or mixed with subbase material, remove the mixed material and replace with clean, compacted subbase material.

3.9 GRADING

A. Grading – General:

1. Uniformly grade areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth subgrade surfaces within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Building Lines:

1. Grade areas adjacent to building lines to drain away from buildings and structures.
2. Grade to prevent ponding of water. Provide grades and slopes as shown on the Drawings and to allow effective drainage to proper drainage routes, such as catch basins, ditches or swales intended to convey storm water, and other storm water drainage routes. Where intended grade for effective drainage is unclear, promptly submit to Engineer request for interpretation and obtain Engineer's interpretation or clarification before proceeding,
3. Provide final surfaces free of irregular surface changes, in accordance with the following:
 - a. Grassed Areas and Areas Covered with Gravel, Stone, Wood Chips, or Other Special Cover: Finish areas to receive topsoil or special cover to within not more than one inch above or below required subgrade elevations. Requirements for topsoil and finish grading are in Section 31 91 13 – Topsoiling and Finish Grading.

- b. Sidewalks: Shape surface of areas under sidewalks to line, grade, and cross section, with finish surface not more than one inch above or below required subgrade elevation.
 - c. Pavement (including hard-surfaced pavement and areas with stone surfacing): Shape surface of areas under pavement to line, grade, and cross section, with finish surface not more than 0.5-inch above or below required subgrade elevation.
- C. Grading Surface of Fill Under Concrete Slabs-on-Grade:
- 1. Grade smooth and even, free of voids, compacted as specified, and to required elevation.
 - 2. Provide final grades within tolerance of 0.5-inch when tested with a ten-foot straight edge.

3.10 DISPOSAL OF EXCAVATED SPOIL MATERIALS

A. Spoil Disposal - General:

- 1. Contractor shall haul away excavated material that does not comply with requirements for fill, or is in excess of quantity required for fill.
- 2. Disposal of materials shall comply with Laws and Regulations, at no additional cost to Owner.

3.11 FIELD QUALITY CONTROL

A. Site Tests and Inspections:

- 1. Testing Laboratory:
 - a. Employ a testing laboratory to perform field quality control testing.
 - b. Testing Laboratory Scope:
 - 1) Perform field moisture content tests (in accordance with ASTM D2216 or ASTM D6938) and density tests (in accordance with ASTM D1556 or ASTM D6938) to verify that required compaction of fill materials was provided.
 - 2) Tests of actual unconfined compressive strength or bearing tests (in accordance with ASTM D2850 or ASTM D2166) on each stratum.
 - 3) Furnish to Engineer and Contractor written results of each test.
 - c. Authority and Duties of Testing Laboratory:
 - 1) Testing laboratory representatives ("technician") shall inspect the materials in the field, perform testing, and report findings to Engineer and Contractor. When the Work is defective, technician will direct attention of Engineer and Contractor to such defective Work.
 - 2) Technician shall not supervise performance of any of Contractor's Work. Technician shall not perform other duties for Contractor.
 - 3) Work will be tested and inspected by testing laboratory as the Work progresses, but failure to detect defective Work (including defective materials) shall not, in any way, prevent later rejection when defect is discovered, nor shall it obligate Engineer for Substantial Completion or final acceptance. Technicians are not authorized to revoke, alter, relax, enlarge, or release requirements of the Contract Documents, or to approve or accept any portion of the Work.
- 2. Responsibilities and Duties of Contractor:
 - a. Use of testing laboratory or geotechnical consultant in no way relieves Contractor of responsibility to provide Work in compliance with the Contract Documents.
 - b. When Owner furnishes services of testing laboratory, geotechnical consultant, or any combination thereof, for trenching, backfilling, and related earth Work, Owner and Engineer do not represent that the sampling and testing performed by Owner-hired testing laboratory or observations by Owner-hired geotechnical consultants, is sufficient for Contractor's purposes, or to monitor all aspects of the trenching, backfilling, and related earth Work. If additional quality control is needed to verify that the Work performed and materials delivered to the Site are in accordance with the Contract Documents, Contractor may retain its own, independent testing laboratory to perform additional sampling and testing for Contractor's purposes.

- c. To facilitate testing laboratory and geotechnical consultant, Contractor shall advise testing laboratory and geotechnical consultant not less than two days in advance of filling operations to allow for completion of field quality control testing and for assignment of personnel.
- d. Contractor shall be responsible for providing required compaction for fill and other earthwork. Contractor shall control construction operations by performing confirming tests to verify that Contractor has complied with the Contract Documents relative to compaction and moisture content.
- e. Contractor shall demonstrate adequacy of compaction equipment and procedures before exceeding one or more of the following quantities of earthwork. Each test location shall include tests for each layer, type, or class of fill to finish grade.
 - 1) 200 linear feet of trench fill.
 - 2) 10 cubic yards of granular structural fill.
 - 3) 100 cubic yards of suitable soil material.
 - 4) 50 cubic yards of subbase material.
- 3. Testing laboratory will inspect and indicate acceptable subgrades and fill layers before construction work is performed thereon. Testing of subgrades and fill layers shall be as follows:
 - a. Trenches for Underground Facilities (including buried ductbanks):
 - 1) In Open Fields: Two locations every 1,000 linear feet.
 - 2) Along Dirt or Gravel Roads or Off Traveled Right-of-Way: Two locations every 500 linear feet.
 - 3) Crossing Paved Roads: Two locations along each crossing.
 - 4) Under Pavement Cuts or Within Two Feet of Pavement Edges: One location every 400 linear feet.
 - b. For granular structural fill: Once per lift for each 1,000 square feet placed and compacted.
 - c. For soil structural fill:
 - 1) For backfilling trenches directly adjacent to buildings or structures, on 30-foot intervals on all sides of the building or structure for every compacted lift, but not less than one per lift on each side of the building or structure for buildings or structures less than 60 feet long on a side.
 - 2) For material not used as fill against buildings or structures, once per lift for each 1,000 square feet placed and compacted.
 - d. For Suitable Soil Material: One per 1,000 square feet on every compacted lift.
 - e. Subbase Material: One per 1,000 square feet on every compacted lift.
- 4. Periodic compliance tests will be made by Engineer to verify that compaction is in accordance with the Contract Documents, at no cost to Contractor. Contractor shall remove overburden above the level at which Engineer wishes to test and shall fill and re-compact the material after testing is complete.

B. Defective Work:

- 1. If testing laboratory reports or inspections indicate subgrade, fill, or bedding compaction less than specified density, Contractor shall remove unacceptable materials as necessary and replace with specified materials and provide additional compaction at Contractor's cost until subgrades, bedding, and fill are acceptable.
- 2. Costs for retesting of subgrade, fill, or bedding materials that did not originally comply with the Contract Documents, including required density, shall be paid by Contractor.

3.12 RESTORATION

A. Restoration – General:

- 1. Perform finish grading, including providing topsoil

2. Provide replacement paving, sidewalks, curbs, gutters, and similar items in accordance with the Contract Documents including the Specifications of Division 32 - Exterior Improvements.
3. Restore landscaping including lawn and meadow areas, in accordance with the Contract Documents including the Specifications of Division 32 - Exterior Improvements.

END OF SECTION

SECTION 31 32 19

GEOTEXTILES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nonwoven geotextile material for all uses as shown on Drawings.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 – General Requirements.
 - 3. Section 31 23 00 – Earthwork.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway Transportation Officials (AASHTO):
 - a. M288, Standard Specification for Geotextile Specification for Highway Applications.
 - 2. ASTM International (ASTM):
 - a. D3786, Standard Test Method for Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method.
 - b. D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus.
 - c. D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - d. D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - e. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - f. D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - g. D4759, Standard Practice for Determining the Specification Conformance of Geosynthetics.
 - h. D4833, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
 - i. D4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.
 - j. D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
 - k. D7238, Standard Test Method for Effect of Exposure of Unreinforced Polyolefin Geomembrane Using Fluorescent UV Condensation Apparatus
- B. Qualifications:
 - 1. Each manufacturing, fabricating firm shall demonstrate five (5) years continuous experience, including a minimum of 10,000,000 SF of geotextile installation in the past three (3) years.
 - 2. Installing firm shall demonstrate that the site Superintendent or Foreman has had responsible charge for installation of a minimum of 1,000,000 SF of geotextile.
 - 3. Installer shall attend pre-installation conference.

1.3 DEFINITIONS

- A. Manufacturer: Manufacturer producing geotextile sheets from resin and additives.
- B. Installer: The Installers are the individuals actually performing the hands-on work in the field.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. Manufacturer's documentation that raw materials and roll materials comply with required geotextile physical properties.
3. Manufacturer and Installer quality control manuals.
4. Original test results for resins, roll material and factory seam tests at frequency specified in respective quality control manuals.
 - a. Results shall include or bracket the rolls delivered for use in the Work.
5. Proposed details of anchoring and overlapping if different than included in Contract Documents.

B. Informational Submittals:

1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
2. For needle punched geotextiles, the manufacturer shall certify that the geotextile has been continuously inspected using permanent on-line full-width metal detectors and does not contain any needles which could damage other geosynthetic layers.
3. Qualification documentation specified in the QUALITY ASSURANCE Article in PART 1 of this Specification Section.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Label, handle, and store geotextiles in accordance with ASTM D4873 and as specified herein.
- B. Wrap each roll in an opaque and waterproof layer of plastic during shipment and storage.
 1. Do not remove the plastic wrapping until deployment.
- C. Label each roll with the manufacturer's name, geotextile type, lot number, roll number, and roll dimensions (length, width, gross weight).
- D. Repair or replace geotextile or plastic wrapping damaged as a result of storage or handling, as directed.
- E. Do not expose geotextile to temperatures in excess of 71 DegC (160 DegF) or less than 0 DegC (32 DegF) unless recommended by the manufacturer.
- F. Do not use hooks, tongs or other sharp instruments for handling geotextile.
 1. Do not lift rolls lifted by use of cables or chains in contact with the geotextile.
 2. Do not drag geotextile along the ground.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 1. GSE Lining Technology.
 2. Propex Geosynthetics.
 3. SKAPS Industries.
 4. TenCate Mirafi.
 5. Tenax.
- B. Requests for substitutions are to be formally submitted.

2.2 MATERIALS AND MANUFACTURE

A. Geotextile:

1. Nonwoven pervious sheet of polymeric material.
2. Geotextile fibers:
 - a. Long-chain synthetic polymer composed of at least 85 percent by weight polyolefins, polyesters, or polyamides.
 - b. Filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure.
 - c. Do not use reclaimed or recycled fibers or polymer to the formulation.
3. Form geotextile into a network such that the filaments or yarns retain dimensional stability relative to each other, including the selvages.
4. The geotextile physical properties shall equal or exceed the minimum average roll values listed below.
 - a. Values shown are for the weaker principal direction.
 - b. Acceptance of geotextile shall be in accordance with ASTM D4759.
 - c. Cushion Geotextile: Non-woven, needle punched; polyester or polypropylene; continuous filament or staple fibers; conforming to the following properties:

PROPERTY	TEST METHOD	MINIMUM REQUIRED VALUE
Unit Weight	ASTM D5261	12 oz/sy
Grab Tensile Strength	ASTM D4632	300 lb
Puncture Strength	ASTM D4833	180 lb

- d. Separator Geotextile: Non-woven, needle punched; polyester or polypropylene; continuous filament or staple fibers; conforming to the following properties:

PROPERTY	TEST METHOD	MINIMUM REQUIRED VALUE
Unit Weight	ASTM D5261	8 oz/sy
Grab Tensile Strength	ASTM D4632	210 lb
Elongation	ASTM D4632	50%
Puncture Strength	ASTM D4833	95 lb
Maximum Apparent Opening Size	ASTM D4751	#70 US Sieve
Permittivity	ASTM D4751	0.5 sec-1

- e. Roadbed Geotextile Fabric: The geotextile shall be composed of synthetic fibers formed into a woven fabric. Fibers used in the manufacture of the geotextile shall be polyolefins, polyesters or polyamides and conform to the following properties:

PROPERTY	TEST METHOD	MINIMUM REQUIRED VALUE
Grab Tensile	ASTM D4632	200 lb
Grab Elongation	ASTM D4632	15%
Puncture Strength	ASTM D4833	100 lb
Trapezoidal Tear	ASTM D4533	75

UV Resistance	ASTM D4355 or D7238	90%

B. Thread:

1. High-strength polyester, nylon, or other approved thread type.
2. Equivalent chemical compatibility and ultraviolet light stability as the geotextile.
3. Contrasting color with the geotextile.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Construct the surface underlying the geotextiles smooth and free of ruts or protrusions which could damage the geotextiles.

3.2 INSTALLATION

- A. Install geotextiles in accordance with manufacturer's written recommendations.
- B. Hand place geotextile.
1. No equipment will be permitted to traffic in direct contact with the geotextile.
- C. Lay geotextile smooth so as to be free of tensile stresses, folds, and wrinkles.
- D. Seam Construction:
1. Broom clean existing geotextile and cut off to provide a clean area for seaming with the new geotextile.
 2. Sew seams continuously using an SSA flat seam with one (1) row of a two-thread 401 chain stitch unless otherwise recommended by the manufacturer.
 3. Minimum distance from the geotextile edge to the stitch line nearest to that edge: 2 IN unless otherwise recommended by the manufacturer.
 4. Tie off thread at the end of each seam to prevent unraveling.
 5. Construct seams on the top side of the geotextile to allow inspection.
 6. Sew skipped stitches or discontinuities with an extra line of stitching with 18 IN of overlap.
 7. Overlap adjacent panels a minimum of 6 IN or in accordance with the manufacturer's recommendations or as shown on the Drawings.
 - a. Construct overlapped seams in accordance with manufacturer's recommendations or as shown on Drawings.
- E. Heat tack the geotextile overlaps as shown on the Drawings.
- F. Backfill anchor trenches in accordance with Specification Section 31 23 00.
- G. Place cover soil in accordance with Specification Section 31 23 00.
- H. Protect geotextiles from clogging, tears, and other damage during installation.
- I. Geotextile Repair:
1. Place a patch of the same type of geotextile which extends a minimum of 12 IN beyond the edge of the damage or defect.
 2. Fasten patches continuously using a sewn seam or other approved method.
 3. Align machine direction of the patch with the machine direction of the geotextile being repaired.
 4. Replace geotextile which cannot be repaired.
- J. Use adequate ballast (e.g., sand bags) to prevent uplift by wind.
- K. Do not use staples or pins to hold the geotextile in place.

- L. Except on gravel columns, any geotextile left exposed for more than 14 days shall be replaced unless approved by the Engineer.

END OF SECTION

This page intentionally left blank.

SECTION 31 37 00

RIPRAP

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dry riprap.
2. Subgrade preparation.
3. Aggregate material underlying the riprap armor stone.
4. Appurtenant Work.

B. Related Requirements: Include, but are not necessarily limited to:

1. Section 31 23 00 - Earthwork.

1.2 PRICE AND PAYMENT PROCEDURES

A. Measurement and Payment:

1. Riprap Work is part of the lump sum bid/pay item indicated on the Bid Form, and part of the Contract, and in Section 01 22 00 - Measurement and Payment.
2. Measurement of riprap Work for payment will be in accordance with Section 01 29 73 - Schedule of Values and other relevant provisions of the Contract Documents.

1.3 REFERENCES

A. Terminology:

1. The following terms are not defined and are not indicated with initial capital letters but, when used in this Section, have the following meaning:
 - a. "Borrow" means riprap material required in excess of quantity available from appropriate sources at the Site. Borrow may be necessary even though not otherwise expressly required by the Contract Documents. No representation is made that any material existing at the Site prior to construction is suitable for use in the riprap Work.
 - b. "Riprap" means materials and Work required by this Section, regardless of whether the word "riprap" is followed by the word "Work". The terms "riprap", "rip-rap", "rip rap", rock slope protection, and "stone revetment" refer to the complete layered system of riprap (including aggregate filter, bedding stone, and geotextile fabric as required), and are derivative terms that have the same meaning. Related terms include:
 - 1) "Aggregate Filter" means the granular material (aggregate) that may be required underneath riprap armor stone to prevent finer material from the subgrade from passing into or through the riprap armor stone.
 - 2) "Bedding Stone" means the granular material (aggregate) used to protect underlying geotextile separation fabric from damage resulting from placing riprap armor stone.
 - 3) "Dry riprap" means riprap where joints or gaps between riprap armor stone are not filled with any type of grout. Dry riprap shall consist of a fitted layer of shaped and graded riprap armor stone.
 - 4) "Grouted riprap" means riprap, generally similar to dry riprap, where the joints or gaps between riprap armor stone are filled or stabilized with cementitious grout.
 - 5) "Riprap armor stone" means the individual stones or rock that comprise surficial protective barrier for shoreline or other marine structure or surface.
 - c. "Subgrade" means the uppermost surface of native soil material unmoved from cuts; the material on which riprap will be installed.

B. Reference Standards: Standards referenced in this section include, but are not necessarily limited to, the following:

1. ASTM International (ASTM):

- a. D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- b. D3744/D3744M - Standard Test Method for Aggregate Durability Index.
- c. D5312/D5312M - Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions.
- d. D5313/D5313M - Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions.
- e. D5519-15 - Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials.
- f. D6473 - Standard Test Method for Specific Gravity and Absorption of Rock for Erosion Control.
- g. D6913 - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
- h. E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Contractor's Testing Laboratory:

- a. Retain the services of independent testing laboratory to perform testing and determine compliance with the Contract Documents of materials specified in this Section, unless this Section expressly allows the Contractor to escape this obligation. Requirements for escaping this obligation, if any, are part of this "Qualifications" provision.
- b. When Contractor is required by this Section's "Field Quality Control" Article, or elsewhere in the Contract Documents, to retain testing laboratory for tests required under this Section's "Field Quality Control" Article, retain one testing laboratory for quality assurance testing and field quality control testing.
- c. Testing laboratory shall possess current, valid accreditation in accordance with ASTM D3740, for tests required for quality assurance testing indicated in this Article and field quality control testing indicated to be Contractor's responsibility.
- d. Testing laboratory shall comply with ASTM E329.
- e. Testing laboratory shall be experienced in the types of testing required.
- f. Selection of testing laboratory is subject to Engineer's acceptance. Upon Engineer's request, submit qualifications statement for testing laboratory, including name of entity, location, copies of applicable certifications, and summary of entity's experience.

B. Quality Assurance Testing:

- 1. Quality assurance testing, which may also be regarded as source quality control testing, is in addition to field quality control testing required by this Section's "Field Quality Control" Article.
- 2. Materials used in the Work may require testing and retesting, as directed by Engineer, during the Project. Allow free access to onsite material stockpiles, borrow sources, and other sources of riprap materials at all times. Tests not specifically indicated to be performed at Owner's expense, including retesting of defective materials and defective Work, shall be at Contractor's cost.
- 3. Contractor's Testing Laboratory Scope:
 - a. Obtain samples and perform testing of proposed riprap materials at sources of supply (unless otherwise allowed by Engineer), to provide assurance that the Work will comply with the Contract Documents.

- b. Submit to Engineer, via Contractor, written results of each test.
- 4. Required Quality Assurance Material Testing by Contractor's Testing Laboratory:
 - a. Perform the following quality assurance tests on materials to be incorporated into the Work. Submit results of such tests to Engineer and obtain Engineer's acceptance thereof prior to incorporating the subject materials into the Work.
 - b. Gradation of Aggregate Underlying Riprap Armor Stone: Gradation in accordance with ASTM D6913. Perform one test for every 1,000 cubic yards of each material to be incorporated into the riprap Work.
 - c. Gradation of Riprap Armor Stone: Perform and submit results of gradation analysis in accordance with ASTM D5519, for riprap armor stone Sample size of not less than 20 times the size of largest riprap armor stone, unless smaller sample size is acceptable to Engineer. Required field Samples shall be consistent with submitted gradation test results.
 - d. Perform riprap material quality assurance testing to determine average apparent saturated surface dry specific gravity when one or more of the following apply:
 - 1) For not less than every 20,000 cubic yards of riprap armor stone; or
 - 2) When location from which materials are obtained changes; or
 - 3) When geologic characteristics of materials change.Requirements for determining quality of riprap armor stone are set fourth in the provision below.
- 5. Riprap material quality shall be evaluated using one of the following two methods:
 - a. Rock Properties:
 - 1) Submit source rock test results completed on rock representative of the material proposed for the Project. Test results will be considered by Engineer when tests for results submitted were performed within five years of the Effective Date of the Contract and samples tested are representative of the source rock proposed for riprap armor stone.
 - 2) Submit test results for alternative source rock when riprap armor stone will be obtained from a location different from that represented by initial test results submitted, or when visual appearance of source rock changes.
 - b. Testing Requirements for Riprap Armor Stone are as follows:
 - 1) Specific Gravity of not less than 2.5 in accordance with ASTM D6473.
 - 2) Wetting-drying test results shall indicate not greater than one percent loss to be acceptable. Wetting-drying testing shall be in accordance with ASTM D5313/D5313M.
 - 3) Freeze-thaw test result shall indicate not greater than five percent loss to be acceptable. Freeze-thaw testing shall be in accordance with ASTM D5312/D5312M.
 - c. Ability of Rock to Perform Based on Previous Reference Project:
 - 1) Contractor may propose providing riprap armor stone from a source with documented record of acceptable performance for comparable applications and exposure conditions as those to which the riprap Work will be subjected. When requesting approval of riprap armor stone using this quality assurance approach, submit the following information to Engineer:
 - a) Record drawings for a prior, completed project where riprap has been in place not less than 20 years prior to [the Effective Date of the Contract] [indicate other milestone or event].
 - b) Documentation of source of riprap armor stone material for the same, prior completed project for which record drawings are submitted.
 - c) Documentation, including still photographs obtained not more than six 18 months prior to Contractor's initial riprap Submittal for the Project. Submit photographs in sufficient quantity to properly document current condition of

such material. Photographs shall comply with requirements of Section 01 32 33 - Project Photographic Documentation, including requirements for indication of location of each image.

- d) Available material testing data for same qualities for which quality assurance testing is otherwise required in this Article.
 - e) Maintenance records for riprap installed for the same, prior completed project for which record drawings are submitted. Unless otherwise allowed by Engineer, maintenance records should include written documentation on the number and frequency of riprap inspections performed following installation, and number and frequency of riprap maintenance activities such as replenishment (e.g., adding riprap to replace rock that has washed away, broken down, or become degraded by any means).
 - f) Photographs, taken since the Effective Date of the Contract, of riprap installation for the same, prior completed project for which record drawings are submitted. Submit not less than eight photographs, including representative closeup and medium-distance images, in accordance with Section 01 32 33 - Project Photographic Documentation. Such photographs are not part of the quantities of still photographs required under Section 01 32 33.
 - g) Contact information for owner of the subject project, including contact person name (who must be current employee of such owner), entity name, complete mailing address, current office telephone number, and current email address. Contact person indicated shall be current employee of such owner, and shall be familiar with maintenance operations and conditions of the subject, existing riprap.
- 2) Engineer will review the submitted information and will endeavor to determine whether the in-place existing, installed riprap armor stone was subjected to conditions expected for the riprap to be provided as part of the Work, and whether the riprap armor stone performed satisfactorily as determined by the owner of existing riprap and Engineer.
 - 3) In the Project's Schedule of Submittals, allow not less than 60 days, after complete, adequate information is received by Engineer, for Engineer's review, including potential visit to the site of the subject, existing, installed riprap.
 - 4) Engineer has sole discretion to determine whether information furnished concerning the riprap reference location is acceptable, and whether such material would be acceptable for use in the Work. If the submitted information or existing riprap armor stone is unacceptable, as deemed solely by Engineer, Contractor will be ineligible for change in the Contract Price and the Contract Times for additional costs and delays, if any, incurred resulting from Engineer's decision.

C. Field Samples:

- 1. Provide the following field Samples of riprap armor stone and aggregate materials (if any) underlying riprap armor stone:
 - a. Provide representative Samples, indicating range of required gradation, acceptable material quality, and colors, [both] [at the material source] [and] at the Site adjacent to riprap material stockpiles.
 - b. Representative gradation Samples shall be sufficient to demonstrate compliance with required gradation. Contractor and Supplier shall use ASTM D5519 Test Method A or B to determine gradation of riprap armor stone, and ASTM D6913 to determine gradation of other aggregate materials. Sample size of riprap armor stone shall be not less than 20 times largest individual stone of required gradation, unless smaller Sample size is acceptable to Engineer. Sample size of other aggregate materials shall be not less than [one] cubic yard.
 - c. Clearly label each Sample with temporary signage appropriate for outdoor exposure, of sufficient size. Temporary signage for field Samples at borrow sources shall clearly identify Owner and Project designation.

- d. Maintain Samples until Substantial Completion, unless Engineer authorizes earlier removal of Samples, in writing.
2. Representative field Samples may be incorporated into the Work upon Engineer's concurrence.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:

- a. Riprap Armor Stone: Name and address of riprap material Supplier, source of materials, Supplier's published description of material, Supplier's certification that materials are sufficiently free of Constituents of Concern so that a Hazardous Environmental Condition will not be created or exacerbated, certification of material's compliance with the associated state department of transportation standard specifications, and certification of material's compliance with requirements of the Contract Documents, including gradation and material quality, as applicable.
- b. Aggregate Layer Underlying Riprap Armor Stone: Supplier's description of aggregate materials, including name and address of Supplier, source of materials, certification of material's compliance with applicable reference standards indicated in this Section, the associated state department of transportation standard specifications, and other requirements of this Section, such as gradation, sizing, and material quality, as applicable.

B. Informational Submittals: Submit the following:

1. Results of Field Surveys for Measurement for Payment:

- a. Submit results of field surveys, required for measurement for payment, indicated in the "Price and Payment Procedures" Article of this Section, including pre-construction measurements, interim measurements, and measurements upon completion of riprap Work. Submit within time limits indicated in the "Price and Payment Procedures" Article of this Section.

2. Quality Assurance Test Results Submittals:

- a. Submit results of quality assurance testing performed in accordance with this Section's "Quality Assurance" Article, unless included as part of another submittal under this Section. Submit results of tests on materials from onsite and borrow sources.
- b. When this Section's "Quality Assurance Testing" provision allows submittal of alternative documentation of riprap quality based on a prior, reference project, submit such information together with other, required quality assurance testing results.

3. Field Quality Control Submittals:

- a. Submit results of testing and inspection performed in accordance with the "Field Quality Control" Article in Part 3 of this Section.
- b. Submit results of gradation analysis required upon delivery of material to the Site, in accordance with the "Delivery, Storage, and Handling" Article of this Section.

4. Qualifications Statements:

- a. Quality assurance testing laboratory, when requested by Engineer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:

1. Rip-rap from approved off-site sources shall be furnished together with delivery tickets, indicating Supplier's name, Supplier's location where material was obtained or produced, date, stockpile number, state department of transportation standard specifications item designation, and other delivery ticket information required by the associated state department of transportation.

2. Arriving loads of riprap armor stone and aggregate layer underlying riprap armor stone] that are not reasonably similar to field Samples, based on visual observation of Engineer, may be rejected by Engineer.
 3. Contractor may arrange, pay for, and perform gradation measurements of riprap material rejected by Engineer. If Contractor's analysis proves rejected stone complies with the Contract Documents and Contractor has furnished results of such analysis to Engineer as a Submittal, then a Change Order [or contingency allowance authorization] will be issued to compensate Contractor for cost of gradation analysis. Contractor will not be eligible for a change in the Contract Times because of Engineer's good-faith rejection of apparently non-conforming materials.
 4. Representative gradation Samples shall be sufficient to demonstrate compliance with required gradation. Contractor shall use ASTM D5519 Test Method A or B to determine gradation. Sample size shall be not less than 20 times largest individual stone of required gradation, unless smaller Sample size is acceptable to Engineer.
- B. Storage and Handling Requirements:
1. Locations where stockpiles will be established shall have compacted surface of not less than six-inches of sand-clay-gravel or crushed stone.
 2. Riprap material that becomes contaminated with soil materials, fine particles, or debris is unacceptable unless the contaminating material is removed from riprap materials prior to installation.
 3. Riprap armor stone stockpiles shall be not more than 12 feet high and shall be constructed and maintained so that stones are stable and will not dislodge unless being moved by Contractor.
 4. Riprap transport, handling, and installation shall not result in breakage of stones or segregation of riprap gradation.
 5. Do not drop riprap armor stone from height greater than one foot.
 6. Do not employ chutes or similar items in handling and installing riprap armor stone, or aggregate layer materials underlying riprap armor stone.

PART 2 - PRODUCTS

2.1 RIPRAP STONE

- A. Description:
1. Provide riprap at the locations shown or indicated on the Drawings, and as may be shown or indicated elsewhere in the Contract Documents, for protection of banks of surface waters, channels, support piers, and marine structures as shown or indicated.
 2. Riprap Work includes providing aggregate layers underlying riprap armor stone and geotextile separation fabric at the locations shown or indicated.
 3. Furnished riprap armor stone gradation shall be produced at the material source and shall not be produced by supplementing and mixing at the Site.
- B. Riprap Armor Stone:
1. Material:
 - a. Riprap shall be durable, angular, quarry stone, shaped as nearly as practicable in the form of right rectangular prisms.
 - b. Material shall be resistant to weathering. Cracks, non-mineralized defects, shale, unsound sandstone, or organic material in riprap armor stone are unacceptable.
 - c. Neither width nor thickness of any stone shall be less than one-third of stone's length.

2.2 ACCESSORIES

- A. Geotextile Separation Fabric:

1. Provide required geotextile separation fabric directly below aggregate layer underlying riprap armor stone for all riprap Work.
- B. Aggregate Layer Underlying Riprap Armor Stone:
 1. Bedding Stone:
 - a. Provide required bedding stone directly below riprap armor stone for all riprap Work.
 - b. Materials: Riprap bedding stone shall be crushed stone and gravel, free of: rock or gravel larger than one-inch in any dimension, debris, waste, frozen materials, organic material and other deleterious matter.
 2. Aggregate Filter Material:
 - a. Material shall be tough, durable particles free of organic matter, soft material, and friable particles.
 - b. Material shall weigh not less than 135 pounds per cubic foot (saturated surface dry).

2.3 SOURCE QUALITY CONTROL

- A. Tests and Inspections at Source of Supply:
 1. Perform quality assurance testing, and submit results to Engineer, in accordance with the "Quality Assurance" Article in "Part 1 – General" of this Section.
 2. Quality of riprap armor stone shall be determined at the material source. Stone with coloration or appearance dissimilar to field Samples will be rejected.
 3. Approval of riprap materials from a particular source does not constitute approval of all material that may potentially be obtained from such source. Engineer reserves the right to reject materials from localized areas, zones, strata, and other areas when such materials are deemed by Engineer to not be representative of acceptable field Samples or appears to be defective. Nothing in this Section, however, regardless of whether Engineer exercises Engineer's right to observe materials, the Work, or verify compliance with gradation and material quality requirements, is for Contractor's benefit. Contractor remains fully responsible for providing the Work in accordance with the Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 1. Provide Engineer with sufficient notice and with means to examine areas and conditions under which riprap Work will be performed. Engineer will advise Contractor in writing when Engineer is aware of conditions that may be detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.
 2. This Article, however, in no way modifies or reduces Contractor's sole responsibility for complying with the Contract Documents, for construction means, methods, procedures, techniques, and sequences, and for the safety and protection measures incident thereto.
 3. Nothing in this Article, including action by Engineer or Resident Project Representative (if any) , is for benefit of Contractor.
- B. Installing the Work constitutes Contractor's approval of underlying work, subgrades, and field conditions prevailing at the time of the Work.

3.2 PREPARATION

- A. Excavation and Subgrade Preparation:
 1. Advise Engineer, in writing, not less than five days in advance, of date when Contractor will commence performing riprap Work.
 2. Provide temporary erosion and sediment controls in accordance with Section 01 57 05 - Temporary Controls.
 3. Perform excavation and filling Work, including compaction of subgrades, in accordance with Section 31 20 00 - Earthwork.

4. Subgrade Preparation for Riprap:
 - a. Provide subgrade elevations shown or indicated in the Contract Documents, within the following tolerances:
 - 1) For areas where installed riprap will not be subjected to immersion, and areas of immersion where installation location will be subjected to temporary dewatering during construction: As indicated in Section 31 20 00 - Earthwork
 - 2) For areas where installed riprap will be, or may reasonably be, subjected to immersion and where installation location will not be subject to temporary dewatering during construction: Within 0.3 vertical feet of required elevation.
 - b. At Contractor's option, Contractor may increase the thickness of riprap armor stone provided in lieu of adding fill to subgrade. Such modifications, if any, shall be approved in advance by Engineer via issuance of a Field Order.
 - c. Furnish to Engineer oral or written advisory that subgrade preparation is complete and allow Engineer not less than 24 hours to visit the Site to observe subgrade conditions. Do not proceed with riprap installation until defects are remedied.

3.3 INSTALLATION

A. Installation Requirements:

1. Comply with this Section's "Field Quality Control" Article regarding Engineer's observations required prior to installing subsequent layers of riprap Work.
2. Installation of geotextile separation fabric (if any), aggregate material (if any), underlying riprap armor stone, or riprap armor stone material, on frozen material, ice, or snow is unacceptable.
3. Geotextile Separation Fabric:
 - a. Install geotextile separation fabric in accordance with Section 31 32 19.16 - Geotextile Soil Stabilization, unless otherwise required in this Section or elsewhere in the Contract Documents.
 - b. Ends of geotextile separation fabric shall be buried.
 - c. Secure geotextile separation fabric by providing pins or weights to prevent displacement prior to or during riprap material installation.
 - d. Install geotextile separation fabric only after observation of prepared subgrade by Engineer or Resident Project Representative, if any.
4. Bedding Stone for Riprap:
 - a. Install bedding stone following observation of geotextile separation fabric installation by Engineer or Resident Project Representative, if any, and Engineer's concurrence that bedding stone installation may proceed.
 - b. Install bedding stone in accordance with Section 31 23 00 - Earthwork unless otherwise required in this Section or elsewhere in the Contract Documents.
 - c. Compaction of installed bedding stone is not required.
 - d. Promptly install subsequent materials on installed bedding stone. Contractor is solely responsible for loss, damage, and remedy of bedding stone prior to installation of riprap armor stone.
5. Aggregate Filter Material:
 - a. Install aggregate filter material following observation of subgrade installation by Engineer or Resident Project Representative, if any, and Engineer's concurrence that aggregate filter material installation may proceed.
 - b. Install aggregate filter material in accordance with Section 31 20 00 - Earthwork unless otherwise required in this Section or elsewhere in the Contract Documents. Installed aggregate filter material shall be in layer of uniform thickness unless expressly required otherwise by the Contract Documents.
 - c. Compaction of aggregate filter material is not required.

- d. Promptly install within three days of Engineer's or Resident Project Representative's (if any) observation and concurrence that installed aggregate filter materials appear acceptable,] subsequent materials on installed aggregate filter material. Contractor is solely responsible for loss, damage, and remedy of aggregate filter material prior to installation of riprap armor stone.
- 6. Riprap Armor Stone Installation:
 - a. Install riprap armor stone following observation of supporting materials' installation by Engineer or Resident Project Representative, if any, and Engineer's concurrence that riprap armor stone installation may proceed.
 - b. Install riprap armor stone on prepared surface in accordance with lines and grades shown or indicated in the Contract Documents.
 - c. Installation Tolerances for Riprap Armor Stone:
 - 1) For riprap installed in dry conditions: Not greater than 0.5 foot, above required top surface elevation as measured over an area of 200 square feet. No tolerance below required top surface elevation.
 - 2) For riprap installed in submerged or partially submerged conditions: Not greater than 0.5 foot, above required top surface elevation as measured over an area of 400 square feet. No tolerance below required top surface elevation.
 - 3) Top of riprap armor stone shall match adjoining grades, allowing positive drainage, especially for riprap installed at or above typical surface water level. Between tops of banks adjoining surface waters, installed riprap shall have smooth transitions that reduce the potential for flow turbulence.
 - d. Voids Between Riprap Armor Stones: Install riprap armor stone to produce a stable, homogenous mass with a minimum of voids between adjacent pieces of riprap armor stone. Rearranging individual riprap armor stones may be necessary or required to obtain suitable distribution of stone sizes. Fill spaces between stones with spalls of suitable size.
 - e. Riprap armor stone installation shall not result in the following: breakage of or damage to riprap armor stones, segregation of riprap armor stone by size, introduction of fine materials into riprap armor stone layer, or adverse effects on materials underlying riprap armor stone.
 - f. Install riprap armor stones so that weight of stone is carried by underlying material and not by adjacent stones.
 - g. When installing riprap armor stone on a slope, commence installing riprap armor stone at bottom of slope and continuously place stone evenly up to top of slope. On slopes, install largest stones at bottom of slope.
 - h. Install riprap armor stone to full thickness in a single operation.
 - i. Do not disturb, displace, or damage underlying material during installation of riprap armor stone.
 - j. Protect adjacent buildings and structures during riprap installation. Comply with Section 01 71 33 - Protection of the Work and Property.

3.4 FIELD QUALITY CONTROL

A. Field Tests and Inspections:

- 1. Furnish to Engineer oral or written advisory that riprap separating and supporting layers, where required, are complete and allow Engineer not less than 24 hours to visit the Site to observe such conditions. Engineer, if any, will observe installed geotextile separation fabric prior to installation of subsequent materials thereon. Do not install geotextile separation fabric, if any, or subsequent materials, prior to observation of conditions at the Site by Engineer or Resident Project Representative, if any. Do not proceed with riprap installation until defects are remedied.
- 2. If Engineer has reason to believe installed riprap does not comply with the Contract Documents and field Samples accepted by Engineer, then Engineer may elect to require

use of ASTM D5519 Test Method D to determine if installed riprap material complies with the Contract Documents. When Engineer exercises such right, such testing shall be performed by Contractor's independent testing laboratory, unless Engineer or Owner elects to retain the services of a different, independent testing laboratory.

3. Compliance with required locations of riprap, surface elevations of riprap armor stone, and quantities of riprap provided will be determined in accordance with the "Measurements Upon Completion of Riprap Work" provision of this Section's "Price and Payment Procedures" Article, and other measurements and determinations by Engineer.

B. Defective Work:

1. Manual manipulation or redistribution of riprap armor stones may be necessary to correct defects such as abrupt transitions, non-uniform distribution of stone sizes, isolated depressions, holes, isolated raised areas, unstable or non-interlocked stones, other surface anomalies, and other potential defects.

END OF SECTION

SECTION 32 15 40
CRUSHED STONE SURFACING

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish labor, materials, tools, equipment, and services for Crushed Stone Surfacing in accordance with provisions of Contract Documents.
- B. Completely coordinate with work of other trades.
- C. Related Sections include but are not necessarily limited to:
 - 1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 33 00 – Submittals.
 - 4. Section 31 23 00 – Earthwork.

1.2 QUALITY ASSURANCE

- A. Construction Quality Assurance and Construction Quality Control (CQA/CQC) Plan.
- B. Reference Standards:
 - 1. ASTM:
 - a. D422, Standard Test method for Particle-Size Analysis.
 - b. D1557, Standard Test Methods for Laboratory Compaction of Soil Modified Effort.
 - c. D6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 - 2. North Carolina Department of Transportation, Standard Specifications for Roads and Structures, current edition.
 - 3. ASTM C117 Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
 - 4. ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 5. ASTM D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - 6. ASTM D4751 Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
 - 7. ASTM D6241 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.3 SUBMITTALS

- A. A. See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Certification that the proposed material conforms to the Specifications along with copies of the test results (from a qualified commercial testing laboratory).
- C. Test Reports:
 - 1. Narrative.
 - 2. Sieve analysis of crushed stone per ASTM D422 (1 test/source or change in material).
 - 3. Compaction test of crushed stone per ASTM D1557 (1 test/source or change in material)

PART 2 - PRODUCTS

2.1 MATERIAL

A. Crushed Stone:

1. Material shall be ABC stone as provided in accordance with Section 1010 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures.

B. Geotextile Filter Fabric:

1. Base: Mirafi 140 N.
2. Nonwoven polypropylene.
3. CBR Puncture: 310 pound.
4. Apparent opening size: US Sieve 70.
5. Water flow rate: 110 gal/min/sf.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. Construct aggregate course to grade, thickness, and typical section as indicated on drawings. Existing subgrade upon which aggregate course is to be placed shall be compacted in accordance with Section 31 23 00.
- B. Aggregate course shall be constructed in accordance with Section 520 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures, unless indicated otherwise on plans or specifications.
- C. Verify that subgrades have been removed, recompact, and rough graded to lines and grades to within 0.10 feet plus/minus to accept crushed stone surfacing. Compact sub-base to 95% Standard Proctor Density.
- D. Install flush edging or curbs to the lines and grades and in the locations shown on the Drawings.
- E. Thoroughly clean sub-base of debris, loose dirt and other extraneous materials before installing filter fabric or crushed stone. Do not install crushed stone when sub-base is wet or muddy.

3.2 COMPACTION

- A. Compact by vibrating or other approved methods to 95 percent maximum dry density as determined by ASTM D1557.
- B. Any irregularities in the surface shall be corrected by scarifying, remixing, reshaping and recompact until a smooth surface is secure.

3.3 FIELD QUALITY CONTROL AND QUALITY ASSURANCE

- A. The crushed stone will be tested for density at a minimum average frequency of 1 test/200 LF of roadway per ASTM D6938 or alternate method approved by CQA Engineer.
- B. The crushed stone will be tested for gradation at a minimum average frequency of 1 test/500 CY of material delivered.
- C. The crushed stone will be tested for depth at a minimum average frequency of 1 test/200 LF of roadway.
- D. Perform laboratory compaction of crushed stone per ASTM D1557 at a minimum frequency of 1 test/change in material if pre-construction test submittals are not representative of materials delivered.

3.4 CLEAN-UP

- A. Keep areas of work clean, neat and orderly.
- B. Clean up and remove debris from the work area prior to Final Acceptance.

END OF SECTION

This page intentionally left blank.

SECTION 32 91 13
TOPSOILING AND FINISHED GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Topsoiling and finished grading.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Procurement and Contracting Requirements.
 - 2. Division 01 – General Requirements.
 - 3. Section 31 23 00 - Earthwork.
- C. Location of Work: All areas within limits of grading and all areas outside limits of grading which are disturbed in the course of the work.

1.2 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Project Data: Test reports for furnished topsoil.

1.3 SITE CONDITIONS

- A. Verify amount of topsoil stockpiled and determine amount of additional topsoil, if necessary to complete work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil:
 - 1. Original surface soil typical of the area.
 - 2. Friable, loamy soil capable of supporting native plant growth.

2.2 TOLERANCES

- A. Finish Grading Tolerance: ± 0.1 FT from required elevations.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Correct, adjust and/or repair rough graded areas.
 - 1. Cut off mounds and ridges.
 - 2. Fill gullies and depressions.
 - 3. Perform other necessary repairs.
 - 4. Bring all sub-grades to specified contours, even and properly compacted.
- B. Loosen surface to depth of 2 IN, minimum.
- C. Remove all stones and debris over 2 IN in any dimension.

3.2 PLACING TOPSOIL

- A. Do not place when subgrade is wet or frozen enough to cause clodding.

- B. Spread and lightly compact to a depth as indicated on the Drawings for all disturbed earth areas.
- C. If topsoil stockpiled is less than amount required for work, furnish additional topsoil from off-site at cost in Bid Schedule.
- D. Provide finished surface free of stones, sticks, or other material 3/8 IN or more in any dimension.
- E. Provide finished surface smooth and true to required grades.
- F. Restore stockpile area to condition of rest of finished work.

3.3 ACCEPTANCE

- A. Upon completion of topsoiling, obtain Engineer's acceptance of grade and surface.
 - 1. Material for Protective cover can be accepted for use as topsoil if it is deemed suitable for supportive vegetative growth. Protective cover would need to meet the testing requirements for the topsoil to ensure proper application of lime and fertilizer. As-built survey for topsoiling would follow Protective Cover requirements.
- B. Make test holes where directed to verify proper placement and thickness of topsoil.

END OF SECTION

SECTION 32 92 00
SEEDING, SODDING AND LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Seeding, sodding and landscape planting:
 - a. Soil preparation.
 - b. Lawn-type seeding.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 32 91 13 – Topsoil and Finished Grading.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Nursery and Landscape Association/American National Standards Institute (ANLA/ANSI):
 - a. Z60.1, American Standard for Nursery Stock.
 - 2. AOAC International (AOAC).
 - 3. ASTM International (ASTM):
 - a. D2028, Standard Specification for Cutback Asphalt (Rapid-Curing Type).
 - b. D5276, Standard Test Method for Drop Test of Loaded Containers by Free Fall.
- B. Quality Control:
 - 1. Fertilizer:
 - a. If Engineer determines fertilizer requires sampling and testing to verify quality, testing will be done at Contractor's expense, in accordance with current methods of the AOAC.
 - b. Upon completion of Project, a final check of total quantities of fertilizer used will be made against total area seeded.
 - c. If minimum rates of application have not been met, Contractor will be required to distribute additional quantities to make up minimum application specified.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Layout drawings:
 - a. Scaled site plan (scale 1 inch = 20 feet or equal to scale of Project site plan Drawing) on reproducible Drawing to show:
 - 1) Limits of seeded, sodded, and mulched areas.
 - 2) Locations of erosion control blankets and turf reinforcement matting
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Signed copies of vendor's statement for seed mixture required, stating botanical and common name, place of origin, strain, percentage of purity, percentage of germination, and amount of Pure Live Seed (PLS) per bag.
 - d. Listing of type of cover crop to be used and rates and procedures for planting Type of herbicide to be used during first growing season to contain annual weeds and application rate.

3. Certification that each container of seed delivered will be labeled in accordance with Federal and State Seed Laws and equals or exceeds Specification requirements.
 4. Test reports.
- B. Informational Submittals:
1. Copies of invoices for fertilizer used on Project showing grade furnished, along with certification of quality and warranty.
- C. Furnish seed in sealed standard containers labeled with producer's name and seed analysis.
1. Remove from the site seed which has become wet, moldy, or otherwise damaged in transit.
- D. Furnish fertilizer uniform in composition, free flowing and suitable for application with approved equipment, delivered to site in bags or other containers, each fully labeled and bearing the name, and warranty of the producer.

1.4 SEQUENCING AND SCHEDULING

- A. Installation Schedule:
1. Provide schedule showing when trees, shrubs, groundcovers and other plant materials are anticipated to be planted.
 2. Show schedule of when lawn type and other grass areas are anticipated to be planted.
 3. Indicate planting schedules in relation to schedule for irrigation system installation, finish grading and topsoiling.
 4. Indicate anticipated dates Engineer will be required to review installation for initial acceptance and final acceptance.
- B. Pre-installation Meeting:
1. Meet with Engineer and other parties as necessary to discuss schedule and methods, unless otherwise indicated by Engineer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND SUPPLIERS

- A. Subject to compliance with the Contract Documents, the manufacturers and suppliers listed in the applicable Articles below are acceptable.

2.2 MATERIALS

- A. Seed Quality:
1. Fresh, clean, new-crop seed labeled in accordance with USDA Rules and Regulations under the Federal Seed Act in effect on date of bidding.
 2. Provide seed of species, proportions, and minimum percentages of purity, germination and maximum percentage of weed seed as specified.
 3. Approval of all seed for use shall be based on the accumulative total of PLS specified for each phase of work.
- B. Temporary Seeding:

Seeding Period	Seeding Mixture/Species	Application Rate (lb/AC)	Comments
January 1 st – May 1 st	Rye (grain)	120	1. Omit Kobe Lespedeza when duration of temporary cover is not to extend beyond June. 2. Apply 4,000 lb/Ac straw
	Kobe Lespedeza (scarified)	50	
May 1 st – August 15 th	German millet	40	1. Apply 4,000 lb/Ac straw

August 15 th – December 30 th	Rye (grain)	120	1. Topdress with 50lb/Ac of Nitrogen in March. If necessary to extend temporary cover beyond June 15th, overseed with 50 lb/AC Kobe Lespedeza in late February or early March 2. Apply 4,000 lb/Ac straw

C. Permanent Seeding

Seeding Period	Seeding Mixture/Species	Application Rate (lb/AC)	Comments
September 1 st – April 15 th	Tall Fescue	100	1. After August 15 use unscarified sericea seed 2. Between May 15 and August 15, add 10 lbs/Ac German Millet 3. Prior to April 15 and after August 15, add 40 lbs/Ac Rye
	Sericea Lespedeza (scarified)	15	

D. Soil Amendments:

1. Follow recommendations for soil tests or apply 2,000 lb/AC ground agricultural limestone and 750 lb/Ac 10-10-10 fertilizer.

E. Asphalt Binder: Emulsified asphalt per State specifications.

F. Water:

1. Water free from substances harmful to grass or sod growth.
2. Provide water from source approved prior to use.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

A. General:

1. Limit preparation to areas which will be planted soon after.
2. Provide facilities to protect and safeguard all persons on or about premises.
3. Protect existing trees designated to remain.
4. Verify location and existence of all underground utilities.
 - a. Take necessary precaution to protect existing utilities from damage due to construction activity.
 - b. Repair all damages to utility items at sole expense.
5. Provide facilities such as protective fences and/or watchmen to protect work from vandalism.
 - a. Contractor to be responsible for vandalism until acceptance of work in whole or in part.

B. Preparation for Lawn-Type Seeding, Sprigging, Plugging or Sodding:

1. Loosen surface to minimum depth of 4 inches.
2. Remove stones over 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter.
3. Prior to applying fertilizer, loosen areas to be seeded with a double disc or other suitable device if the soil has become hard or compacted.
4. Correct any surface irregularities in order to prevent pocket or low areas which will allow water to stand.

5. Distribute fertilizer uniformly over areas to be seeded:
6. Incorporate fertilizer into soil to a depth of at least 2 inches by disking, harrowing, or other approved methods.
7. Remove stones or other substances from surface which will interfere with turf development or subsequent mowing operations.
8. Grade lawn areas to a smooth, even surface with a loose, uniformly fine texture.
 - a. Roll and rake, remove ridges and fill depressions, as required to meet finish grades.
 - b. Limit fine grading to areas which can be planted soon after preparation.
9. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and before planting.

3.2 INSTALLATION

A. Lawn-Type and Pasture Seeding:

1. Do not use seed which is wet, moldy, or otherwise damaged.
2. Perform seeding work from April 20 to May 15 for spring planting, and August 1 to September 15 for fall planting, unless otherwise approved by Engineer.
3. Employ satisfactory methods of sowing using mechanical power-driven drills or seeders, or mechanical hand seeders, or other approved equipment.
4. Distribute seed evenly over entire area at rate of application not less than 4 pounds (PLS) of seed per 1000 square feet, 50% sown in one direction, remainder at right angles to first sowing.
5. Stop work when work extends beyond most favorable planting season for species designated, or when satisfactory results cannot be obtained because of drought, high winds excessive moisture, or other factors.
 - a. Resume work only when favorable conditions develop.
6. Lightly rake seed into soil followed by light rolling or cultipacking.
7. Immediately protect seeded areas against erosion by mulching.
 - a. Spread mulch in continuous blanket using 1-1/2 tons per acre to a depth of 4 or 5 straws.
8. Protect seeded slopes against erosion with erosion netting or other methods approved by Engineer.
 - a. Protect seeded areas against traffic or other use by erecting barricades and placing warning signs.
9. Immediately following spreading mulch, anchor mulch using a rolling coulter or a wheatland land packer having wheels with V-shaped edges to force mulch into soil surface or apply evenly distributed emulsified asphalt at rate of 10-13 GAL/1000 square feet.
 - a. SS-1 emulsion in accordance with ASTM D5276 or RC-1 cutback asphalt in accordance with ASTM D2028 are acceptable.
 - b. If mulch and asphalt are applied in one treatment, use SS-1 emulsion with penetration test range between 150-200.
 - c. Use appropriate shields to protect adjacent site improvements.
10. If hydroseeding is used, machinery must be approved, modern, properly equipped and operated by an experienced operator.
 - a. Seed and fertilize at the rate specified.
 - b. Use appropriate shields to protect adjacent site improvements.

3.3 PLANTING TREES, SHRUBS, AND GROUND COVERS

A. Notification:

1. Notify Engineer of source of plants and plant materials at least 30 days prior to planting to permit Engineer's inspection of source qualifications.

B. Preparation:

1. Handle plants so that roots or balls are adequately protected from breakage of balls, from sun or drying winds.
 - a. Ensure tops or roots of plants are not permitted to dry out.
2. During transportation, protect materials from wind and sun to prevent tops and roots from drying out.
3. Protect tops of plants from damage.
 - a. Plants with damaged tops will be rejected.
4. For purpose of inspection and planting identification, attach durable, legible labels to bundle or container of plant material delivered at the planting site.
 - a. State correct plant name and size of each plant in weather-resistant ink on labels.
5. Do not prune trees and shrubs at nursery.

C. Planting Season:

1. Plant deciduous shade trees and shrubs any time the ground is suitable between October 15 and June 1.
2. Plant evergreen material between September 1 and June 1.
3. Plant ground covers between March 15 to June 1.

D. Planting Procedure:

1. Indicate locations of plants for approval by Engineer before excavating plant locations.
2. In event underground construction, utilities, obstructions, or rock are encountered in excavation of plantings, secure alternate locations from Engineer.
 - a. Make said changes without additional compensation.
 - b. Where tree locations fall under existing overhead wires, or crowd existing trees, adjust locations as directed by Engineer.
3. Excavate pits and beds as necessary and in accordance with ANLA/ANSI Z60.1.
 - a. Loosen bottom of pits prior to planting.
 - b. Excavation is unclassified, excavate all materials without additional cost.
4. Tree and shrub pits to be circular in shape with vertical sides at least 1 foot greater in diameter than ball diameter.
 - a. Pit to be of sufficient depth to provide 6 inches of planting soil under ball when set to natural grade.
5. Shrub and ground cover beds:
 - a. Plant shrubs used in mass plantings in individual holes of required size.
 - b. Strip all sod from among mass planting.
 - c. For ground cover beds, remove sod from within limits of bed.
 - d. Add soil amendments as specified and mix or rototill with existing topsoil to a depth of 6 inches.
6. Set plants straight or plumb, in locations when indicated and at such level that after settlement they bear same relationship to finished grade as they did in their former setting.
 - a. Carefully tamp planting soil under and around base of balls to prevent voids.
 - b. Remove burlap, rope and wires from top of balls.
 - c. Do not remove burlap from sides and bottom of balls.
7. Backfill plants with planting soil.
 - a. Tamp to 1/2 depth of pit and thoroughly water and puddle before bringing backfill to proper grade.
 - b. After planting has been completed, flood pit again so that backfill is thoroughly saturated and settled.

8. After planting is complete, form a level saucer 3 inches high around each tree extending to limit of plant pit for watering purposes.
9. Mulch plant pit after saucer has been shaped.
 - a. Mulch to limits of pit and uniformly over ground cover beds to a depth of 3 inches.
 - b. In mass plantings of shrubs, mulch entire area uniformly among shrubs to a depth of 3 inches.
 - c. If mulching is delayed and soil has dried out, water plants thoroughly before spreading mulch.
10. Staking: Stake trees immediately after planting as detailed on Drawings or in accordance with Nursery Standards.
11. Wrap deciduous trees 2 inches or more in caliper by neatly overlapping wrapping material between ground line and second branch.
 - a. Place ties at top and bottom of wrapping material and not more than 12 inches apart between top and bottom ties.
12. Remove dead or damaged branches.
 - a. Thin deciduous material to about two-thirds of initial branching.
 - b. Remove only dead or damaged branches from evergreens.
13. Water plants during planting operations.
 - a. Water each plant a minimum of once each week until final acceptance.
 - b. Apply sufficient water to moisten backfill about each plant so that moisture will extend into the surrounding soil.

3.4 MAINTENANCE AND REPLACEMENT

A. General:

1. Begin maintenance of planted areas immediately after each portion is planted and continue until final acceptance or for a specific time period as stated below, whichever is the longer.
2. Provide and maintain temporary piping, hoses, and watering equipment as required to convey water from water sources and to keep planted areas uniformly moist as required for proper growth.
3. Protection of new materials:
 - a. Provide barricades, coverings or other types of protection necessary to prevent damage to existing improvements indicated to remain.
 - b. Repair and pay for all damaged items.
4. Replace unacceptable materials with materials and methods identical to the original specifications unless otherwise approved by the Engineer.

B. Seeded or Sodded Lawns:

1. Maintain seeded lawns: 90 days, minimum, after installation and review of entire project area to be planted.
2. Maintenance period begins at completion of planting or installation of entire area to be seeded or sodded.
3. Engineer will review seeded or sodded lawn area after installation for initial acceptance.
4. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, and replanting as required to establish a smooth, uniform lawn, free of weeds and eroded or bare areas.
5. Lay out temporary lawn watering system and arrange watering schedule to avoid walking over muddy and newly seeded areas.
 - a. Use equipment and water to prevent puddling and water erosion and displacement of seed or mulch.
6. Mow lawns as soon as there is enough top growth to cut with mower set at recommended height for principal species planted.

- a. Repeat mowing as required to maintain height.
 - b. Do not delay mowing until grass blades bend over and become matted.
 - c. Do not mow when grass is wet.
 - d. Time initial and subsequent mowings as required to maintain a height of 1-1/2 to 2 inches.
 - e. Do not mow lower than 1-1/2 inches.
7. Remulch with new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose.
 - a. Anchor as required to prevent displacement.
8. Unacceptable plantings are those areas that do not meet the quality of the specified material, produce the specified results, or were not installed to the specified methods.
9. Replant bare areas using same materials specified.
10. Engineer will review final acceptability of installed areas at end of maintenance period.
11. Maintain repaired areas until remainder of maintenance period or approved by Engineer, whichever is the longer period.

END OF SECTION

This page intentionally left blank.

SECTION 33 05 15
PRECAST CONCRETE UTILITY STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Precast concrete utility structures, non-circular in plan, and appurtenant items.
 - a. Valve and meter vaults.
 - b. Drainage structures.
 - 2. Design and fabrication of precast concrete utility structures.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 - Procurement and Contracting Requirements.
 - 2. Division 01 - General Requirements.
 - 3. Section 31 23 00 - Earthwork.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C857, Standard Practice for Minimum Design Loading for Underground Precast Concrete Utility Structures.
 - b. C858, Standard Specification for Underground Precast Concrete Utility Structures.
 - c. C890, Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
 - d. C990, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
 - e. D1227, Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 2. Concrete mix design(s):
 - a. Certification in accordance with ASTM C858, Section 12.
 - 3. Fabrication and/or layout drawings:
 - a. Include detailed diagrams of utility structures showing typical components and dimensions, reinforcement, and other details.
 - b. Itemize, on separate schedule, elevations or sectional breakdown of each utility structure with all components and refer to drawing identification number or notation.
 - c. Indicate required penetration details for all piping entering each structure.
 - 4. Drawings and calculations: All Drawings, including layout drawings, certifications and calculations shall be sealed by a Professional Engineer registered in the state where the project is located.
 - a. Provide certification stating that calculations provided have been prepared specifically for this Project and that they match and pertain to the Shop Drawings provided.

- b. Provide a summary document as part of the above certification listing the design criteria used for precast design including:
 - 1) Codes and standards.
 - 2) Soil load.
 - 3) Exterior groundwater load.
 - 4) Live loads.
 - 5) Other loads.
- 5. Test Reports:
 - a. Copies of source quality control tests, including compressive strength and air content, for units provided.

1.4 SITE CONDITIONS

- A. Design groundwater elevation for precast structure design shall be the 100-year flood elevation shown on the Contract Documents.
 - 1. If the 100-year flood elevation is not shown on the Contract Documents, the design groundwater elevation shall be equal to the ground surface elevation at the structure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Premolded joint sealant:
 - a. NPC Bidco, Inc., C-56.
 - b. Ram-Nek, Henry Co.
 - c. EZ-Stik, Press-Seal Gasket Corp.
 - d. CS-102, Conseal.
 - 2. Elastomeric joint seals:
 - a. Kent Seal.
 - 3. External joint wrap.
 - a. NPC, Bidco, Inc.
 - b. EZ-Wrap, Press-Seal Gasket Corp.
 - c. RUBR-Nek, Henry Co.
 - 4. Emulsified fibrated asphalt compound:
 - a. Sonneborn Hydrocide 700B Semi-Mastic.

2.2 PRECAST UTILITY STRUCTURE COMPONENTS

- A. Provide utility structures with interior dimensions as shown on the Drawings.
- B. Provide the following components for each utility structure:
 - 1. Precast base section with integral or cast in place base slab.
 - 2. Precast wall section(s).
 - 3. Precast flat top.
 - a. Where reinforcement is shown for top slab, furnish slab with reinforcing as designed, but not less than reinforcing shown on Drawings.
- C. Provide openings and appurtenances as shown on Drawings.
- D. Concrete:
 - 1. Conform to requirements of ASTM C858.
 - a. Minimum 28-day compressive strength 4500 PSI.

- b. All portions of precast utility structure are considered to be exposed to freeze-thaw cycles.
- E. Joints:
 - 1. Joints of precast riser and top sections:
 - a. Preformed flexible joint sealants: ASTM C990.
 - b. Exterior joint wrap.
 - 2. Pipe and conduit entry for utility structures.
 - a. Resilient O-ring gaskets manufactured from natural or synthetic materials complying with ASTM C923, of suitable cross section and size to meet specified infiltration or exfiltration requirements.
- F. Coatings:
 - 1. Vertical wall surfaces:
 - a. Emulsified fibrated asphalt compound meeting ASTM D1227 Type I for all vertical wall exterior surfaces.

2.3 DESIGN

- A. General Design Requirements:
 - 1. Design precast units and appurtenances in accordance with ASTM C858.
 - a. Notify Engineer and furnish cast-in-place structures if sizes of precast utility structures shown on Drawings can not be designed or fabricated.
- B. Design loads:
 - 1. Design precast units for all loads and load cases described in ASTM C857, with the following values and selections:
 - a. Minimum uniform live load for exposed roof slabs shall be 150 PSF.
 - b. Wheel loads shall be considered.
 - 1) Use wheel load designation A-16 (HS20-44) as shown in ASTM C857, Table 1.
 - 2) Wheel loads and uniform live load do not act concurrently.
 - c. Unit weight of soil W shall be taken as no less than 115 LB/CUFT.
 - d. Minimum lateral soil pressure coefficient (K_0): 0.50.
- C. Specific Design Requirements:
 - 1. Out-of-plane shear:
 - a. Out-of-plane shear shall be shown in the calculations.
 - b. Wall thickness shall be determined based on meeting design requirements for out-of-plane shear resulting from soil and groundwater loads.
 - c. Wall sections shall be designed as one-way spans between corners for calculation of out-of-plane shear. Transfer of shear or bending load shall not be considered to be transferred across joints between precast units or between walls and slabs, unless unit as integrally cast together.
 - d. Use of shear steel reinforcement to increase out-of-plane shear capacity shall be prohibited.
 - 2. The distribution of moments in adjacent walls of different lengths in rectangular structures shall be considered.
 - 3. Design precast units taking into account reduced cross section at openings and penetrations.
 - 4. Structure shall be checked for buoyancy.
 - a. The minimum factor of safety for uplift with the design groundwater elevation shall be 1.25, unless a larger factor of safety is required by the local governing body or building code.

- b. The minimum factor of safety for uplift at the fully submerged condition shall be no less than 1.0.
- c. If the buoyant weight of soil above base slab extensions beyond the external dimensions of the structure is used to resist uplift, the volume of soil considered to resist uplift shall be limited to soil within the vertical projection of the edge of the base slab extensions.

PART 3 - EXECUTION

3.1 PRECAST UTILITY STRUCTURE CONSTRUCTION

A. General:

1. Prepare subgrade for base as required by Specification Section 31 23 00.
 - a. For precast base slabs, place and compact 6 IN of Granular Fill or Bedding Material as shown on Drawings.
 - b. For cast-in-place concrete base slabs, support base section and prepare bottom joint with preformed strip-type hydrophilic waterstop.
 - c. Confirm that base is level and fully supported by stable material.
 2. Ensure accurate vertical placement and leveling prior to placement of interior grout.
 - a. Provide vertical alignment tolerance of maximum 1 IN horizontal to 10 FT vertical.
- B. Build each structure to dimensions shown on plans and at such elevation that pipe sections built into wall of structure will be true line of pipe extensions.
- C. For all horizontal mating surfaces between precast concrete units, apply premolded flexible joint sealant to clean mating surfaces in accordance with sealant manufacturer's written instructions. Apply sufficient pressure to each concrete unit to seat unit in sealant.
- D. Seal all pipe penetrations in manhole.
1. Where post-installed seals are permitted, form pipe openings smooth and well shaped.
 2. After installation, seal exterior of penetration with non-shrink grout.
 3. After grout cures, wire brush smooth and apply two coats emulsified fibrated asphalt compound to minimum wet thickness of 1/8 IN to ensure complete seal.
- E. Set top slab level to elevation shown on Drawings.

3.2 FIELD QUALITY CONTROL

- A. Any proposed repairs of precast components or structures shall be submitted to Engineer for approval.
- B. Structures shall be observed for signs of leakage during periods of high groundwater.
- C. No leakage that includes visible flow through joints between precast concrete sections or through pipe penetrations shall be permitted.
- D. Damp spots on interior wall surfaces shall be considered leakage and shall not be permitted.
1. Damp spots shall be defined as spots where moisture from a source outside the structure can be picked up on a dry hand.
 2. Locate the source of water movement through the wall and permanently seal.
- E. Dampness on the top of the base slab will not be construed as leakage.

END OF SECTION

SECTION 33 05 33.23

POLYETHYLENE PRESSURE PIPE AND TUBING (AWWA C901 AND AWWA C906)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Polyethylene (PE) pipe, fittings, and appurtenances.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 31 23 33 – Utilities – Trenching and Backfilling.
 - 2. Section 40 05 00 – Pipe and Fittings – Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer of PE Pipe:
 - a. Obtain all PE pipe and fittings from one manufacturer, unless otherwise acceptable to Owner and Engineer.
 - b. Manufacturer of pipe required by this Section shall be regularly engaged in the business of manufacturing PE piping of the size and type(s) required for the Work. Upon Engineer's request, submit documentation of manufacturer's prior furnishing of PE pipe of the type(s) required for not less than five other projects, similar in size and complexity to the PE piping Work of this Project, in North America.
 - c. Equipment:
 - 1) Qualify each extrusion line and molding machine to produce pressure rated products by taking representative production samples and performing sustained pressure tests in accordance with ASTM D1598.
 - d. QA and QC Program:
 - 1) PE pipe manufacturer shall have documented quality assurance and quality control programs as part of manufacturer's routine business.
 - 2) PE piping manufacturer shall maintain permanent Quality Control (QC) and Quality Assurance (QA) records.
 - 2. Installer:
 - a. Use one entity for all PE pipe Work, unless otherwise acceptable to Owner and Engineer.
 - b. Installer shall be experienced with PE piping installation work similar in scope and complexity to the Work of this Section. When required by Engineer, submit documentation of successful completion of not less than five similar projects to the PE piping Work completed within the past five years.
 - c. Where PE pipe joints are made by fusing, fusion machine operators shall have been trained by fusion machine manufacturer within 12 months of starting to perform joint fusion Work. Submit documentation of such training, acceptable to Engineer, when requested by Engineer.
 - d. Installer's training and qualifications shall be acceptable to PE pipe Supplier retained for the Project.
- B. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
 - b. B16.1, Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
 - c. B16.21, Nonmetallic Flat Gaskets for Pipe Flanges.

2. ASTM International (ASTM):
 - a. A182, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
 - b. A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - c. A194, Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - d. A536, Standard Specification for Ductile Iron Castings.
 - e. B695, Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 - f. D638, Standard Test Method for Tensile Properties of Plastics.
 - g. D1248, Specification for Polyethylene Plastics Molding and Extrusion Materials.
 - h. D1505, Test Method for Density of Plastics by the Density-Gradient Technique.
 - i. D1598, Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.
 - j. D1599, Test Method for Short-Time Hydraulic Failure Pressure of Plastics Pipe, Tubing and Fittings.
 - k. D2239, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter.
 - l. D2290, Test Method for Apparent Tensile Strength of Ring or Tubular Plastics and Reinforced Plastics by Split Disk Method.
 - m. D2683, Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
 - n. D2737, Standard Specification for Polyethylene (PE) Plastic Tubing.
 - o. D2837, Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
 - p. D3035, Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
 - q. D3261, Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - r. D3350, Standard Specification for Polyethylene (PE) Plastics Pipe and Fittings Materials.
 - s. F714, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
 - t. F1055, Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
 - u. F2620, Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.
3. American Water Works Association (AWWA).
 - a. C207, Steel Pipe Flanges for Waterworks Service, Sizes 4 In. through 144 In.
 - b. C901, Polyethylene (PE) Pressure Pipe and Tubing, $\frac{3}{4}$ In. through 3 In. for Water Service.
 - c. C906, Polyethylene (PE) Pressure Pipe and Fittings, 4 In. through 65 In. for Waterworks.
4. Plastic Pipe Institute (PPI):
 - a. TR-3, Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Material.
 - b. PPI TR-4, Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fittings Compounds.
5. Military Specification (Mil Spec):
 - a. QQ-P-416F, Plating, Cadmium Electro Deposited.

6. National Sanitation Foundation International (NSF):
 - a. 14, Plastic Piping Components and Related Materials.
 - b. 61, Drinking Water System Components – Health Effects.

1.3 DEFINITIONS

- A. DIOD: Ductile Iron Outside Diameter.
- B. CTS: Copper Tube Size.
- C. DR: Dimension Ratio, Outside Diameter/Minimum Wall Thickness, both in inches.
- D. Diametral Deflection: reduction in diameter caused by earth and surcharge loads acting on the installed pipe.
- E. ESCR: Environmental Stress Crack Resistance.
- F. HDB: Hydrostatic Design Basis per ASTM D2837.
- G. IPS: Iron Pipe Size.
- H. SDR: Standard Dimension Ratio.
- I. SIDR: Standard Inside Diameter Ratio.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
 1. Shop Drawings:
 - a. Dimensioned, scaled drawings showing Contractor's proposed deviations from piping alignment shown on the Drawings.
 - b. Where necessary, include both plans and profiles and section views in Shop Drawings.
 2. Product Data:
 - a. Manufacturer's published catalog information and specifications for each size and type of PE piping required, including pipe, fittings, and jointing materials.
 - b. Clearly indicate in product data submittal the reference standards with which pipe and appurtenances comply.
 - c. Where couplings are required, submit coupling manufacturer's catalog literature and specifications for the specific couplings proposed.
- B. Informational Submittals; Submit the following:
 1. Supplier Instructions:
 - a. Submit manufacturer's written instructions for handling, storing, and installing piping furnished.
 2. Source Quality Control:
 - a. Submit documentation from manufacturer that piping materials furnished were inspected at the production facility and successfully passed manufacturer's quality control procedures.
 - b. Manufacturer's affidavit certifying piping materials furnished comply with AWWA standard C906.
 3. Fusion machines proposed for joining pipe/fittings.
 4. Field Quality Control:
 - a. Documentation of temperature and pressure profiles from data logger for each butt fusion joint.
 - b. Results of field quality control testing and inspections required in this Section.
 - c. Documentation of temperature and pressure profiles from data logger for each butt fusion joint.
 5. Qualifications:

- a. Piping materials manufacturer, when requested by Engineer.
- b. Installer, when requested by Engineer, including documentation of training in use of joint fusion equipment.
- c. Documentation showing fusion machine operators have been trained within 12 months prior to installation.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. In addition to requirements elsewhere in the Contract Documents, also comply with the following:
 - 1. During handling and installation avoid conditions where pipe bends excessively and avoid imparting kinks in the pipe.

PART 2 - PRODUCTS

2.1 MANUFACTURER'S

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. PE Pipe and Fittings:
 - a. Chevron Phillips Chemical Company LP - Performance Pipe Division (DriscoPlex).
 - b. WL Plastics.
 - c. JM Eagle.
 - d. Pipeline Plastics.
 - e. Or equal.
 - 2. Restrained Transition Fitting:
 - a. Georg Fischer Waga N.V.
 - 3. Butt Fusion Equipment:
 - a. McElroy Manufacturing, Inc.
 - b. Or equal.
 - 4. Adaptor Couplings
 - a. Central Plastics Co.
 - b. Poly-Cam, Inc.
 - c. Or equal.

2.2 MATERIALS

- A. Pipe:
 - 1. AWWA C906.
 - a. PE 4710 polyethylene material.
 - b. ASTM D3350 cell classification 445574C.
 - c. Minimum Hydrostatic Design Basis (HDB) of 1600 psi at 73 degF when tested in accordance with PPI TR-3.
- B. Fittings:
 - 1. Same material and thickness as adjoining pipe.
 - a. Fittings may be one DR lower (thicker) than the adjoining pipe.
 - 2. Molded fittings:
 - a. Butt fused: ASTM D3261.
 - b. Socket: ASTM D2683.
 - c. Electrofusion: ASTM F1055.
 - 3. Fabricated fittings: Fabricate from same material as pipe.

C. Back-up flanges:

1. Stainless steel: ASTM A182, dimensions per AWWA C207, Class 150.
2. Ductile iron: ASTM A536 Grade 70-50-5, dimensions per ANSI B16.1, Class 125.

D. Nuts and Bolts:

1. Buried:
 - a. Tee-Head bolts for mechanical joints: Per AWWA/ANSI C111/A21.11.
 - b. Other bolts and nuts: ASTM A304L Stainless Steel .
 - c. Wax Tape Coatings per AWWA C217.
2. Exposed: Mechanical galvanized ASTM B695, Class 40 ASTM A193/A194 Grade B8, Class 1.
3. Heads and dimensions per ASME B1.1.
4. Threaded per ASME B1.1.
5. Project ends 1/4 to 1/2 inches beyond nuts.

E. Gaskets: See individual piping systems in Section 40 05 00.

2.3 MANUFACTURED UNITS

A. Adaptor Fittings:

1. Mechanical joint: Adaptor fitting butt fused to pipe.
 - a. Capable of developing same pressure rating as specified for pipe.
 - b. Restrained.
 - c. Central Plastics MJ Adaptor or equal.

B. Restrained Adapter Fitting:

1. Restrained coupling for pipe material transition.
2. Multi/Joint 3000 Plus, Type 3000

C. Butt Fusion Equipment:

1. Designed to create a joint at least as strong as the adjacent pipe.
2. Equipment to contain stops to prevent excessive pressure on pipe ends during fusion process.
3. Equipment to plane pipe ends prior to fusion process.
4. Provide a data logger to document temperatures and pressures for each butt fusion joint.

2.4 DESIGN CRITERIA

A. DR: See Drawings.

B. Pipe Outside Diameter (OD):

1. Minimum allowable pipe outside diameter: Per AWWA C906, Table 4 (DIOD sizing).

C. Stub flanges: Design to develop full pressure specified for pipe with blind flange connected to back up flange.

2.5 FABRICATION

A. Pipe:

1. Clearly mark pipe and fittings per AWWA C906.
2. Service Indication:
 - a. Provide integral color or longitudinal color banding at 180 degrees apart.
 - 1) Water: Blue.
 - 2) Sewer: Green.

3) Reclaimer Water: Purple.

B. Stub flanges:

1. Design for use with backing flange.
2. Fabricate per manufacturers recommendations to develop full pressure specified for pipe with blind flange attached.

2.6 SOURCE QUALITY CONTROL

A. Materials:

1. Incoming polyethylene materials:
 - a. Inspect for density per ASTM D1505, melt rate per ASTM D1248, and carbon containment.
 - b. Provide certification from material supplier for a minimum of 30% of all incoming polyethylene materials.
 - c. PE pipe manufacturer shall verify certifications prior to processing into finished pipe or fittings.
2. Outgoing materials:
 - a. Manufacturer to inspect for diameter, wall thickness, length, straightness, out-of-roundness, concentricity, toe-in, inside and outside surface finish, markings, and end cut.
 - b. Perform tests to determine density, melt flow rate, carbon content, and carbon dispersion.
 - c. Test representative samples of the pipe provided to determine hoop tensile strength and ductility by either quick burst per ASTM D1599 or ring tensile per ASTM D2290.

B. Equipment:

1. Qualify each extrusion line and molding machine to produce pressure rated products by taking representative production samples and performing sustained pressure tests in accordance with ASTM D1598.

C. Quality Control Program:

1. Pipe and fitting manufacturer shall maintain permanent Quality Control (QC) and Quality Assurance (QA) records.
2. Certified copies of the quality control data taken during product manufacture shall be supplied to the Owner upon request.

D. Factory Inspection:

1. PE pipe manufacturer's production and quality assurance facilities shall be open and available for inspection by Owner and its authorized representatives.

PART 3 - EXECUTION

3.1 GENERAL

1. Locations: Provide PE piping at the locations shown on the Drawings or as otherwise shown and indicated in the Contract Documents.
2. Install PE piping in accordance with:
 - a. Section 31 23 00 - Earthwork, 31 23 33 Utilities - Trenching and Backfilling.
 - b. Other provisions of the Contract Documents.
 - c. Laws and Regulations.

3.2 INSTALLATION

A. General:

1. Locations: Provide PE piping at the locations shown on the Drawings or as otherwise shown and indicated in the Contract Documents.
 2. Install PE piping in accordance with:
 - a. Manufacturer's recommendations.
 - b. a. Section 31 23 00 - Earthwork, 31 23 33 Utilities - Trenching and Backfilling .
 - c. Other provisions of the Contract Documents.
 - d. Laws and Regulations.
 3. Field repairs of pipe and fittings are not permitted, with the exception that portions of straight pipe which are damaged may be cut off provided this alteration is in accordance with the manufacturer's established procedures.
- B. Joining method - Fusion Joints:
1. Joint Fusing – General:
 - a. Comply with ASTM F2620, the Contract Documents, pipe manufacturer's written instructions, and fusion machine manufacturer's written recommendations. Where any of the foregoing are inconsistent, comply with the more-stringent requirement. When unclear, request and obtain from Engineer written interpretation or clarification.
 - b. Fusion joiner shall be appropriately qualified and experienced in making the type of fusion joint required (butt fusion, socket fusion or sidewall fusion). Fusion joiner shall perform fusion jointing only for the types of joints for which such person possesses appropriate qualifications and experience.
 - c. Cost of certifying its workers and performing testing required for fused joints is Contractor's responsibility.
 - d. Plane ends of joints in fusion machine prior to heating.
 - e. Push pipe ends together in fusion machine and visually inspect compatibility and alignment of the two ends.
 - f. Comply with pipe manufacturer's written procedures and recommended heating time for pipe ends based upon pipe diameter and ambient temperature.
 - g. Visually inspect joint immediately upon removal of heating element to verify blistering of pipe has not occurred. Blistering of pipe is unacceptable.
 - h. Do not remove pipe from fusion machine until pipe has cooled in accordance with the pipe manufacturer's written instructions.
 2. PE pipe [1] inch diameter and smaller shall be socket fused.
 3. PE pipe joints [1.5] inch diameter and larger shall be butt fused.
 4. Electro-Fusion Fittings:
 - a. Comply with pipe fitting manufacturer's written instructions.
 - b. Ensure ends of connecting pipe are round when fusing.
 - c. Couplings: Provide means to place pipe ends in compression when fusion coupler is heated/cooled until connection process is complete.
- C. Joining method – Flanged Joints:
1. Slide back up flange on PE pipe.
 2. Install stub flange on end of pipe with butt fusion.
 3. Make flange faces flat and perpendicular to pipe centerline.
 4. Allow one flange free movement in any direction while bolts are being tightened.
 5. Do not assemble adjoining flexible joints until flanged joints in piping system have been tightened.
 6. Gradually tighten flange bolts uniformly to permit even gasket compression.
 7. Check bolt torque after 24 hours to ensure that stress relief has not occurred.
- D. Joining method – Mechanical Joint:

1. Use only for joining PE pipe to DIP or PVC (AWWA C900).
 2. Install MJ adapter on end of PE pipe with butt fusion.
 3. Clean components before installation.
 - a. Clean bolts and nuts by wire brushing.
 - b. Lubricate bolts with vegetable-based oil only.
 4. Insert nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension.
 5. Execute care when tightening joints to prevent undue strain upon adjoining pipe.
 6. Test joint for leakage.
 - a. If joint leaks under pressure testing, loosen or remove nuts and bolts, reset, or replace the gasket, reinstall or retighten bolts and nuts, and retest the joints.
 - b. Completed joints shall be watertight.
 7. Check bolt torque after 24 hours to ensure that stress relief has not occurred.
- E. Install buried pipe per Section 40 05 00] and per details shown on Drawings.
1. Allow pipe to stabilize to trench bottom or casing temperature before final tie-in or backfilling.
 2. For field sweeps, the minimum cold bending allowable radius:

DR	Minimum Radius
≤9	20 times pipe OD
>9 - 13.5	25 times pipe OD
>13.5 - 21	27 times pipe OD
>21	30 times pipe OD
With flange or fitting inside sweep	100 times pipe OD

3.3 FIELD QUALITY CONTROL

- A. Use only fusion machine operators who have been trained by machine manufacturer no more than 12 months prior to installation of first fused joint.
- B. Visually inspect all pipe for gouges.
 1. Gouges in excess of 10% of the pipe wall thickness are not acceptable.
 2. In area where excessive gouges are present, cut out affected pipe section and butt fused to remaining pipe to make a continuous section.
- C. Check integrity of the heating plate in the fusion equipment a minimum of twice per each 8-hour work shift for temperature uniformity.
- D. Butt-fused specimen joint inspection and testing per ASTM F2620, Appendix X4.
 1. Visually inspect all joints during and after joining to ensure that the joint meets the requirements of the butt fusion welding procedure.
 2. On every day that butt fusions are to be made, prepare a trial butt-fused joint specimen.
 3. Allow specimen to cool completely and cut into test straps.
 4. Test straps:
 - a. Length: 12 inches (min) or 30 times the wall thickness.
 - b. Location of fusion: Center of strap.
 - c. Width: 1 inch (min) or 1.5 times the wall thickness.
 5. Visually examine the straps for voids or discontinuities.
 6. Deform the straps by bending, torque, or impact.

7. If failure of the joint occurs outside of the joint area, the test is acceptable.
- E. Diametral Deflection:
1. After backfilling, check each section of pipe for deflection by pulling a mandrel through the pipe.
 2. Pipe with deflection exceeding 5% of the inside diameter: remove backfill and replace to provide a deflection of less than 5%.
 3. Retest any repaired pipe.
- F. Hydrostatically test installed pipe and fittings in accordance with Section 40 05 00.
1. Provide butt fused stub flanges, back up flanges and blind flanges on both ends of each pipe string for hydrostatic testing prior to and following installation.

END OF SECTION

This page intentionally left blank.

SECTION 33 05 33.53
POLYETHYLENE GAS UTILITY PIPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Polyethylene pipe, fittings, and appurtenances for gas service in accordance with the National Fuel Gas Code.
- B. Related Requirements: Include but are not necessarily limited to:
 - 1. Section 31 23 00 - Earthwork.
 - 2. Section 31 23 33 – Utilities - Trenching and Backfilling.

1.2 REFERENCES

- A. Abbreviations: The abbreviations indicated below are used in this Section and have the meanings indicated below:
 - 1. CTS: Copper tube size.
 - 2. DR: Dimension ratio", which is the pipe's average OD divided by minimum wall thickness (t)
 - 3. Diametral Deflection: Reduction in diameter caused by earth and surcharge loads acting on the installed pipe.
 - 4. ESCR: Environmental stress crack resistance.
 - 5. HDB: Hydrostatic design basis in accordance with ASTM D2837.
 - 6. HDPE: High density polyethylene.
 - 7. HDS: Hydrostatic design stress
 - 8. IPS: Iron pipe size.
 - 9. MDPE: Medium density polyethylene.
 - 10. SDR: Standard dimension ratio.
- B. Reference Standards:
 - 1. American National Standards Institute (ANSI):
 - a. B16.1, Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
 - b. B16.21, Nonmetallic Flat Gaskets for Pipe Flanges.
 - c. Z223.1, National Fuel Gas Code.
 - 2. ASTM International (ASTM):
 - a. A182, Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
 - b. A193, Standard Specification for Alloy-Steel and Stainless-Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - c. A194, Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - d. A536, Standard Specification for Ductile Iron Castings.
 - e. B695, Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 - f. D638, Standard Test Method for Tensile Properties of Plastics.
 - g. D1248, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
 - h. D1505, Test Method for Density of Plastics by the Density-Gradient Technique.

- i. D1598, Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.
- j. D1599, Test Method for Short-Time Hydraulic Failure Pressure of Plastics Pipe, Tubing and Fittings.
- k. D1693, Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
- l. D2290, Test Method for Apparent Tensile Strength of Ring or Tubular Plastics and Reinforced Plastics by Split Disk Method.
- m. D2513, Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
- n. D2683, Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
- o. D3261, Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- p. D3350, Standard Specification for Polyethylene (PE) Plastics Pipe and Fittings Materials.
- q. F1055, Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
- r. F1473, Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins.
- s. F2206, Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE).
- t. F2620, Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.
- 3. Society for Protective Coatings (SSPC):
 - a. SP 3, Power Tool Cleaning.

1.3 QUALITY ASSURANCE

A. Qualifications:

- 1. Manufacturer of PE Pipe:
 - a. Obtain all PE gas pipe and fittings from one manufacturer, unless otherwise acceptable to Owner and Engineer.
 - b. Manufacturer of pipe required by this Section shall be regularly engaged in the business of manufacturing PE gas piping of the size and type(s) required for the Work. Upon Engineer's request, submit documentation of manufacturer's prior furnishing of PE gas pipe of the type(s) required for not less than five other projects, similar in size and complexity to the PE gas piping Work of this Project, in North America.
 - c. Equipment:
 - 1) Qualify each extrusion line and molding machine to produce pressure rated products by taking representative production samples and performing sustained pressure tests in accordance with ASTM D1598.
 - d. QA and QC Program:
 - 1) PE pipe manufacturer shall have documented quality assurance and quality control programs as part of manufacturer's routine business.
 - 2) PE piping manufacturer shall maintain permanent Quality Control (QC) and Quality Assurance (QA) records.
- 2. Installer:
 - a. Use one entity for all PE gas pipe Work, unless otherwise acceptable to Owner and Engineer.
 - b. Installer shall be experienced with PE gas piping installation work similar in scope and complexity to the Work of this Section. When required by Engineer, submit documentation of successful completion of not less than five similar projects to the PE gas piping Work completed within the past five years.

- c. Installer of PE gas piping shall, where applicable, be licensed plumber, duly licensed by municipality or other authority having jurisdiction.
- d. Where PE gas pipe joints are made by fusing, fusion machine operators shall have been trained by fusion machine manufacturer within 12 months of starting to perform joint fusion Work. Submit documentation of such training, acceptable to Engineer, when requested by Engineer.
- e. Installer's training and qualifications shall be acceptable to PE gas pipe Supplier retained for the Project.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

- 1. Shop Drawings:
 - a. Dimensioned, scaled drawings showing Contractor's proposed deviations from gas piping alignment shown on the Drawings. Where necessary, such Shop Drawings shall include both plans and profiles and section views.
- 2. Product Data:
 - a. Manufacturer's published catalog information and specifications for each size and type of PE gas piping required, including pipe, fittings, and jointing materials.
 - b. Clearly indicate in product data submittal the reference standards with which pipe and appurtenances comply.
 - c. Where couplings are required, submit coupling manufacturer's catalog literature and specifications for the specific couplings proposed.

B. Informational Submittals: Submit the following:

- 1. Supplier Instructions:
 - a. Submit manufacturer's written instructions for handling, storing, and installing piping furnished.
- 2. Source Quality Control:
 - a. Submit documentation from manufacturer that piping materials furnished was inspected at the production facility and successfully passed manufacturer's quality control procedures.
 - b. Manufacturer's affidavit of certifying piping materials furnished comply with ASTM D2513.
- 3. Fusion machines proposed for joining pipe/fittings.
- 4. Field Quality Control:
 - a. Documentation of temperature and pressure profiles from data logger for each butt fusion joint.
 - b. Results of field quality control testing and inspections required in this Section.
- 5. Qualifications:
 - a. Piping materials manufacturer, when requested by Engineer.
 - b. Installer, when requested by Engineer, including documentation of training in use of joint fusion equipment.

1.5 DELIVERY, HANDLING, AND STORAGE

A. In addition to requirements elsewhere in the Contract Documents, also comply with the following:

- 1. During handling and installation avoid conditions where pipe bends excessively and avoid imparting kinks in the pipe.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable for natural gas applications:
 - 1. PE Pipe and Fittings:
 - a. Performance Pipe.
 - b. PolyPipe USA.
 - c. JM Eagle.
 - d. WL Plastics.
 - e. Or equal..
 - 2. Adaptor Couplings:
 - a. Smith-Blair.
 - b. GF Central Plastics Co.
 - c. Poly-Cam, Inc.
 - d. Or equal.
- B. Polyethylene materials used for manufacturing pipe and fittings shall be listed in PPI TR-4, Listed Materials.

2.2 MDPE PIPING

- A. Description:
 - 1. Provide PE 2708 pipe and fittings complying with ASTM D2513
- B. Materials:
 - 1. The following applies generally to MDPE piping unless indicated otherwise elsewhere in the Contract Documents:
 - a. Cell Classification: In accordance with ASTM D3350 shall be PE-277373E, or PE 234373E, or PE 234363E.
 - b. Sizing Classifications:
 - 1) IPS for pipe greater than 1.75-inch diameter.
 - 2) CTS for pipe 1.75-inch diameter and less.
 - c. Minimum Wall Thickness: SDR as indicated on the Drawings.
 - d. Mark pipe to clearly indicate on the pipe: "GAS" and "ASTM D2513".
 - 2. Fittings:
 - a. ASTM D2513.
 - b. Provide fittings with not less than strength of connected pipe.
 - c. Minimum Wall Thickness: [SDR 11, or as shown on Drawings.
 - d. ASTM Classification:
 - 1) 0.5-inch to 1.75-inch diameter: ASTM D2683.
 - 2) Two-inch to 24-inch diameter: ASTM D3261.
 - e. Mark each fitting with, "ASTM D2513" along with applicable fitting specification.
 - f. Connections to Pipe:
 - 1) Socket fused ends for fittings 1.75-inch diameter and less.
 - 2) Butt-fused ends for fitting two-inch diameter and larger.
 - g. Provide IPS reducers on main lines.
 - h. Provide tapping tees or straight-outlet service saddles to join service laterals to main line.
 - i. Mitered or field fabricated fittings are unacceptable.

2.3 HDPE PIPING – NATURAL GAS AND LP GAS

A. Description:

1. Provide PE 4710 pipe and fittings complying with ASTM D2513.
2. Identify each length of pipe in accordance with ASTM D2513.
 - a. Include manufacturer's name and trademark.
 - b. Nominal size of pipe, appurtenant information regarding polymer cell classification and critical identifications regarding performance specifications
 - c. Mark pipe with "GAS" and "ASTM D2513"

B. Materials:

1. Unless required otherwise elsewhere in the Contract Documents, HDPE piping provided under this Article shall comply with the following:
 - a. Cell Classification: In accordance with ASTM D3350, shall be PE-445574C or PE-445574E.
 - b. Size Classification:
 - 1) IPS for piping larger than one-inch diameter.
 - 2) CTS for piping one-inch diameter or less.
 - c. Minimum Wall Thickness: SDR 11, or as Shown on Drawings
2. Fittings:
 - a. ASTM D2513.
 - b. Electrofusion Fittings: ASTM F1055.
 - c. Provide fittings with not less than strength of connected pipe.
 - d. Minimum Wall Thickness SDR 11, or as shown on Drawings.
 - e. ASTM Designation:
 - 1) 0.5-inch to 1.75-inch diameter: ASTM D2683.
 - 2) Two-inch to 2-inch diameter: ASTM D3261.
 - f. Mark each fitting with, "ASTM D2513" and the applicable fitting specification.
 - g. Connections to Pipe:
 - 1) Socket fused ends for fittings 1.75-inch diameter and less.
 - 2) Butt-fused ends for fitting two-inch diameter and larger.
 - h. IPS reducers on main lines.
 - i. Tapping tees or straight-outlet service saddles to join service laterals to main line.
 - j. Mitered or field fabricated fittings are unacceptable.

2.4 ACCESSORIES

2.5 CASING

A. Casing Pipe:

1. Material: ASTM A53 steel, Grade B, black.
2. Size and wall thickness as shown or indicated on the Drawings.
3. Joints: Buttweld or socketweld.

B. Casing Accessories:

1. Casing Spacer/Isolators: PSI Model PE, or equal.
2. End Seal: PSI Model S, or equal.

2.6 SOURCE QUALITY CONTROL

A. Factory Tests and Inspections:

1. PE Materials to be Used in Manufacturing PE Pipe for the Work:

- a. Inspect for density per ASTM D1505, melt rate per ASTM D1248, and containment.
 - b. PE pipe manufacturer shall verify material certifications prior to incorporating the subject materials into the PE piping materials to be furnished for the Work.
 2. Manufactured PE Pipe: Prior to shipping manufactured PE pipe from the manufacturing facility, PE pipe manufacturer shall perform the following and document the results per ASTM D2513 including Annexes A1 and A.2:
 - a. Inspect for diameter, wall thickness, length, straightness, out-of-roundness, concentricity, toe-in, inside and outside surface finish, markings, and end cut.
 - b. Perform tests to determine density, melt flow rate, carbon content, and carbon dispersion.
 - c. Test representative samples of the pipe provided to determine hoop tensile strength and ductility by either quick burst in accordance with ASTM D1599 or ring tensile in accordance with ASTM D2290.
 - d. Submit affidavit of compliance with all testing required by ASTM D2513 prior to installation of the pipe and fittings.
 - e. Do not ship to the Site (or other location for the Project) PE pipe materials found to be defective or that exhibit unacceptable manufacturing defects. Promptly furnish acceptable pipe in lieu of defective materials.
- B. Factory Inspection:
1. PE pipe manufacturer's production and quality assurance facilities shall be open and available for inspection by Owner, Engineer, and Owner's other representatives.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation - General:
1. Locations: Provide PE gas piping at the locations shown on the Drawings or as otherwise shown and indicated in the Contract Documents.
 2. Install PE gas piping in accordance with:
 - a. Section 31 23 00 - Earthwork[31 23 33 – Utilities - Trenching and Backfilling].
 - b. Other provisions of the Contract Documents.
 - c. Laws and Regulations.
 - d. Written installation instructions of PE gas pipe manufacturer and, where joints will be fused, written instructions of joint fusing machine manufacturer.
 3. In event of conflict between the above, obtain from Engineer written clarification or interpretation.
- B. Installation of PE Gas Piping:
1. Maximum allowable diametral (cross sectional) deflection of installed piping: fivepercent of internal diameter.
 2. Do not field-thread PE gas piping.
 3. Comply with this Section's "Delivery, Handling, and Storage" Article.
 4. Temporarily cap open ends of piping at end of each workday.
 5. Connections for Service Laterals:
 - a. Provide connections for service laterals, if any, at locations shown on the Drawings.
 - b. Where completed PE gas piping will serve as conveyance for delivering gas to customers of utility owner and quantity, size, and location of connections for service laterals are not shown or indicated, provide a 3/4-inch diameter connection per residential unit and one 1-inch diameter connection per commercial business.

- c. Unless otherwise shown or indicated, provide service connection for each vacant lot or parcel of land along route of gas piping, based on lot lines on the date Bids were opened or, if there were no Bids, on the Effective Date of the Contract.
- 6. Changes in Direction of PE Piping:
 - a. Pipe may be cold-bent to minimum radius listed in Paragraph 3.1 E. (sweeps) or with PE fittings.
- 7. Remove burrs resulting from cutting and threading piping.
- 8. Casings:
 - a. Center pipe in casing with casing spacers.
 - b. Slope casing pipe to one end for positive drainage.
- C. Joining Method - Fusion Joints:
 - 1. Comply with ASTM F2620, the Contract Documents, and written instructions of PE gas pipe manufacturer and fusion machine manufacturer. In event of conflict among such requirements, comply with the most-stringent, most-conservative requirements.
 - 2. Fusion joiner personnel must be qualified by type of fusion (i.e., butt fusion, socket fusion or sidewall fusion) and fuse pipe only as qualified.
 - 3. Fusing Method:
 - a. Socket-fuse joints of pipe 1.25-inches diameter and smaller.
 - b. Butt-fuse joints of pipe 1.5 inches diameter and larger.
 - 4. Making the Joint:
 - a. Prior to fusing, visually inspect each end of the planned joint, inside and outside, for burrs, damage, dirt, moisture, abnormalities, and other conditions unsuitable for jointing. Remedy unsuitable conditions before proceeding.
 - b. Plane ends of joints in fusion machine prior to heating.
 - c. In fusion machine, push pipe ends together and visually check compatibility and alignment of pipes' ends. Make necessary corrections.
 - d. Comply with manufacturer's procedures and recommended heating time for pipe ends, based on pipe diameter and ambient temperature.
 - e. Inspect joint immediately after removing heating element. Blistering of pipe is unacceptable.
 - f. Remove piping from fusion machine after piping has cooled in accordance with pipe manufacturer's written installation instructions.
- D. Joining Method: Flanged Joints:
 - 1. Provide slip-on flange on PE gas pipe by slipping backup flange onto PE gas pipe prior to welding a PE stub flange to the pipe at each required location.
 - a. Do not provide flanged joint where flanged joint will be subject to settlement or lateral movement.
 - b. When the Contract Documents are unclear about whether flanged joint is required, submit to Engineer request for interpretation in accordance with the Contract Documents.
 - 2. Provide stub flange on end of pipe with butt fusion.
 - 3. Make flange faces flat and perpendicular to pipe centerline.
 - 4. Allow one flange free movement in any direction while bolts are being tightened.
 - 5. Do not assemble adjoining flexible joints until flanged joints in piping system have been tightened.
 - 6. Gradually tighten flange bolts uniformly to permit even gasket compression.
 - 7. Check bolt torque after 24 hours to ensure that stress relief has not occurred.
- E. Installing PE Gas Piping in Trench:

1. Install buried piping [in accordance with Section 40 05 00, and] as shown and indicated on the Drawings.
2. Allow piping to stabilize to temperature of trench bottom or casing pipe, as applicable, before performing connections (tie-ins) to other piping (including service laterals) and backfilling.
3. For field bends (sweeps), minimum allowable cold bending radius is:

DR	Minimum Radius
7, 7.3, 9	20 times pipe OD
11, 13.5	25 times pipe OD
17, 21	27 times pipe OD
26	34 times pipe OD
32.5	42 times pipe OD
41	52 times pipe OD
With flange or fitting inside sweep	100 times pipe OD

3.2 FIELD QUALITY CONTROL

A. Field Tests and Inspections:

1. Visual Inspection Prior to Jointing and Installation:
 - a. Visually inspect each pipe for gouges and other defects resulting from manufacturing or handling.
 - b. Gouges with depth (measured from original, outside surface of pipe) in excess of 10 percent of pipe's wall thickness are unacceptable.
 - c. Remedy unacceptable gouges as indicated in this Article.
 - d. Other defects and damage are unacceptable when so indicated by pipe manufacturer's written installation instructions.
2. Fusing Machine and Fusion Quality Control:
 - a. Verify integrity of heating plate in joint fusion machine, not less than twice per eight-hour work shift, for temperature uniformity.
 - 1) Criteria for acceptability: in accordance with written instructions of fusing machine manufacturer and PE gas pipe manufacturer.
 - 2) Do not use fusing machine in unacceptable condition.
 - b. Daily Test Specimen:
 - 1) Each day of joint fusing, prior to starting fusing pipe joints in the Work, each fusing crew shall prepare trial fused joint specimen for each type of fusing required that day.
 - 2) Diameter of specimen shall be most-common size of pipe to be fused that day.
 - 3) When Engineer, Resident Project Representative (if any), or Owner's Site Representative (if any) is onsite at start of day's joint fusing, advise them of time of daily testing and allow to observe test joint and associated testing.
 - 4) Record results of each daily test, indicating crew and machine, size of test specimen, type of joint, and results of test.
 - 5) Allow specimen to cool completely and cut into test straps.
 - 6) Test straps:
 - a) Length: Not less than 12 inches or 30 times pipe wall thickness.
 - b) Location of fusion: Center of strap.

- c) Width: Not less than one inch or 1.5 times pipe wall thickness.
- 7) Visually examine straps for voids or discontinuities.
- 8) Deform straps by bending, torque, or impact.
- 9) If failure of joint occurs outside of joint area, test is acceptable.
- 10) Repeat daily test until acceptable results are achieved.
- 11) Perform joint fusing in the Work using same techniques that resulted in acceptable daily test, in accordance with the Contract Documents.
- c. Perform butt-fused specimen joint inspection and testing in accordance with ASTM F2620, Appendix X4
- 3. During and After Pipe Joint Fusing:
 - a. Visually inspect each joint during and after joining to ensure that joint complies with fusion procedure.
- 4. Diametral Deflection:
 - a. After piping installation and backfilling, perform draw mandrel through piping to measure deflection.
 - b. Where deflection of the pipe's cross section exceeds five percent of pipe's ID, remove backfill, remedy the piping Work, and reinstall backfill.
 - 1) Repeat mandrel test until acceptable results are obtained.
 - c. Record results of each mandrel test and submit to Engineer, clearly indicating segment of PE gas piping Work tested, pipe size, and measured deflection (including indication of percentage of pipe ID).
- 5. Gas-tightness Testing:
 - a. Pressure test installed PE gas piping in accordance with Section 40 05 00.
 - b. Provide butt fused stub flanges, back up flanges and blind flanges on both ends of each pipe string for hydrostatic testing prior to and following installation.
- B. Defective Work:
 - 1. Unacceptable Gouges: In areas of unacceptable gouges, cut out unacceptable pipe section and fuse together ends of acceptable pipe sections, on each side of removed section, to provide continuous section in accordance with the Contract Documents.
 - 2. Other Manufacturing or Handling Defects or Damage: Remedy in accordance with pipe manufacturer's written instructions, or remove unacceptable pipe from site and provide acceptable, new pipe.
 - 3. Deflection Test: Remedy for PE gas piping with unacceptable deflection is indicated in this Article.
 - 4. Gas-tightness Testing: When PE gas piping gas-tightness testing has unacceptable results, determine locations of leaks and repair or remedy leaks and repeat testing until acceptable results are obtained.

END OF SECTION

This page intentionally left blank.

SECTION 33 40 00
STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Storm drainage systems.
 - 2. Storm drainage pipe.
 - 3. Inlets, headwalls, flumes and flared end sections.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 - Procurement and Contracting Requirements.
 - 2. Division 01 - General Requirements.
 - 3. Section 31 23 33 – Utilities – Trenching and Backfilling..

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M36, Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains (Equivalent ASTM A760/A760M).
 - b. M190, Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.
 - 2. ASTM International (ASTM):
 - a. A760/A760M, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
 - b. C14, Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
 - c. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - d. C361, Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
 - e. F2510/F2510M, Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Corrugated Dual- and Triple-Wall Polyethylene and Polypropylene Pipes.
 - f. F2648/F2648M, Standard Specification for 2 to 60 IN (50 to 1500 MM) Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications.
 - 3. Standard Specifications for Road and Structures, State of North Carolina Department of Transportation:
 - a. Standard Details.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - 3. Certifications.
 - 4. Test reports.

5. Submit all tests and certification in a single coordinated submittal.
 - a. Partial submittals will not be accepted.
- B. Submit schedules and details for structures and joints.

1.4 WARRANTY

- A. Warrant that the infiltration will not exceed the amount specified in the Exfiltration Test paragraph in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section during the one year correction period.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforced Concrete Pipe (RCP):
 1. Reinforced concrete culvert, storm drain and sewer pipe: ASTM C76, Classes III, IV, and V.
- B. RCP Joint Sealer:
 1. Rubber gasket: ASTM C361.
- C. Flared End Sections:
 1. Conform to State of North Carolina DOT Specifications.
 2. Bituminous coated: AASHTO M190, Type A.
 3. Jointing: Same as pipe.
- D. Corrugated Metal Pipe (CMP):
 1. AASHTO M36 (ASTM A760/A760M), 16 GA.
 2. Bituminous coated: AASHTO M190, Type A.
 3. Jointing: Connecting bands of same base metal coated as pipe.
- E. High Density Polyethylene Pipe (HDPE):
 1. ASTM F2648/F2648M.
 2. ASTM F2510/F2510M.
- F. CMP Joint Sealer:
 1. Cold applied asphalt joint compound.
 2. Preformed flexible pipe joint sealing compound.
- G. Concrete and Reinforcement for Inlets, Manholes, Junction Boxes, Headwalls, and Flumes:
 1. Conform to Drawings and Details.
- H. Concrete and Reinforcement for Concrete Flared End Sections:
 1. Conform to Drawings and Details.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with Specification Section 31 23 33.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Comply with Specification Section 31 23 33.

3.3 FIELD QUALITY CONTROL

- A. Verify and coordinate installation.

B. Exfiltration Test:

1. Perform an exfiltration test on each reach of sewer between manholes.
 - a. Test the first reach after backfilling and prior to installing any of the remaining pipe, or any additional reach.
 - b. Single or multiple reaches may be tested thereafter, at Contractor's option.
 - c. Subject each manhole to at least one test.
 - d. Provide all necessary piping between the reach to be tested and the water supply, and other necessary materials and equipment.
 - e. Air testing may be allowed.
 - 1) Submit complete information to Engineer for review describing the proposed test method, scheduling, and duration, including the method of testing manholes before beginning testing.
2. Procedure:
 - a. Block off all manhole openings, except those connecting with the reach being tested.
 - b. Fill the line.
 - 1) Average depth: 10 FT above invert, except as required by manhole depth.
 - 2) Depth at lower end: 25 FT maximum above crown.
 - 3) Depth at upper end: 5 FT minimum above crown.
 - c. Add and measure water as required to maintain a constant level.
 - 1) Exfiltration: 100 GAL maximum per inch of nominal diameter per mile per day.
 - 2) Manholes are considered section of 48 IN pipe.
 - d. Maintain test for at least 2 HRS, or as long as necessary in Engineer's opinion, to locate all leaks.
3. Repair and retest any reach that exceeds the allowable exfiltration.

C. Infiltration Test:

1. If at any time prior to expiration of the correction or warranty period infiltration exceeds 200 GAL/IN of nominal diameter/mile/day, locate the leaks and make repairs.

D. In case of conflict, do not relocate piping without prior approval from the Engineer.

END OF SECTION

This page intentionally left blank.

SECTION 40 05 00
PIPE AND PIPE FITTINGS - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Process piping systems.
 - 2. Utility piping systems.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Division 00 – Procurement and Contracting Requirements.
 - 2. Division 01 – General Requirements.
 - 3. Section 31 23 33 – Utilities – Trenching and Backfilling.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M36, Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains (Equivalent ASTM A760).
 - b. M190, Standard Specification for Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.
 - c. M252, Standard Specification for Corrugated Polyethylene Drainage Tubing.
 - d. M278, Standard Specification for Class PS 46 Polyvinyl Chloride (PVC) Pipe.
 - e. M294, Interim Specification for Corrugated Polyethylene Pipe 12 to 24 Inch Diameter.
 - 2. American National Standards Institute (ANSI):
 - a. B16.5, Pipe Flanges and Flanged Fittings.
 - b. B36.19, Stainless Steel Pipe.
 - c. B40.100, Pressure Gauges and Gauge Attachments.
 - 3. American National Standards Institute (ANSI)/American Water Works Association (AWWA):
 - a. ANSI/AWWA C110/A21.10, Ductile Iron and Gray Iron Fittings, 3 IN through 48 IN for Water and Other Liquids.
 - b. ANSI/AWWA C115/A21.15, Flanged Ductile Iron Pipe with Threaded Flanges.
 - c. ANSI/AWWA C151, Ductile-Iron Pipe, Centrifugally Cast In Metal Molds or Sand-Lined Molds for Water or Other Liquids.
 - d. ANSI/AWWA C153/A21.53, Ductile-Iron Compact Fittings, 3 IN Through 16 IN, for Water and Other Liquids.
 - 4. ASTM International (ASTM):
 - a. C14, Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
 - b. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - c. C361, Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
 - d. C443, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 - e. D3261, Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - f. D4101, Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials.

- g. F438, Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
 - h. F439, Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
 - i. F441/ F441M, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
5. Underwriters Laboratories, Inc. (UL).
- B. Coordinate flange dimensions and drillings between piping, valves, and equipment.
 - C. Minimum Bury. Unless otherwise shown on the drawings, provide a minimum of three (3) feet earth cover over exterior buried piping systems and appurtenances conveying water.
 - D. Comply with rules, regulations and policies of the North Carolina Department of Environmental Quality (NCDEQ).
 - E. All material or products which come into contact with drinking water shall be third party certified as meeting the specifications of the American National Institute/National Sanitation Foundation Standard 61, Drinking Water System Components – Health Effects. The certifying party shall be accredited by the American National Standards Institute.
 - F. All pipe, fittings, packing, and jointing materials, shall conform to Section C of the AWWA Standards.

1.3 SYSTEM DESCRIPTION

- A. Piping Systems Organization and Definition:
 - 1. Piping services are grouped into designated systems according to the chemical and physical properties of the fluid conveyed, system pressure, piping size and system materials of construction.
 - 2. See PIPING SYSTEMS SCHEDULE in PART 3.

1.4 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation.
 - c. Separate schedule sheet for each piping system scheduled in this Specification Section showing compliance of all system components.
 - 1) Attach technical product data on gaskets, pipe, fittings, and other components.
 - 2. Fabrication and/or Layout Drawings:
 - a. Piping drawings (minimum scale 1 IN equals 10 FT) with information including:
 - 1) Dimensions of piping lengths, schedule, fittings and supports.
 - 2) Invert or centerline elevations of piping crossings.
 - 3) Acknowledgement of bury depth requirements.
 - 4) Details of fittings, tapping locations, thrust blocks, restrained joint segments, harnessed joint segments, hydrants, and related appurtenances.
 - 5) Acknowledge designated valve or gate tag numbers, manhole numbers, instrument tag numbers, pipe and line numbers.
 - 6) Line slopes.
 - b. Schedule of interconnections to existing piping and method of connection.
- C. Product technical data including:

1. Acknowledgement that products submitted meet requirements of standards referenced.
 2. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation.
 3. Separate schedule sheet for each piping system scheduled in this Specification Section showing compliance of all system components. Attach technical product data on gaskets, pipe, fittings, and other components.
- D. Operation and Maintenance Manuals:
1. See Specification Section 01 33 00 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content of Operation and Maintenance Manuals.
- E. As-Built Drawings:
1. As work progresses and again when work is complete, submit "As-Recorded" drawings of piping systems including project items and pre-existing items. Identify complete location, elevation, and description of piping systems. Relate piping systems to identified structures and appurtenances.
- F. Test reports:
1. Copies of pressure test results on all piping systems.
 2. Reports defining results of dielectric testing and corrective action taken.
 3. Notification of time and date of piping pressure tests.
 4. Video documentation.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe coating during handling using methods recommended by manufacturer.
1. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.
- B. Prevent damage to pipe during transit.
1. Repair abrasions, scars, and blemishes.
 2. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.
- C. Store materials on site under protective coverings above ground to keep materials clean and dry.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers of PE pipe are acceptable for landfill leachate and gas applications:
1. Driscoplex.
 2. CSR/Polypipe.
 3. ISCO.
 4. Lee Supply.
 5. Ferguson Industrial Plastics.
 6. Plexco.
 7. Or approved equal.

2.2 HIGH DENSITY POLYETHYLENE (HDPE/PE 4710) PIPING AND FITTINGS

- A. General:
1. All HDPE pipe used must be in conformance with the documentation set forth in the Contract Drawings. The SDR of each specific pipe can be found on the Contract Drawings.

2. Pipe shall be extruded from a Type III, Class C, Category 5, Grade P34 compound as described in ASTM D 1248. It shall be classified as cell 445574C according to ASTM D 3350 and have the material designation of PE 3408/3608. The pipe shall be manufactured to meet the requirements of ASTM D 2513. Manufacturer's literature shall be adhered to when "manufacturer's recommendations" are specified. All pipe and fittings shall be provided by one of the manufacturers specified in Section 2.1 of this specification.
- B. HDPE Fittings:
1. Fittings shall be manufactured from polyethylene compound having cell classification equal to or exceeding the compound used in the pipe.
 2. All fittings 12 inches and smaller shall be molded (excluding gas header pipe), unless approved by the Engineer. Extrusion welds on fittings will not be allowed, except for addition of gussets. The ends of the fabricated fittings shall not be trimmed to match the pipe section to which they are going to be joined. All polyethylene fittings shall have the same or higher pressure rating as the pipe when installed in accordance with the latest technical specifications. All landfill gas tie-ins to the header may be shop fabricated branch saddle fittings. Field fabricated branch saddle fittings will not be accepted.
 3. Flanges for HDPE Pipe:
 - a. Flanges for HDPE pipe shall be convoluted ductile iron back-up rings with a minimum thickness of 1-inch.
 - b. The studs, nuts and washers for the flanges shall be 316 stainless steel hardware . Below grade flanges shall be wrapped in 5-mil polyethylene sheeting just after installation and prior to backfilling to help prevent corrosion.
 - c. Flange gaskets shall be full-face Neoprene, or approved equal.
 - d. Flanges and bolt patterns consistent with ANSI B16.5/AWWA C207/ASTM A536, as recommended by manufacturer.
 4. Reducers:
 - a. Furnish appropriate size reducers and reducing fittings to mate pipe to equipment connections. Connection size requirements may change from those shown on the Contract Drawings depending on equipment furnished.
- C. All pipe and fittings must be supplied by the same manufacturer.
- D. Identify each length of pipe clearly at intervals of 5 feet or less with the following markings:
1. Manufacturer's name and trademark.
 2. Nominal size of pipe,
 3. Type of plastic (e.g., PE 4710)
 4. Standard dimension ratio (SDR) value
 5. ASTM designations (i.e., ASTM D 2513)

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Pipe may be rejected for failure to conform to Specifications, or for:
1. Fractures or cracks passing through pipe wall, except single crack not exceeding two (2) inches in length at either end of pipe which could be cut off and discarded. Pipes within one shipment will be rejected if defects exist in more than 5% of shipment or delivery.
 2. Cracks sufficient to impair strength, durability, or serviceability of pipe.
 3. Defects indicating improper proportioning, mixing, and molding.
 4. Damaged ends, where such damage would prevent making satisfactory joints.
- B. Acceptance of fittings, stubs, or other specifically fabricated pipe sections shall be based on visual observation by the Owner or Engineer at the Project site and documentation that they conform to these Specifications.

3.2 HDPE PIPE INSTALLATION

- A. Perform trenching, backfilling, and compaction in accordance with Section 31 23 33.
- B. Install pipe as indicated on the Contract Drawings. Pipe installation shall comply with the requirements of ASTM D 2321, PPI TR31/9-79, and the manufacturer's recommendations.
- C. Remove standing water in trench before installation.
- D. Lengths of fused pipe to be handled as one segment shall not exceed 400 feet.
- E. The Owner and Engineer shall be notified prior to any pipe being installed in the trench in order to have an opportunity to inspect the following items:
 - 1. All butt and saddle fusions.
 - 2. Pipe integrity.
 - 3. Trench excavation and bedding material for rocks and foreign material.
 - 4. Proper trench slope.
 - 5. Trench contour to ensure the pipe will have uniform and continuous support.
 - 6. Proposed backfill and filter pack for horizontal collector wells.
- F. Any irregularities found by the Engineer during this inspection must be corrected before lowering the pipe into the trench. Pipe shall be allowed sufficient time to adjust to trench temperature prior to any testing, segment tie-ins, and/or backfilling.
- G. Pipes and fittings shall be carefully lowered into trench to limit stress to pipes, fittings, and joints.
- H. Pipe and fittings shall be installed so that there will be no deviation at the joints and so that inverts present a smooth surface. Pipe and fittings that do not fit together to form a tight fitting joint are not permitted.
- I. Tie-ins shall be made out of the trench whenever possible. When tie-ins are to be made only in the trench, a bell hole shall be excavated large enough to ensure an adequate and safe work area.
- J. The Contractor shall ensure that kinking or excessive bend diameters of the pipe do not occur during the installation process.
- K. The Contractor shall insure that the pipe installed in the trench is firmly supported. The Contractor shall follow the minimum length and type of backfill specified in the Contract Drawings.
- L. Cap pipe sections longer than single joint (usually 40 feet) on both ends during placement, except during fusing operations.
- M. The Contractor shall cap all open pipe ends at the end of the work day.
- N. HDPE pipe and fittings shall be by the same manufacturer. The minimum strength of the fittings shall not be less than that of the pipe.
- O. Changes in direction of HDPE Pipe:
 - 1. Do not bend pipe to greater degree than minimum radius recommended by manufacturer for type and grade.
- P. The Contractor shall remove cuttings. Shavings shall not be left on the ground.
- Q. HDPE shall not be field threaded and such threaded joints shall not be used in gas collection systems.
- R. Except as indicated on the Contract Drawings, landfill gas pipe fittings shall be butt fusion type, meeting the requirements of ASTM D-3261 and this specification. All fittings shall be pressure rated to match the system piping to which they are fused. The side slope riser fittings shall be factory fabricated and shall have a smooth interior surface.

- S. All perforated pipes shall be perforated by the Manufacturer as shown on the Contract Drawings.
- T. Workmanship: Exterior and interior surfaces shall be smooth with no sharp projections. The surfaces shall be free of foreign inclusions and major surface defects. Polyethylene pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties. The product function shall be considered when judging external defects.
- U. All installed HDPE pipe shall be marked in 25-foot intervals corresponding to the stationing required for slope confirmation and conformance surveying. Each joint shall be marked at header and lateral joints. For main pipeline, station numbering shall be continuous and sequential. Station numbering shall be referenced in daily logs to document pipe installation progress. Survey data shall be submitted in the state plane coordinate system. Top of pipe and cover soil elevation shall be included for all points unless piping is designed to be above grade.

3.3 HEAT FUSION OF HDPE PIPING:

- A. HDPE pipe shall be joined by butt-fusion methods, having a uniform and monolithic pipe interior according to the fusion joining procedures as instructed by the manufacturer, except within the structures, as shown in the Construction Drawings.
- B. Each individual performing fusion joining shall have at least one (1) year of experience in the use of the fusion procedure.
- C. Join pipe sections at ground level to a maximum length of 400 feet, or a length recommended by the manufacturer such that maximum allowable stress, when pulling the pipe into position alongside the trench, is not exceeded. Use appropriate materials and equipment, as recommended by the HDPE pipe manufacturer, when pulling butt-fused pipe sections alongside the trench to prevent pipe damage.
- D. During installations when temperature exceeds 90 Deg F, it may be necessary to provide a slightly longer length of HDPE pipe when connections are to be made between two fixed points or structures to compensate for contraction of the pipe in a cooler trench bottom. The additional pipe length requirements shall be in accordance with the HDPE pipe manufacturer's instructions.
- E. For cleaning pipe ends, solutions such as detergents and solvents, when required, shall be used in accordance with manufacturer's recommendations.
- F. Do not bend pipe to greater degree than minimum radius recommended by manufacturer for type and grade.
- G. Do not subject pipe to strains that will overstress or buckle pipe or impose excessive stress on joints.
- H. Branch saddle fusions shall be joined in accordance with manufacturer's recommendations and procedures. Branch saddle fusion equipment will be of the size to facilitate saddle fusion within the trench.
- I. Before butt fusing pipe, each length shall be observed for presence of dirt, sand, mud, shavings, and other debris or animals. Remove all materials from the inside of the pipe.
- J. At end of each working day, cover open ends of fused pipe. Cap to prevent entry by animals or debris.
- K. Use compatible fusion techniques when polyethylene pipes of different melt indexes are fused together. Refer to manufacturer's specifications for compatible fusion.

3.4 FLANGED CONNECTIONS

- A. For flanged connections in virgin soil, the Contractor shall wrap and tape the flanges and bolts in 5 mil polyethylene sheeting prior to backfilling to help protect the assembly from corrosion.
- B. Flanges shall be joined with 316 stainless steel studs and nuts. Stud lengths shall accommodate the required distance between flanges including spacers, if necessary.

- C. Tighten flange bolts at uniform rate which will result in uniform gasket compression over entire area of joint. Provide tightening torque in accordance with manufacturer's recommendations. CAUTION: Do not over-torque bolts.
- D. For flanged connections within the limits of refuse, all below grade back-up rings, studs, nuts and washers shall be thoroughly coated with a rubberized emulsion undercoating spray, or approved substitute.
- E. The Contractor shall wrap and tape the flanges and bolts in 5 mil polyethylene sheeting prior to backfilling.

3.5 CONNECTIONS WITH EXISTING PIPING

- A. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered.
- B. Perform connections with existing piping at time and under conditions which will least interfere with service to customers affected by such operation.
- C. Undertake connections in fashion which will disturb system as little as possible.
- D. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
- E. Where connections to existing systems necessitate employment of past installation methods not currently part of trade practice, utilize necessary special piping components.
- F. Once tie-in to each existing system is initiated, continue work continuously until tie-in is made and tested.
- G. Where connection involves potable water systems, provide disinfection methods as required.

3.6 SEGMENT TESTING

- A. The HDPE transmission line and air supply shall be subjected to pneumatic pressure tests as described herein to detect any leaks in the piping. Testing shall only be performed below grade (inside the trench). The Contractor shall accept the responsibility for locating, uncovering (if previously backfilled), and repairing any leaks detected during testing.
- B. Polyethylene piping shall be butt welded together into testing segments. Segments shall be connected to a testing apparatus on one end and fitted with fusion-welded caps on all openings.
- C. The segment to be tested shall be allowed time to reach constant and/or ambient temperature before initiating the test.
- D. The test must be performed during a period when the pipe segment will be out of direct sunlight; i.e., early morning, late evening, or cloudy days. This will minimize the pressure changes which will occur during temperature fluctuations.
- E. The pneumatic test pressure for LFG header pipe and laterals shall be 10 psig with a maximum of 5% loss. Failing pipe sections will be inspected for any visible leaks and re-tested. Engineer will determine protocol for any additional failures.
- F. Pressure drop during the test shall not exceed five percent of the testing gauge pressure over a period of one hour. The pressure drop shall be corrected for temperature changes before determining pass or failure. (See Section 3.7 for test failures).
- G. The Engineer shall be notified 1 week prior to commencement of the testing procedure and shall be present during the test.
- H. All equipment for this testing procedure, including an adequately sized air compressor, fittings, caps/pipe plugs, etc. shall be furnished by the Contractor. Other necessary equipment includes a pressure gauge with a scale that spans the test pressure range with increments equal to 0.1 percent of the test pressure, an appropriate valve to facilitate an air compressor hose, and a ball valve to release pipe pressure at completion of test. Pipe reducers shall be utilized to adapt test flange to size of pipe being tested.

3.7 TEST FAILURE

- A. The following steps shall be performed when a pipe segment fails the five percent/one hour test described in Section 3.6. F.
 - 1. The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.
 - 2. All blocked risers and capped ends shall be inspected for leaks.
 - 3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.
- B. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and re-fusing the pipe.
- C. After all leaks are repaired, a retest shall be performed in accordance with Section 3.6.

3.8 TEST REPORTING

- A. Each test (pass or failure) shall be reported in writing on a form approved by the Engineer.
 - 1. Test report to include, date, size of pipe, length, description, and stationing.
- B. If failure occurs, Contractor shall note the following:
 - 1. Location of failure segment.
 - 2. Nature of leaks.
 - 3. Repairs performed.
 - 4. Results of test.

3.9 LOCATION OF BURIED OBSTACLES

- A. Furnish exact location and description of buried utilities encountered and thrust block placement.
- B. Reference items to definitive reference point locations such as found property corners, entrances to buildings, existing structure lines, fire hydrants and related fixed structures.
- C. Include such information as location, elevation, coverage, supports and additional pertinent information.
- D. Incorporate information on "As-Recorded" Drawings.

END OF SECTION

SECTION 40 05 31

PIPE - PLASTIC

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plastic pipe.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 40 05 00 - Pipe and Fittings – Basin Requirements.

1.2 QUALITY ASSURANCE

- A. See Specification Section 40 05 00.
- B. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. PVC (polyvinyl chloride) materials:
 - 1) D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
 - 2) D1785, Standard Specification for Poly(Vinyl Chloride) PVC Plastic Pipe, Schedules 40, 80 and 120.
 - 3) D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
 - 4) D3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - 5) D3139, Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 - 6) D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - 7) F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - 8) F679, Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
 - 9) F794, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
 - 10) F949, Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings.
 - b. Installation:
 - 1) D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 - 2. American Water Works Association (AWWA):
 - a. PVC (polyvinyl chloride) materials:
 - 1) C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In.
 - b. Polyethylene (PE) materials:
 - 1) C901, Standard for Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inches through 3 IN, for Water Service.
 - 3. NSF International (NSF).

1.3 SUBMITTALS

- A. See Specification Section 40 05 01.

PART 2 - PRODUCTS

2.1 PVC PRESSURE PIPING (EXPOSED)

A. General:

1. Provide Schedule 80 pipe with Schedule 80 fittings and appurtenances to locations shown on Drawings.
2. Furnish materials in full compliance to following material specifications:
 - a. Manufacture pipe, fittings and appurtenances from polyvinyl chloride (PVC) compound which meets the requirements of Type 1, Grade 1 (12454-B) Polyvinyl Chloride as outlined in ASTM D1784.
 - b. Manufacture pipe, fittings and valves from materials that have been tested and approved for conveying potable water by the NSF.

B. Pipe:

1. Furnish pipe meeting requirements of ASTM D1785.
2. Pipe 2 inches and less to be solvent welded.
3. Pipe larger than 2 inches may be either flanged or solvent welded unless shown otherwise on Drawings.

C. Fittings: Provide ASTM D2467 PVC socket type fittings having the same pressure and temperature rating as the pipe.

D. Flanges/Unions:

1. Furnish flanges and unions at locations shown on Drawings.
2. Provide either flanges or unions at valves, penetrations through structures and equipment connections.
3. For pipe larger than 2 inches, provide 150 pound socket type PVC flange.
4. For pipe 2 inches and less, provide socket type PVC union with Buna O-rings.
5. Use flat, full faced natural rubber gaskets at flanged connections.
 - a. Furnish heavy hex head bolts, each with one heavy hex nut, ASTM F593 Type 316 stainless steel.
6. Use spacers supplied by pipe manufacturer when mating raised-faced flanges to other flanges.

E. Installation:

1. Field threading PVC will not be permitted.
 - a. Perform required threaded connections or attachments by the use of factory molded socket by threaded adapters.
 - b. Female adapters are not acceptable.
2. Employ installation and pipe support practices and solvent welding all in compliance to the manufacturer's printed recommendation.
 - a. Continuously support PVC piping at liquid operating temperatures in excess of 100 DEGF.
 - b. For vertical piping, band the pipe at intervals to rigidly support load of twice vertical load.
 - c. Support riser clamps on spring hangers.
 - d. Do not clamp PVC tightly or restrict movement for expansion and contraction.

2.2 PRESSURE PIPING (UNDERGROUND)

A. Materials: Furnish materials in full compliance with following requirements:

1. Sizes 1/2- through 3-inch diameter: AWWA C901 PE with Pressure Class of 125PSI.
2. Sizes 4- through 60-inch diameter: AWWA C900 PVC with Pressure Class of 150 PSI.

3. Joints for polyethylene pipe shall be fusion type in accordance with AWWA C901.
4. Joints for PVC pipe shall be the elastomeric-gasket type with a pressure rating not less than pipe pressure rating meeting performance requirements of ASTM D3139.

B. Installation:

1. Field threading of PVC pipe will not be permitted.
2. Perform installation procedures, handling, thrust blocking, connections, and other appurtenant operations in full compliance to the manufacturer's printed recommendations and in full observance to plan details when more stringent.

2.3 PVC DRAINAGE, SEWER PIPING

A. Materials:

1. Furnish materials in full compliance to the following material specification.
2. PVC pipe shall be rigid, unplasticized polyvinyl chloride (PVC) made of PVC plastic having a cell classification of 12454-B or 12454-C as described in specification ASTM D1784.
3. The requirements of this Specification are intended to provide for pipe and fittings suitable for non-pressure drainage of wastewater and surface water.
4. Joining systems shall consist of an elastomeric gasket joint meeting requirements of ASTM D3212.
5. Supply to the Engineer all information and sample of joining method for his evaluation.
 - a. Only jointing methods acceptable to the Engineer will be permitted.
6. Provide pipe and fittings meeting or exceeding the following requirements:
 - a. 4-27 inches diameter: ASTM D3034 and ASTM F679, SDR 35.
 - b. 8-30 inches diameter: ASTM F794.
 - c. 4-18 inches diameter: ASTM F949.
7. Ensure impact strengths and pipe stiffnesses in full compliance to these Specifications.

B. Installation: Install pipe and fittings in accordance with ASTM D2321 and as recommended by the manufacturer.

1. Provide for a maximum deflection of not more than 3%.

2.4 PVC TUBING

A. General: Provide nylon tubing with fittings and appurtenances as shown on Drawings.

B. Materials:

1. Furnish clear outer braided tubing with braid outside the walls.
2. Have tubing manufactured of nylon with working temperatures from 5 to 180 degrees F.
3. Design tubing with a minimum safety factor of 4 to 1 ratio of burst pressure to working pressure at maximum temperature.
4. Provide tubing with working pressure of 75 psi at 180 degrees F.
5. Ensure that tubing is self-extinguishing and fire resistant.

C. Fittings:

1. Install tubing with nylon fittings and connectors.
2. Use barbed type adapters with stainless steel clamps.
3. Provide fittings capable of withstanding temperatures from a -70 to 250 degrees F.
4. Ensure fittings have the same pressure and temperature rating as the tubing.

PART 3 - EXECUTION

3.1 IDENTIFICATION

- A.** Identify each length of pipe clearly at intervals of 5 feet or less.

1. Include manufacturer's name and trademark.
2. Nominal size of pipe, appurtenant information regarding polymer cell classification and critical identifications regarding performance specifications and NSF approvals when applicable.

3.2 PRESSURE PIPING (UNDERGROUND)

A. Installation:

1. Field threading of PVC pipe will not be permitted.
2. Perform installation procedures, handling, thrust blocking, connections, and other appurtenant operations in full compliance to the manufacturer's printed recommendations and in full observance to plan details when more stringent.

3.3 PVC DRAINAGE, SEWER PIPING

A. Installation: Install pipe and fittings in accordance with ASTM D2321 and as recommended by the manufacturer.

1. Provide for a maximum deflection of not more than 3%.

B. Infiltration and Exfiltration:

1. The maximum allowable infiltration measured by test shall not exceed 100 GAL per inch of pipe diameter per mile per 24 hours.
2. For exfiltration, all the pipe and fittings shall exceed performance requirements by the test procedure as specified in Section 40 05 00.
3. Observe full instructions of the Engineer for carrying of testing procedures.
 - a. Perform tests only during presence of the Engineer or his authorized representative.
4. Should any test on any section of pipe line disclose either infiltration rates greater than allowed or disclose air loss rate greater than that permitted, locate and repair the defective joints or pipes at no cost to Owner and retest until requirements stated are met.

C. Deflection:

1. After backfilling, each section of pipe shall be checked for deflection by pulling a mandrel through the pipe.
2. Pipe with deflection exceeding 5% of the inside diameter shall have backfill removed and replaced to provide a deflection of less than 5%.
3. Any repaired pipe shall be retested.

3.4 PVC TUBING

A. Fittings:

1. Install tubing with nylon fittings and connectors.
2. Use barbed type adapters with stainless steel clamps.
3. Provide fittings capable of withstanding temperatures from a -70 to 250 degrees F.
4. Ensure fittings have the same pressure and temperature rating as the tubing.

B. Trays:

1. Flat smoothed bottom tray for supporting flexible hoses when there is a chance that the hoses may pulse or move.

END OF SECTION

SECTION 40 05 34
PIPE: CORRUGATED POLYETHYLENE

PART 1 - GENERAL

1.1 DESCRIPTION

A. General:

1. This item shall consist of furnishing, fabricating, and installing corrugated polyethylene pipe of the types, classes, sizes, and dimensions as shown on the plans, at such places as are designated on the plans and profiles, or by the Engineer, in accordance with these specifications and in conformity with the lines and grades given.
2. Piping locations include, but may not be limited to slope drains.

B. Related work specified elsewhere:

1. Section 01 33 00 – Submittals.
2. Section 31 23 33 – Utilities – Trenching and Backfilling.
3. Section 40 05 00 – Pipe and Pipe Fittings: Basic Requirements.

1.2 QUALITY ASSURANCE

A. Reference Standards

1. American Society of Testing and Materials (ASTM) Standards.
 - a. D618, Methods of Conditioning Plastics and Electrical Insulating Materials for Testing.
 - b. D1056, Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.
 - c. D1600, Terminology for Abbreviated Terms Relating to Plastics.
 - d. D1693, Test Method for Environmental Stress-Cracking of Ethylene Plastics.
 - e. D2122, Method of Determining Dimensions of Thermoplastic Pipe and Fittings.
 - f. D2321, Practice for Underground Installation of Flexible Thermoplastic Pipe and Sewers and Other Gravity-Flow Applications.
 - g. D2412, Test Method for External Loading Properties of Plastic Pipe by Parallel-Plate Loading.
 - h. D2444, Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).
 - i. D3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - j. D3350, Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
 - k. F405, Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.
 - l. F412, Definitions of Terms Relating to Plastic Piping Systems.
 - m. F477, Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 - n. F667, Standard Specification for Large Diameter Corrugated Polyethylene (PE) Tubing and Fittings.
 - o. F1417, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.
2. American Association of State Highway and Transportation Officials (AASHTO) Standards.
 - a. M252, Standard Specification for Corrugated Polyethylene Drainage Tubing, 75mm to 250mm (3" to 10") Diameter.
 - b. M294, Standard Specification for Corrugated Polyethylene Pipe, 300mm to 1200mm (12" to 36") Diameter.

- c. MP6-95, Provisional Specification for Corrugated Polyethylene Pipe, 1050 and 1200mm (42" and 48") Diameter.

1.3 SUBMITTALS

- A. See Section 01 33 00 - Submittals.
- B. See submittal requirements of Section 40 05 00 – Pipe and Pipe Fittings, Basic Requirements.
- C. Shop Drawings:
 - 1. Layout drawings to include the following:
 - a. Dimensions.
 - b. Schedule of pipe.
 - c. Fittings.
 - d. Miscellaneous appurtenances.
 - e. When special fittings are necessary, verify locations of items and include complete details.
 - 2. Render copies of any manufacturer's written instructions regarding material handling, delivery, storage, and installation.
- D. Miscellaneous:
 - 1. Submit As-built drawings of piping systems in project including project items and pre-existing items. Identify complete location, elevation, and description of piping systems. Relate piping systems to identified structures and appurtenances.

PART 2 - MATERIALS

2.1 GENERAL

- A. Corrugated Polyethylene Pipe and Fittings: This pipe and connections shall conform to the requirements of AASHTO M252 and M294 and Section 40 05 00 – Pipe and Pipe Fittings – Basic Requirements, Schedule 17.
- B. This pipe shall be Type "S" dual-walled pipe with a smooth interior and annular exterior corrugations.
- C. Basic Materials: Pipe and fittings shall conform to the requirements of ASTM D3350, except the carbon black content shall not exceed 5 percent.
- D. Coupling Bands: Flexible pipe shall be firmly joined by coupling bands. These bands shall be not more than two nominal sheet thicknesses lighter than the thickness of the pipe to be connected. Only fittings supplied or recommended by the pipe manufacturer should be used. Fittings shall be installed in accordance with the manufacturer's recommendations. Couplers used with pipe and fittings shall be of a design that preserves alignment during construction and prevents separation at the joints. Bell-and-spigot joints, external snap, or split couplers shall be used. Annular split couplers shall overlap at least two full corrugations on each pipe end being coupled. Helical split couplers shall be at least 6" long for 4" to 10" diameter, and one-half the nominal pipe diameter in width for diameters 12" and above. If necessary, self-locking nylon ties, HDPE tape, or rods can be used to secure the split coupling bands.
 - 1. Joining systems shall be Type 3 (Water Tight) couplers used to connect individual pipe sections.
 - 2. Gasketed soil tight joints: Architectural weather-stripping material per ASTM D-1056 or rubber per ASTM F477.
 - 3. Gasketed integral bell/spigot: rubber gasket per ASTM F-477 installed on the spigot end.
 - 4. Reinforced couplers shall be used where the possibility of separation is great. These couplers shall be constructed of a heavy cross-laminated polyethylene backing, rubberized mastic sealer, plastic straps with sheathing, and woven polypropylene reinforcing.
- E. Perforations:

1. All perforations shall be cleanly cut.
2. The water inlet area shall be a minimum as follows:

1.0 in ² /ft	4" to 10" pipe
1.5 in ² /ft	12" to 18" pipe
2.0 in ² /ft	pipe sizes larger than 18"

3. The width of slots shall not exceed 1/8". The length of slots shall not exceed 10% of the nominal inside circumference for 4" to 8" pipe, 2.5' for 10" to 15" pipe, and 3.0" for 18" and larger pipe.
4. Circular perforations shall not exceed:

3/16"	4" through 10" pipe
3/8"	pipe sizes larger than 10"

PART 3 - EXECUTION

3.1 GENERAL

- A. Equipment: All equipment necessary and required for the proper construction of piping shall be on the project, in first class working condition. The Contractor shall provide such mechanical tampers as required to obtain the compaction of the pipe bedding and backfill as specified.
- B. Excavation: The Contractor shall perform all excavation to the depth shown on the plans. The bedding for the pipe shall be shaped so that the bottom of the pipe shall be in continuous contact with the bottom of the trench. Bedding shall be as shown on the plans.
- C. Placing Pipe: The pipe shall be laid with the separate sections joined firmly together with coupling bands with outside laps of circumferential joints pointing upgrade, and with longitudinal laps on the sides. The pipe shall be laid carefully and true to lines and grades on a bed which is uniformly firm throughout its entire length. Any pipe which is not in true alignment, or which shows any undue settlement after laid or is damaged, shall be taken up and relaid or replaced without additional cost to the Owner. Pipe shall not be laid on frozen ground.
- D. Connections: Contractor shall follow manufacturer's recommendations in installing pipe connections.
- E. Backfill: The trench shall be backfilled with material indicated on the Drawings.

END OF SECTION

This page intentionally left blank.

SECTION 40 05 51
COMMON REQUIREMENTS FOR PROCESS AND UTILITY VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Valving and valving appurtenances.
- B. Related Sections include but are not necessarily limited to:
 - 1. Section 01 61 03 - Common Work Results for Equipment.
 - 2. Section 40 05 00 - Common Work Results for Process Piping.
 - 3. Section 40 05 61 - Gate Valves.
 - 4. Section 40 05 62 - Plug Valves.
 - 5. Section 40 05 63 - Ball Valves.

1.2 REFERENCES

- A. Definitions:
 - 1. The following are definitions of abbreviations used in this Specification Section or one of the individual valve sections:
 - a. CWP: Cold water working pressure.
 - b. SWP: Steam working pressure.
 - c. WOG: Water, oil, gas working pressure.
 - d. WWP: Water working pressure.
- B. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B1.20.1, Pipe Threads, General Purpose.
 - b. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - c. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
 - d. B16.34, Valves-Flanged, Threaded and Welding End.
 - 2. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
 - 3. American Water Works Association (AWWA):
 - a. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 inches through 144 inches.
 - b. C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
 - c. C504, Standard for Rubber-Seated Butterfly Valves.
 - d. C507, Standard for Ball Valves, 6 inches through 48 inches (150 mm through 1200 mm).
 - e. C509, Standard for Resilient-Seated Gate Valves for Water Supply Service.

- f. C550, Standard for Protective Coatings for Valves and Hydrants.
 - g. C606, Standard for Grooved and Shouldered Joints.
- 4. American Water Works Association/American National Standards Institute (AWWA/ANSI):
 - a. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- 5. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. MG 1, Motors and Generators.
- 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).

1.3 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. See Section 40 05 57 - Actuators for Process Valves and Gates.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Valve pressure and temperature rating.
 - d. Valve material of construction.
 - e. Special linings.
 - f. Valve dimensions and weight.
 - g. Valve flow coefficient.
- B. Informational Submittals:
 - 1. Test reports if required in the individual valve specification.
- C. Closeout Submittals:
 - 1. Operation and Maintenance Data:
 - a. Submit in accordance with Section 01 78 23 - Operation and Maintenance Data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to individual valve Specification Sections for acceptable manufacturers.

2.2 MATERIALS

- A. Refer to individual valve Specification Sections.

2.3 FABRICATION

- A. End Connections:
 - 1. Provide the type of end connections for valves as required in the Piping Schedules presented in Section 40 05 00 or as shown on the Drawings.
 - 2. Comply with the following standards:
 - a. Threaded: ASME B1.20.1.
 - b. Flanged: ASME B16.1, Class 125 unless otherwise noted or AWWA C207.
 - c. Bell and spigot or mechanical (gland) type: AWWA/ANSI C111/A21.11.
 - d. Soldered: ASME B16.18.
 - e. Grooved: Rigid joints per Table 5 of AWWA C606.

- B. Refer to individual valve Specification Sections for specifications of each type of valve used on Project.
- C. Nuts, Bolts, and Washers:
 - 1. Wetted or internal to be bronze or stainless steel.
 - a. Exposed to be zinc or cadmium plated.
 - 2. Buried:
 - a. Tee-Head bolts for mechanical joints: Per AWWA/ANSI C111/A21.11.
 - b. Other bolts and nuts: ASTM A307.
 - c. Wax Tape Coatings per AWWA C217.
 - 3. Exposed: Mechanical galvanized ASTM B695, Class 40.
 - 4. Heads and dimensions per ASME B1.1.
 - 5. Threaded per ASME B1.1.
 - 6. Project ends 1/4 to 1/2 inches beyond nuts.
- D. On Insulated Piping: Provide valves with extended stems to permit proper insulation application without interference from handle.
- E. Epoxy Interior Coating: Provide epoxy interior coating for all ferrous surfaces in accordance with AWWA C550.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Painting Requirements: Comply with Section 09 96 00 for High Performance Industrial Coatings.
- C. Setting Buried Valves:
 - 1. Locate valves installed in pipe trenches where buried pipe indicated on Drawings.
 - 2. Set valves and valve boxes plumb.
 - 3. Place valve boxes directly over valves with top of box being brought to surface of finished grade.
 - 4. Install in closed position.
 - 5. Place valve on firm footing in trench to prevent settling and excessive strain on connection to pipe.
 - 6. After installation, backfill up to top of box for a minimum distance of 4 feet on each side of box.
- D. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.
- E. For grooved coupling valves, install rigid type couplings [or provide separate support to prevent rotation of valve from installed position].
- F. Wax Tape Coating System:
 - 1. After installation, coat all buried nuts and bolts with a wax tape coating system in accordance with:
 - a. AWWA C217.
 - b. Manufacturer's printed instructions.
 - 2. Cut strips of wax tape and apply them around all bolts and nuts so that there are no voids or spaces under the tape.
 - 3. Apply a sufficient amount of tape to completely encapsulate all bare metal.
- G. For threaded valves, provide union on one side within 2 feet of valve to allow valve removal.

H. Install valves accessible for operation, inspection, and maintenance.

3.2 FIELD QUALITY CONTROL

A. Wax Tape Coating Testing:

1. Inspect each wax tape-wrapped component.
 - a. Verify primer was applied to substrate surfaces.
 - b. Ensure the wax tape has fully encapsulated all portions of the substrate.
 - c. Ensure that the wax tape is in intimate contact with the substrate.
 - d. Verify that the wax tape has been applied to the specified thickness.
2. Do not backfill until this inspection is complete and the wax tape application is approved by the Engineer.

END OF SECTION

SECTION 40 05 60
LANDFILL GAS SYSTEM VALVES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope of Work: The CONTRACTOR shall provide all materials, equipment, and labor needed to install complete and ready for use all header isolation valves as specified herein and as indicated on the Plans.
- B. Related Section included but not necessarily limits to:
 - 1. Section 40 05 00 – Pipe and Pipe Fittings: Basic Requirements

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. B1.20.1, Pipe Threads, General Purpose.
 - b. B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
 - c. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
 - d. B16.34, Valves-Flanged, Threaded and Welding End.
 - 2. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
 - 3. American Water Works Association (AWWA):
 - a. C111, Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
 - b. C207, Steel Pipe Flanges for Waterworks Service - Sizes 4 IN through 144 IN.
 - c. C500, Gate Valves for Water and Sewerage Systems.
 - d. C504, Rubber-Seated Butterfly Valves.
 - e. C507, Ball Valves, 6 IN through 48 IN (150 MM through 1200 MM).
 - f. C509, Resilient-Seated Gate Valves 3 through 12 NPS, for Water and Sewage Systems.
 - g. C540, Power-Actuating Devices for Valves and Sluice Gates.
 - h. C550, Protective Epoxy Interior Coatings for Valves and Hydrants.
 - i. C606, Grooved and Shouldered Joints.

4. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.(MSS).

1.3 SUBMITTALS

- A. The CONTRACTOR shall prepare and submit to the ENGINEER, for review and approval, certificates of compliance on materials furnished and manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, inspection, maintenance, operation, and repair of each type of valve furnished. Shop drawings shall be submitted for butterfly valve assemblies requiring spacers per paragraph 3.1 B of this Section.

PART 2 - MATERIALS

2.1 BUTTERFLY VALVES (LFG HEADER)

- A. All valves shall be complete with all necessary operators, actuators, handwheels, extension stems, worm gear operators, operating nuts, wrenches, spacers, and other accessories or appurtenances which are required for the proper completion of the work. Operators and other accessories shall be sized and furnished by the valve supplier and be factory mounted.
- B. Valves shall be suitable for the intended service. Renewable parts including discs, packing, and seats shall be of types recommended by valve manufacturer for intended service, but not of a lower quality than specified herein.
- C. Valves and operators shall be suitable for burial within a landfill.
- D. Unless otherwise shown, valves shall be the same size as the adjoining pipe.
- E. Valves and operators shall be suitable for the intended use (i.e., buried within a landfill, and subjected to landfill gas, condensate, and leachate).
- F. Valve position indicators shall be installed correctly to properly identify the valve position.
- G. Header isolation valves shall be butterfly bubble tight, wafer design, with a PVC body, polypropylene disc, nitrile seats and seals, 316 stainless steel valve stem, or 403 stainless steel valve stem if 14-inch valve or larger, and compatible with a flat face flange. Valves shall be Asahi/America (800-343-3618), Type 57 or 75, as appropriate, or approved equal.
- H. Stem extensions shall be stainless steel in an epoxy coated carbon steel outer housing with a die-cast aluminum alloy gear box assembly mounted on top and equipped with a removable manual operating wheel.

2.2 GATE VALVES

- A. The gate shall be constructed of Type 1, Grade 1 PVC with socket fittings and a polypropylene wedge. No metal parts shall be in contact with the LFG flowing through the valve. The valves shall meet the requirements of ASTM D-1784 for rigid PVC compounds. The "gate" shall be of a tapered cylindrical plug design made of PVC, thickly lined with styrene butadiene rubber (SBR) material, flanged, non-rising stem with position indicator.

2.3 MONITORING PORTS

- A. Monitoring ports shall be installed at each header isolation valve and shall include the following items, or approved substitutes. Monitoring hose shall be stainless steel with outer braid Swagelok flexible metal hose, Part No. SS-H04PM4PF4, of adequate length to extend above grade as shown on the Plans. The male NPT end shall be threaded into the top of the header. Sampling end shall have a ¼-inch NPT polypropylene monitoring quick disconnect ports by

Ryan Herco (800-848-1141), Part No. 0812-002. The hose shall be secured to the valve stem outer boring by stainless steel worm-gear clamps.

- B. Quick connects may be replaced by SCH 80 PVC labcock valves subject to approval by the ENGINEER. Labcock valves shall be 1/4-inch PVC with EPDM seats and seals. Valves shall have 1/4-inch MPT on one end and hose connection on the end, and the body shall be single piece construction.

2.4 IDENTIFICATION TAGS

- A. CONTRACTOR shall supply and affix to each header isolation valve monitoring port a plastic tag marked with pre-printed letters designating the valve number followed by the letters "A" or "B" (e.g., V-1A, V-1B, V-2A, etc.). The tags imprinted with an "A" shall be placed on the monitoring port closest to the blower/flare station. Those marked with a "B" shall be affixed to the other valve monitoring port. Tags shall not be marked with pen or marker.
- B. Tags shall be 2 1/2-inch square tag, yellow with black lettering, Square Setonply® tag, style M4550, by Seton (800-243-6624), or equal. Tag shall be secured to the valve stem housing with a plastic "zip tie" or as approved by the ENGINEER.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Valves shall be installed in accordance with the manufacturer's recommendations and the following:
 - 1. Butterfly valves shall be installed between two flanges as shown on the Plans; care shall be taken to avoid stripping bolts when tightening.
 - 2. Flanges shall be joined with hot dipped galvanized steel studs and nuts. Stud lengths shall accommodate the required distance between flanges including spacers, if necessary. Stainless steel studs and nuts are not acceptable substitutes.
 - 3. All below grade back-up rings, studs, nuts and washers shall be thoroughly coated with Polyken Technologies 1027 Primer, or rubberized emulsion undercoating spray, or approved substitute. There shall be no "holidays", or areas where the coating is not completely applied.
 - 4. The CONTRACTOR shall wrap and tape the valve, flanges, and bolts in 5 mil polyethylene sheeting prior to backfilling.
- B. Flanged butterfly valves require spacers between the flange adapters and the valve body in order to allow full travel of the internal disk. The CONTRACTOR shall install valve spacers for all isolation valves and with the approval by the ENGINEER.
- C. Setting Buried Valves:
 - 1. Locate valves installed on pipe in trenches with valve pit box where buried pipe indicated on Drawings. Alternately the valve can be pre-manufactured and preassembled in valve pit.
 - 2. Set valves and valve boxes plumb.
 - 3. Place valve boxes directly over valves with top of box being brought to surface of finished grade.
 - 4. Install in closed position.
 - 5. Place valve on firm footing in trench to prevent settling and excessive strain on connection to pipe.

- 6. After installation, backfill up to top of box for a minimum distance of 4 FT on each side of box.
- D. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.
- E. For grooved coupling valves, install rigid type couplings or provide separate support to prevent rotation of valve from installed position.
- F. Install electric or cylinder actuators above or horizontally adjacent to valve and gear box to optimize access to controls and external handwheel.
- G. For threaded valves, provide union on one side within 2 FT of valve to allow valve removal.
- H. Install valves accessible for operation, inspection, and maintenance.

3.2 ADJUSTING

- A. Operate valve, open and close at system pressures and make necessary adjustments.

END OF SECTION

SECTION 40 05 61
GATE VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gate valves.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 40 05 51 - Common Requirements for Process and Utility Valves.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - 2. American Water Works Association (AWWA):
 - a. C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
 - b. C504, Standard for Rubber-Seated Butterfly Valves.
 - c. C550, Standard for Protective Epoxy Interior Coatings for Valves and Hydrants.
 - 3. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
 - a. SP-9, Spot Facing for Bronze, Iron and Steel Flanges.
 - b. SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
 - c. SP-80, Bronze Gate, Globe, Angle and Check Valves.

1.3 DEFINITIONS

- A. OS&Y: Outside Screw and Yoke.
- B. NRS: Non-rising Stem.
- C. RS: Rising Stem.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 40 05 51.
- B. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.

2.2 VALVES: WATER, STEAM CONDENSATE, STEAM TO 125 PSI, AIR; 2-1/2 INCHES AND SMALLER

- A. Class 125 bronze gate valve.
- B. Comply with MSS SP-80.

- C. Materials:
 - 1. Body, bonnet, wedge: Bronze.
 - 2. Stem: Silicon bronze.
 - 3. Packing: Aramid fibers with graphite (Kevlar®).
- D. Design Requirements:
 - 1. 125 psi steam, 200 psi non-shock WOG.
 - 2. Screw in bonnet, non-rising stem, solid wedge.
- E. Manufacturers:
 - 1. Nibco.
 - 2. Stockham.

2.3 VALVES: STEAM CONDENSATE, STEAM TO 125 PSI, AIR; 3 INCHES AND LARGER

- A. Class 125 iron body gate valve.
- B. Comply with MSS SP-70.
- C. Materials:
 - 1. Body, bonnet, wedge: Cast iron, ASTM A126, Class B.
 - 2. Stem: Brass, bronze, or copper silicon alloy.
- D. Design Requirements:
 - 1. 125 psi steam to 400 degrees F, 200 psi WOG.
 - 2. Bolted bonnet, OS&Y, solid wedge, bronze mounted.
- E. Manufacturers:
 - 1. Nibco.
 - 2. Stockham.

2.4 VALVES: WATER (HOT, COLD, HEATING, COOLING, SERVICE, PROCESS, POTABLE, NON-POTABLE, AND WASTEWATER)

- A. Double Disc Gate Valve, 3 to 12 inches (Water Application):
 - 1. Comply with AWWA C500.
 - 2. Materials:
 - a. Seating surfaces, stems, stem nut: Bronze.
 - b. Body, disc: Cast iron.
 - 3. Design requirements:
 - a. 200 psi working pressure.
 - b. Buried: NRS, O-ring stem seal, 2 inches operation nut.
 - c. Exposed: NRS, O-ring stem seal, handwheel
 - 4. Manufacturers:
 - a. American Flow Control.
 - b. Clow.
 - c. M&H.
 - d. Mueller.
- B. Resilient Wedge Gate Valves, 2 to 48 inches (Water, Wastewater Application):
 - 1. Comply with AWWA C509
 - 2. Materials:
 - a. Stem and stem nut: Bronze.

- 1) Wetted bronze parts in low zinc bronze.
 - 2) Aluminum bronze components: Heat treated per AWWA C504.
 - b. Body, gate: Ductile iron Rubber type is dependent on application.
 - c. Resilient wedge: Fully encapsulated rubber wedge. Ethylene Propylene Diene Monomer (EPDM)
 3. Design requirements:
 - a. Minimum 150 PSIG working pressure.
 - b. Buried: NRS, O-ring stem seal, 2 inches square operating nut.
 - c. Exposed: OS&Y, stuffing box stem seal, handwheel].
 - d. Counter clockwise open rotation.
 - e. Fusion bonded epoxy coating interior and exterior except stainless steel and bearing surfaces.
 - 1) Comply with AWWA C550.
 - 2) Wetted bronze parts in low zinc bronze.
 - 3) Aluminum bronze components: Heat treated per AWWA C504.
 4. Manufacturers:
 - a. Clow.
 - b. Mueller.
 - c. American Flow Control.
 - d. M & H.
- C. Double Disc Gate Valves, 14 to 48 inches (Water, Wastewater Application):
1. Comply with AWWA C500.
 2. Materials:
 - a. Seating surfaces, stem, stem nut: Bronze.
 - b. Body, discs: Cast iron.
 3. Design requirements:
 - a. 150 psi working pressure.
 - b. NRS O-ring stem seal.
 - c. Provide gear actuator, 20 inches and larger valves.
 - d. Provide roller tracks and scrapers for horizontal valves size 16 inches and larger.
 - e. Provide bypass valve sized per AWWA C500.
 4. Manufacturers:
 - a. Clow.
 - b. Mueller.
 - c. American Flow Control.
 - d. M & H.
- D. Knife Gate Valves, 2 to 36 inches (Wastewater Sludge Application):
1. Materials:
 - a. Body construction:
 - 1) 2 to 4 inches: Cast stainless steel.
 - 2) 6 to 24 inches: Cast iron body with stainless steel lining.
 - b. Wetted parts: Stainless steel Type 316.
 - c. Packing: Flax, 150 degrees F max.
 - d. Stem: Stainless steel, double pitch thread.
 - e. Resilient seat material (2 to 36 inches): Butadiene.
 2. Design requirements:

- a. Working pressure (WOG non-shock):
 - 1) 2 to 24 inches: 150 psi.
 - 2) 30 to 36 inches: 125 psi.
 - 3) Actuator: Geared actuator for valves 20 inches and larger.
- 3. Manufacturers:
 - a. DeZurik, Series L.
 - b. Fabri-Valve.

2.5 VALVES: STEAM, 125 TO 200 PSI

- A. 2 inches and Smaller:
 - 1. Class 300 bronze gate valve.
 - 2. 300 psi steam, 600 psi WOG, (non-shock).
 - 3. Comply with MSS SP-80.
 - 4. Materials:
 - a. Body, bonnet, wedge: Bronze.
 - b. Stem: Silicon bronze alloy.
 - c. Packing: Teflon or TFE impregnated fiber.
 - 5. Design requirements:
 - a. Union bonnet, rising stem, solid wedge disc, handwheel.
 - 6. Manufacturers:
 - a. Nibco.
 - b. Stockham.
- B. 2-1/2 inches and Larger:
 - 1. Class 250 iron body gate valve.
 - 2. 250 psi steam, 500 psi WOG (non-shock).
 - 3. Comply with MSS SP-70.
 - 4. Materials:
 - a. Body: Cast iron, cast bronze trim.
 - b. Stem: Silicon copper alloy.
 - c. Packing: Teflon or TFE impregnated fiber.
 - 5. Design requirements:
 - a. Bolted bonnet, OS&Y, solid wedge disc, handwheel.
 - 6. Manufacturers:
 - a. Nibco.
 - b. Stockham.

2.6 ACCESSORIES

- A. Refer to Drawings and valve schedule for type of actuators.
 - 1. Furnish actuator integral with valve.
- B. Refer to Specification Section 40 05 00 for actuator requirements.

2.7 FABRICATION

- A. General:
 - 1. Provide valves with clear waterways the full diameter of the valve.
- B. Spot valves in accordance with MSS SP-9.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. See Specification Section 40 05 51.
- B. Where larger buried valves utilize smaller bypass valves, provide a second valve box installed over the bypass valve operating nut.
- C. Do not install gate valves inverted or with the stems sloped more than 45 degrees from the upright unless the valve was ordered and manufactured specifically for this orientation.

END OF SECTION

This page intentionally left blank.

SECTION 40 05 62
PLUG VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plug valves.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 40 05 51 - Common Requirements for Process and Utility Valves.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125 and 250.
 - 2. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - b. A536, Standard Specification for Ductile Iron Castings.
 - c. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
 - 3. American Water Works Association (AWWA):
 - a. C517 Resilient-Seated Cast-Iron Eccentric Plug Valves

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 40 05 51.
- B. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
 - 2. See Specification Section 40 05 51.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed under the specific valve types are acceptable.

2.2 NON-LUBRICATED ECCENTRIC PLUG VALVES (SEWAGE, SLUDGE, SEWAGE GAS APPLICATIONS)

- A. Manufacturers:
 - 1. DeZurik.
 - 2. Henry Pratt.
 - 3. Millikin.
 - 4. ValMatic.
- B. Materials:
 - 1. Body: Cast-iron ASTM A126, Class B.

2. Plug: One or two-piece construction ductile iron, ASTM A536 65-45-12 or cast iron, ASTM A126 Class B.
3. Plug facing: Grease and/or petroleum-resistant resilient Neoprene or Buna-N compound, 70 Type A durometer hardness per ASTM D2240.
4. Shaft bearing bushings: Permanently lubricated TFE or Delrin sleeve type stainless steel or bronze.
5. Valve seats: Welded-in overlay of 90% nickel, (minimum 1/8 inches thick).
6. Stem seal: per AWWA C517, Section 4.4.7.

2.3 LUBRICATED SEAL PLUG VALVES (NATURAL GAS APPLICATIONS)

A. Manufacturers:

1. Nordstrom.
2. Walworth.
3. Millikin.

B. Materials:

1. Body: Cast iron ASTM A126, Class B.
2. Plug: Cast iron ASTM A126, Class B.
3. Plug facing: Teflon on tapered plug.
4. Valve seats: Gas-resistant lubricant/sealant.

2.4 NON-LUBRICATED ECCENTRIC PLUG (HEATING-COOLING WATER APPLICATIONS)

A. Manufacturers:

1. DeZurik Figure 499.
2. Millikin Series 603.
3. Victaulic Series 365.

B. Materials:

1. Body: Cast iron, ASTM A126, Class B.
2. Plug: Bronze or nickel-plated cast iron.
3. Bearings: Bronze or nickel.
4. Plug seal: Isobutene-isoprene (250 degrees F).

2.5 DESIGN REQUIREMENTS

A. Non-Lubricated Eccentric Plug Valves (Wastewater, Sludge):

1. Port area:
 - a. Valves 4 inches through 20 inches: Equal to or exceed 80% of full pipe area.
 - b. Valves greater than 20 inches: 100% equivalent full pipe area.
2. Valve body: Fitted with bolted bonnet.
3. End connections: See Specification Section 40 05 51.
4. Stem seal: Adjustable and replaceable without disassembling valve or bonnet.
5. Designed for seating drip tight in any flow direction.
6. Rating:
 - a. 1/2 through 12 inches, 175 psi working pressure.
 - b. 14 through 36 inches, 150 psi working pressure.
 - c. Three-way valves, 125 psi working pressure.
7. Actuator:
 - a. Actuator gearing in enclosure suitable for running in oil with seals on shaft to prevent entry of dirt or water.

- b. Positive identification on actuator indicating valve position.
 - c. Adjustable stop to set closing torque.
- B. Lubricated Plug Valves (Natural Gas):
 - 1. Pressure lubricated valve with sealed ports and grooves.
 - a. Re-seatable under full pressure in any position.
 - 2. Pressure rating: 200 psi WOG.
 - 3. Port area: Minimum 60% of pipe area.
 - 4. Acceptable to local gas company.
- C. Non-Lubricated Eccentric Plug Valve-(HVAC):
 - 1. Port area: Valves 1/2 inches through 2-1/2 inches: Equal to or exceed 100% of full pipe area.
 - 2. Valve body: Fitted with threaded bonnet or bolted bonnet.
 - 3. End connections:
 - a. Flanges: In full accordance with ASME B16.1, Class 125 including facing, drilling and thickness.
 - b. Threaded connection: In full compliance with NPT.
 - 4. Stem seal: Self-adjusting U-cups or multiple O-ring seals.
 - 5. Shut-off: Designed for setting drip-tight at the full rated pressure.

2.6 FABRICATION

- A. See Specification Section 40 05 51.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. See Specification Section 40 05 51.
- B. Install valves with valve stem horizontal, plug seat on inlet side and with plug rotating up into the open position for valves in horizontal lines.
- C. Install valve with actuator above pipe or plug centerline.

END OF SECTION

This page intentionally left blank.

SECTION 40 05 63

BALL VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ball valves.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 40 05 51 - Common Requirements for Process and Utility Valves.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A48, Standard Specification for Gray Iron Castings.
 - b. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - c. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - d. A351, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - 2. American Water Works Association (AWWA):
 - a. C507, Standard for Ball Valves, 6 inches through 48 inches.
 - 3. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
 - a. SP-110, Ball Valves; Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 DEFINITIONS

- A. PVDF: Polyvinylidene fluoride.
- B. PTFE: Polytetrafluoroethylene.
- C. RPTFE: Reinforced PolyTetraFluoroEthylene.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 40 05 00.
 - 2. Test results for AWWA valves.
- B. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.

2.2 METALLIC BALL VALVES 1/4 TO 3 INCHES DIAMETER

- A. Comply with MSS SP-110.
- B. Manufacturers:

1. Apollo.
 2. Jamesbury.
 3. Watts.
 4. Stockham.
 5. Nibco.
- C. Materials (All Stainless Steel):
1. Body: Three-part stainless steel, ASTM A351 CF8M.
 2. Ball: Stainless steel ASTM A276.
 3. Seats: RPTFE.
- D. Design Requirements:
1. Rated for a minimum of:
 - a. 500 psi CWP.
 - b. 150 psi of saturated steam.
 - c. 29 inches vacuum.
 2. Two-position lockable handle.
 3. Stem with blowout-proof design.
 4. Balancing stop for all applications.
 5. Bodies with mounting pad for applications requiring actuators.

2.3 PLASTIC BALL VALVES: 1/2 INCHES TO 4 INCHES DIAMETER

- A. Manufacturers:
1. Chemtrol/NIBCO.
 2. Spears.
 3. ASAHI/America.
- B. Materials:
1. Body, stem, ball, handle, end connectors:
 - a. PVC ASTM D1784-12454B.
 2. Ball Seat: Teflon.
 3. O-rings: Viton.
- C. Design Requirements:
1. Rated at 150 psi at 75 degrees F.
 2. Double or "true union" design.
 3. Blocks both directions, upstream and downstream.
 4. Union nut capable of compensating for seat wear.
 5. Body with mounting pad for actuators where required.
 6. Capable of being disconnected at downstream end under full line pressure.

2.4 AWWA C507 BALL VALVES: 6 INCHES TO 48 INCHES DIAMETER PRATT (P), WILLAMETTE (W)

- A. Comply with AWWA C507.
- B. Manufacturers:
1. Willamette.
 2. Pratt.
- C. Materials:
1. Body:

- a. Cast iron ASTM A126, Class B (P).
 - b. Cast iron ASTM A48, Class 35 (W).
- 2. Ball:
 - a. Cast iron ASTM A48, Class 40 (P).
 - b. Cast iron ASTM A48, Class 35 (W).
- 3. Shaft:
 - a. Stainless steel 18-8 Type 304 (P).
 - b. Forged steel, chrome plated at seal tensile yield 82,000 psi (W).
- 4. Bearings, sleeve type, non-metallic:
 - a. Teflon lined (P).
 - b. Sleeve type, bronze (W).
- 5. Ball seat: Stainless steel Type 304 (P and W).
- 6. Body seat:
 - a. Buna-N (P).
 - b. Monel (W).
- D. Design Requirements:
 - 1. Design pressure: 250PSI.
 - 2. Flanges: Class 250.
 - 3. Ball shall provide one direction seal or closure.
 - 4. Provide pipe tap for body drain and air vent and legs or base for support.
 - 5. Ball and body seats: Field adjustable and replaceable.

2.5 ACCESSORIES

- A. Refer to Drawings and valve schedule for type of actuators.
 - 1. Furnish actuator integral with valve.
- B. Refer to Specification Section 40 05 51 for actuator requirements.

2.6 SOURCE QUALITY CONTROL

- A. Shop test AWWA C507 ball valves in accordance with AWWA C507.
- B. Furnish record of test.
- C. Product Testing: MSS SP-110.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. See Specification Section 40 05 00.

3.2 FIELD QUALITY CONTROL

- A. For AWWA C507 ball valves employ and pay for services of equipment manufacturer's field service representative(s) to:
 - 1. Inspect equipment covered by this Specification Section.
 - 2. Supervise adjustments and installation checks.
 - 3. Provide test equipment, tools, and instruments necessary to accomplish equipment testing.
 - 4. Conduct startup of equipment and perform operational checks.
 - 5. Provide Owner with a written statement that manufacturer's equipment has been installed properly, has been started up, and is ready for operation by Owner's personnel.

END OF SECTION

CONSTRUCTION QUALITY ASSURANCE PLAN

Blackburn Resource Recovery Facility

Unit 4

Catawba County

Catawba County, North Carolina

December 1, 2017

This page intentionally left blank.

ContentsContents	i
1 Introduction.....	1
1.1 Purpose	1
1.2 Quality Assurance and Quality Control	1
1.3 Units	1
1.4 Overview of Plan.....	1
2 Responsible Parties	1
2.1 Contractor.....	1
2.1.1 Definition	1
2.1.2 Responsibilities.....	1
2.1.3 Qualifications.....	2
2.2 Contractor's Representative	2
2.2.1 Definition	2
2.2.2 Responsibilities.....	2
2.2.3 Qualifications.....	2
2.3 Engineer.....	2
2.3.1 Definition	2
2.3.2 Responsibilities.....	2
2.3.3 Qualifications.....	2
2.4 Engineer's Resident Project Representative.....	2
2.4.1 Definition	2
2.4.2 Responsibilities.....	2
2.4.3 Qualifications.....	3
2.5 Installation Supervisor	4
2.5.1 Definition	4
2.5.2 Responsibilities.....	4
2.5.3 Qualifications.....	4
2.6 Installer.....	4
2.6.1 Definition	4
2.6.2 Responsibilities.....	4
2.6.3 Qualifications.....	4
2.7 Manufacturer.....	4
2.7.1 Definition	4
2.7.2 Responsibilities.....	4
2.7.3 Qualifications.....	4
2.8 Quality Assurance Laboratory.....	4
2.8.1 Definition	4
2.8.2 Responsibilities.....	5
2.8.3 Qualifications.....	5

3	Communication Between Involved Parties	7
3.1	Lines of Communication.....	7
3.2	Pre-Construction Meeting.....	7
3.3	Progress Meetings	7
4	Construction Materials	8
4.1	Landfill Subgrade.....	8
4.2	Base Soil Barrier.....	8
4.3	HDPE Geomembrane.....	8
4.4	Non-Woven Fabric Cushion.....	9
4.5	Operational Layer	9
4.6	Leachate Collection Pipes.....	9
4.7	Filter Fabric.....	9
5	Documentation.....	11

Tables

Table 2-1.	Project Personnel Responsibilities.....	6
Table 4-1.	Landfill Subgrade.....	8
Table 4-2.	Base Soil Barrier.....	8
Table 4-3.	HDPE Geomembrane.....	8
Table 4-4.	Non-Woven Fabric Cushion.....	9
Table 4-5.	Operational Layer	9
Table 4-6.	Leachate Collection Pipes	9
Table 4-7.	Filter Fabric.....	9

Appendices

Appendix A – Specifications

PART 1 - INTRODUCTION

1.1 PURPOSE

The Construction Quality Assurance (CQA) Plan is intended to fulfill 15A NCAC 13 B (Rule) .1621 that requires a CQA Plan be developed and used as part of the construction of a Subtitle D landfill. The plan describes the observations and tests that will be used before, during, and upon completion of construction to ensure that the construction materials meet the design specifications and the requirements set forth in Rule .1624 of the Solid Waste Rules.

1.2 QUALITY ASSURANCE AND QUALITY CONTROL

In the context of this CQA Plan, quality assurance and quality control are defined as follows:

Quality Assurance: A program of tests and observations, executed by a party independent of the contractor, performed to confirm that completed work meets contractual and regulatory requirements and will perform satisfactorily in service.

Quality Control: Those actions performed by the contractor or an agent of the contractor which provide a means to monitor the quality of the work being performed.

1.3 UNITS

In this CQA Plan all properties and dimensions are expressed in U.S. units.

1.4 OVERVIEW OF PLAN

This CQA Plan addresses:

1. Responsibilities and authorities. Per Rule .1621(b)(1), the plan establishes responsibilities and authorities for the construction management organization. This includes a pre- construction meeting conducted prior to beginning construction of the new phase. The meeting shall include a discussion of the construction management organization, respective duties during construction, and periodic reporting requirements for test results and construction activities. This information is presented in Sections 2 and 3.
2. Inspection activities. Per Rule .1621(b)(2), a description of all field observations, tests, and equipment that will be used to ensure that the construction meets or exceeds all design criteria established in accordance with Rules .1620 and .1624.
3. Sampling strategies. Per Rule .1621(b)(3), a description of all sampling protocols, sample size, methods for determining sample locations and frequency of sampling.
4. Documentation. Per Rule .1621(b)(4), reporting requirements for CQA activities are included. Progress and troubleshooting meetings, daily and monthly, will be planned.

The proposed expansion will be designed and constructed in accordance with Rule .1624. The base liner system will be utilizing a compacted clay liner as described in Rule .1624(b)(1)(A)(i).

PART 2 - RESPONSIBLE PARTIES

This section was prepared in accordance with Rule .1621(b)(1). The parties discussed in this section are associated with the ownership, design, manufacture, transportation, installation, and quality assurance of the liner, leachate collection, and closure cap systems. The definitions, responsibilities, and qualifications of these parties are summarized in Table 2-1 and outlined in the following subsections.

2.1 CONTRACTOR

A. Definition

The Contractor is the company with which the Owner has entered into agreement to construct the project.

B. Responsibilities

The Contractor is ultimately responsible for meeting the requirements of the contract documents and the successful completion of the landfill construction. Some of the Contractor's specific responsibilities include: providing qualified personnel to perform quality control, providing submittals for the various

materials as required by the specifications, scheduling and coordinating the work with suppliers and subcontractors, providing a representative at all times during construction activity, provide surveying services, furnish progress and record drawings, attending progress meetings, and notifying the Engineer of design and construction discrepancies.

C. Qualifications

The Contractor shall be experienced in all aspects of the work required to successfully construct the project. The Contractor shall be registered in North Carolina and shall provide references from previous projects.

2.2 CONTRACTOR'S REPRESENTATIVE

A. Definition

The Contractor's Representative (CR) is a qualified individual assigned by the Contractor to represent him/her onsite during construction activities.

B. Responsibilities

The CR is responsible for communication with the Engineer and Owner, coordinating and supervising his crew, subcontractors, and quality control personnel, ensuring that construction activities are conducted in accordance with the plans and specifications, immediately notifying the Engineer's Resident Project Representative (RPR) of any discrepancies between the plans and specifications and the field conditions, attending all meetings held on the project, and keeping a daily log of all construction activities onsite.

C. Qualifications

The CR shall be an individual who demonstrates the capability to direct all tasks required for landfill construction. The CR shall demonstrate experience similar to the nature of the project and be knowledgeable of all aspects of the work.

2.3 ENGINEER

A. Definition

The Engineer is the party responsible for the preparation of the contract documents, including plans and specifications, and for providing administrative and quality assurance services during construction.

B. Responsibilities

The Engineer is responsible for performing the engineering design and preparing the associated construction drawings and specifications. The Engineer is responsible for approving all design and specification changes, clarifying the design, reviewing and approving shop drawings, and other tasks as required during construction. The Engineer conducts the pre-construction meeting and progress meetings outlined in this plan. The Engineer will certify that the construction was completed in accordance with this CQA plan, the conditions of the permit to construct, the requirements of the Rules, and acceptable engineering practices.

C. Qualifications

The Engineer shall be a professional engineer registered by the State of North Carolina. The Engineer shall have a working knowledge of geosynthetics (including detailed geosynthetic design methods and procedures) and all applicable regulatory requirements.

2.4 ENGINEER'S RESIDENT PROJECT REPRESENTATIVE

A. Definition

The RPR is a qualified individual assigned by the Engineer to observe and document activities requiring quality assurance.

B. Responsibilities

The RPR is responsible for observing and documenting activities related to the quality assurance of the production, handling, storage, and installation of the liner and leachate collection systems. The RPR is responsible for implementation of this CQA Plan and coordination of the Quality Assurance Laboratory (QAL).

The specific duties of the RPR personnel are as follows:

- a. Review all construction drawings and specifications.
- b. Review other site-specific documentation, including permits, proposed layouts, and Manufacturer's and Installer's literature.
- c. Develop a site-specific addendum for quality assurance of geosynthetics, if necessary.
- d. Administer the geosynthetic portions of the CQA Plan, e.g., assign and manage all geosynthetic quality assurance personnel, review all field reports, and provide an initial review of all quality assurance related issues.
- e. Review all changes to design drawings and specifications as issued by the Engineer.
- f. Act as the onsite (resident) representative of the owner.
- g. Attend all quality assurance related meetings, e.g., resolution, pre-construction, daily, weekly.
- h. Review all Manufacturer and Installer certifications and documentation and make appropriate recommendations.
- i. Review the Installer's personnel qualifications for conformance with those qualifications pre-approved for work onsite.
- j. Review the calibration certification of the onsite tensiometer, if applicable.
- k. Review all daily reports, logs, and photographs.
- l. Note any onsite activities that could result in damage to the liner system.
- m. Report to the Engineer and log in the daily report any relevant observations.
- n. Prepare daily reports in addition to Contractor's Daily Reports.
- o. Prepare daily reports summarizing liner system quality assurance activities.
- p. Oversee the marking, packaging, and shipping of all laboratory test samples.
- q. Review the results of laboratory testing.
- r. Report any unapproved deviations from the CQA Plan.
- s. Prepare the final certification report.
- t. Monitor, log, photograph, and/or document all liner system installation, including but not limited to subgrade, geosynthetic liner, and leachate collection system using the proper forms as identified within this document. Photographs shall be taken routinely of critical areas during installation sequence.
- u. Monitor the following for all liner system and leachate collection system materials:
 - (1) Material delivery
 - (2) Unloading and onsite transport and storage
 - (3) Conformance test sampling
 - (4) Condition of geosynthetic panels as placed
 - (5) Geosynthetic deployment and installation operations
 - (6) Repair operations
- v. Monitor by visual inspection and document geosynthetic deployment and installation operations, including:
 - (1) Pre-weld seams
 - (2) Seaming
 - (3) Nondestructive seam testing
 - (4) Sampling for destructive seam testing
 - (5) Destructive seam testing
 - (6) Field tensiometer testing
 - (7) Laboratory sample marking
 - (8) Repair operations
- w. Monitor by visual inspection and document leachate pipe installation operations and testing.
- x. Document any onsite activities that could result in damage to the liner system. Any problems noted shall be reported as soon as possible to the Engineer.

C. Qualifications

The RPR shall be experienced with the implementation and preparation of quality assurance documentation including: quality assurance forms, reports, certifications, and manuals; and shall have prior experience with soil and geosynthetics installation.

2.5 INSTALLATION SUPERVISOR

A. Definition

The Installation Supervisor is the individual provided and assigned by the Installer to provide on-site supervision and guidance to the installation crew.

B. Responsibilities

The Installation Supervisor is responsible for coordinating the installation of the subgrade and clay liner, the installation and seaming of the geosynthetic products, the fusing of leachate system piping, and the installation of the protective cover material. The Installation Supervisor is responsible for providing supervision and guidance to the installation crew. The Installation Supervisor is responsible for obtaining samples for field testing and for coordinating testing activities with the CR and the RPR. The Installation Supervisor is responsible for keeping a daily log of all activities related to geosynthetic products installation and testing and for attending all project related meetings.

C. Qualifications

The Installation Supervisor must be qualified based on previously demonstrated experience, management ability, and authority. Qualification requirements are provided in the technical specifications.

2.6 INSTALLER

A. Definition

The Installer is the company employed by the Contractor to install a particular component of the landfill. The Installer is a Manufacturer or an approved installer trained and certified to install a Manufacturer's product.

B. Responsibilities

The Installer shall be responsible for field handling, storing, deploying, seaming, curing, temporary restraining, and all other aspects of the product installation. The Installer shall be responsible for submittal of the documentation as listed in the material specifications.

C. Qualifications

The Installer shall be certified to install the material used and shall be able to provide qualified personnel to meet the demands of the project. Material specifications list specific install material qualifications.

2.7 MANUFACTURER

A. Definition

The Manufacturer is the firm or corporation producing and supplying the material to be used in the project.

B. Responsibilities

Each Manufacturer is responsible for the production of its material and for the condition of the material until the material is accepted by the RPR upon delivery. Each Manufacturer shall produce a consistent product meeting the project specifications and shall provide quality control documentation for its product as specified in this CQA Plan.

C. Qualifications

Qualification requirements are provided in the technical specifications.

2.8 QUALITY ASSURANCE LABORATORY

A. Definition

The QAL is a firm, independent from the Contractor, Manufacturer, and Installer responsible for conducting tests on samples of geosynthetics obtained from the site.

B. Responsibilities

The QAL shall be responsible for conducting the appropriate laboratory tests as directed by the Engineer and in accordance with the project plans and specifications. The test procedures shall be done in accordance with the test methods outlined in the specifications. The QAL shall be responsible for providing test results as outlined in the specifications.

C. Qualifications

The QAL shall have experience in testing geosynthetics and be familiar with ASTM, GRI, and other applicable test standards. The QAL shall be capable of providing verbal test results to the RPR within 48 hours of receipt of test samples and shall maintain that standard throughout the installation.

Table 2-1. Project Personnel Responsibilities

Party	Definition	Responsibilities	Qualifications	Report To
Contractor	Company contracted by Owner to construct project in accordance with plans and specifications	Section 2.1	Licensed in North Carolina and similar project experience	Owner, Engineer, and RPR
Contractor's Representative (CR)	Person assigned by the Contractor to act as the onsite representative	Section 2.2	Similar project experience	Contractor and RPR
Engineer	Company contracted by Owner for design of the project and to provide services during construction	Section 2.3	Registered professional engineer in North Carolina	Owner
Engineer's Resident Project Representative (RPR)	Person assigned by the Engineer to perform QA inspection and document construction activities	Section 2.4	Similar project experience	Engineer and Owner
Installation Supervisor	Person assigned by an Installer to provide supervision and guidance to the installation crews	Section 2.5	See material specifications	CR and RPR
Installer	Company contracted to install one of the liner or leachate collection system products	Section 2.6	See material specifications	CR and RPR
Manufacturer	A producer of one or more liner or leachate collection system products	Section 2.7	See material specifications	CR and RPR
Quality Assurance Laboratory (QAL)	Lab hired by Contractor and approved by Owner or Engineer to conduct materials testing	Section 2.8	GRI accredited and experience in testing in accordance with ASTM and GRI.	RPR and Owner

PART 1 - COMMUNICATION BETWEEN INVOLVED PARTIES

Communication is essential to achieve a high level of quality during construction and to assure a final product that meets all project requirements. This section discusses the necessary lines of communication and was prepared to fulfill requirements in Rule .1621(b)(1).

1.1 LINES OF COMMUNICATION

All communication between parties shall go through the Engineer's Resident Project Representative (RPR), who, in turn, will direct the communication through the proper channels.

1.2 PRE-CONSTRUCTION MEETING

A pre-construction meeting shall be held before construction activity begins. The meeting shall be conducted by the Engineer and attended by the Owner, RPR, Contractor's Representative (CR), and Installers as appropriate. A Solid Waste Section representative will be invited to attend and meeting notes from the pre-construction meeting will be forwarded to the Solid Waste Section representative. Per Rule 0.1621(b)(1), the meeting will include a review of the project documents, any modifications to these documents, the responsibilities and duties of each party, the construction strategy, the proposed schedule and critical path, and a discussion of the procedures for periodic reporting for testing and construction activities.

1.3 PROGRESS MEETINGS

Progress meetings shall be conducted by the Engineer and attended by the Owner, RPR, CR, Installation Supervisor as appropriate, and any other concerned parties. Progress meetings shall be held as deemed necessary. These meetings shall discuss current progress, planned activities to be accomplished prior to the next progress meeting, issues requiring resolution, and any new business or revisions to the work. The RPR shall log any issues requiring resolutions, decisions, or questions arising at the meeting in a weekly report. If any matter remains unresolved at the end of the meeting, the RPR will be responsible for obtaining a resolution of the matter and for forwarding communication of the decision to the appropriate parties.

PART 2 - CONSTRUCTION MATERIALS

This section provides information on construction materials that complies with Rules .1621 and .1624. The section is presented from bottom to top for the base composite liner system and includes leachate collection system materials. Material construction specifications are provided in Appendix A.

2.1 LANDFILL SUBGRADE

Table 4-1 presents Rule .1624 requirements for landfill subgrade and information located in the material Specification Section 31 23 00 provided in Appendix A.

Table 2-1. Landfill Subgrade

Requirement	Rule Reference	Specification Reference
Material	.1624(b)(7)(A)	2.1 Materials
Construction	.1624(b)(7)(B)	Part 3: Execution
Certification	.1624(b)(7)(C)	3.4 Field Quality Control 3.5 Compaction Density Requirements 3.7 Acceptance of Work

2.2 BASE SOIL BARRIER

Following the subgrade installation, a base soil barrier will be installed. Table 4-2 presents Rule .1624 requirements and information located in the material Specification Section 31 38 10 provided in Appendix A.

Table 2-2. Base Soil Barrier

Requirement	Rule Reference	Specification Reference
Material	.1624(b)(8)(A)	2.1 Materials
Construction	.1624(b)(8)(B)	3.1 Soil Liner Test Strip 3.2 Installation
Certification	.1624(b)(8)(C)	2.2 Soil Liner Material Acceptance 3.3 Field Quality Control and Quality Assurance

2.3 HDPE GEOMEMBRANE

Following the base soil barrier, a high-density polyethylene (HDPE) geomembrane will be installed. Table 4-3 presents Rule .1624 requirements and information located in the material Specification Section 33 47 14 provided in Appendix A.

Table 2-3. HDPE Geomembrane

Requirement	Rule Reference	Specification Reference
Material	.1624(b)(10)(A)	2.2 Materials
Construction	.1624(b)(10)(B)	Part 3: Execution
Certification	.1624(b)(10)(C)	3.2 Field Quality Control 3.3 Geosynthetic liner System Acceptance

2.4 NON-WOVEN FABRIC CUSHION

Following the geomembrane, a non-woven fabric cushion will be installed. Table 4-4 presents Rule .1624 requirements and information located in the material Specification Section 31 32 19 provided in Appendix A.

Table 2-4. Non-Woven Fabric Cushion

Requirement	Rule Reference	Specification Reference
Material	.1624(b)(14)	2.2 Materials and Manufacture
Construction	.1624(b)(14)	Part 3: Execution
Certification	.1624(b)(14)	2.2 Materials and Manufacture

2.5 OPERATIONAL LAYER

Following the non-woven fabric cushion, the operational layer consisting of 24 inches of No. 57 stone will be installed. Table 4-5 presents Rule .1624 requirements and information located in the material Specification Section 31 38 30 provided in Appendix A.

Table 2-5. Operational Layer

Requirement	Rule Reference	Specification Reference
Material	.1624(b)(12)(A)	2.1 Materials
Construction	.1624(b)(12)(B)	Part 3: Execution
Certification	.1624(b)(12)(C)	3.2 Quality Control

2.6 LEACHATE COLLECTION PIPES

After the operational layer is placed, leachate collection pipes will be installed. Table 4-6 presents Rule .1624 requirements and information located in the material Specification Section 40 05 33 provided in Appendix A.

Table 2-6. Leachate Collection Pipes

Requirement	Rule Reference	Specification Reference
Material	.1624(b)(11)(A)	Part 2: Products
Construction	.1624(b)(11)(B)	Part 3: Execution
Certification	.1624(b)(11)(C)	3.5 Cleaning 3.6 Testing and Inspection

2.7 FILTER FABRIC

A woven filter fabric will be installed around the stone that surrounds the leachate collection pipes. Table 4-7 presents Rule .1624 requirements and information located in the material Specification Section 31 32 19 provided in Appendix A.

Table 2-7. Filter Fabric

Requirement	Rule Reference	Specification Reference
Material	.1624(b)(13)(A)	2.2 Materials and Manufacture
Construction	.1624(b)(13)(B)	Part 3: Execution

PART 3 - DOCUMENTATION

This Section is intended to comply with Rule .1624(b)(16).

Upon completion of construction activities, a Construction Quality Assurance (CQA) Certification Report will be submitted to the Solid Waste Section in accordance with 15A NCAC 13B .1621 and .1624.

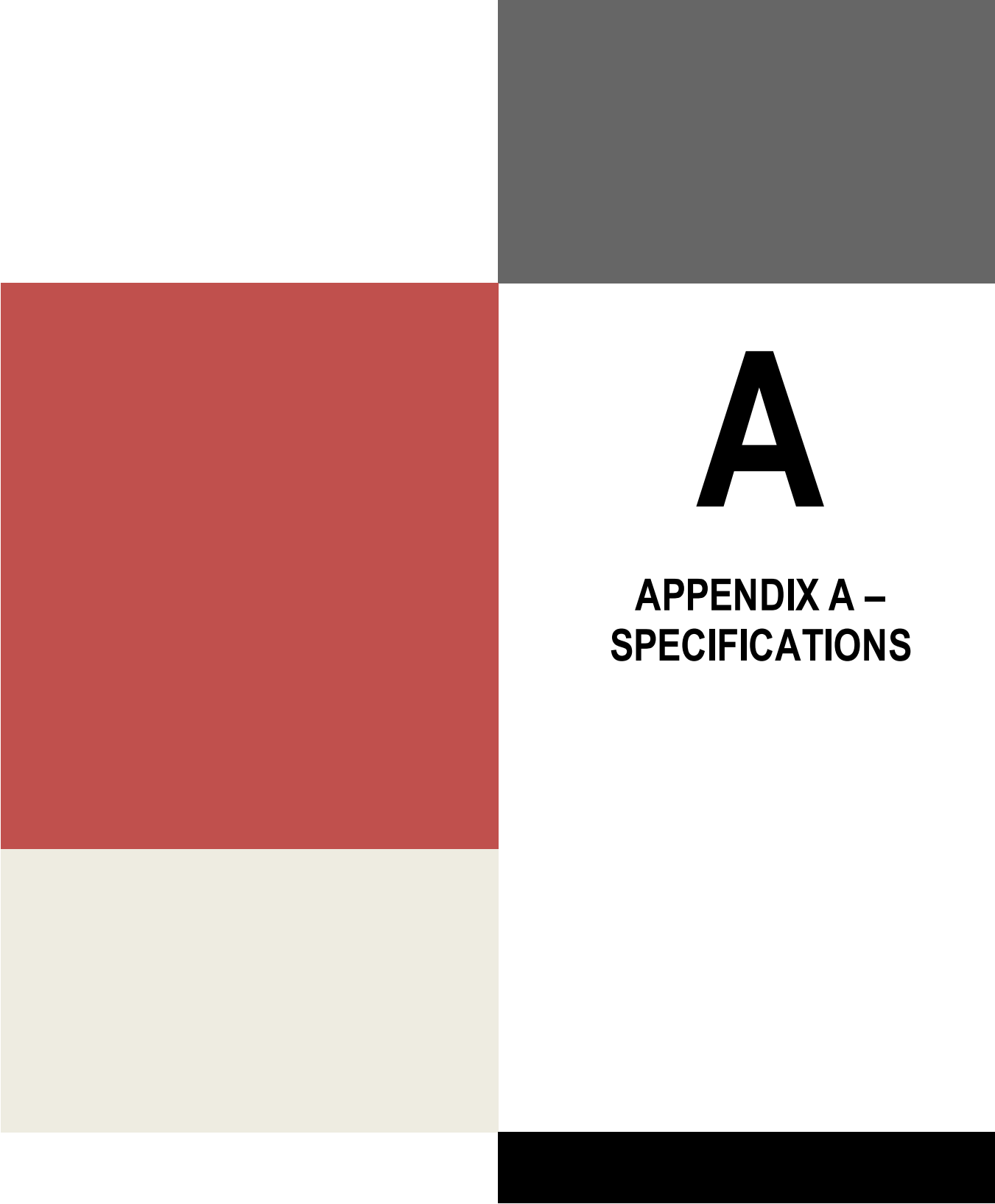
The report will summarize all quality assurance services performed during construction of the landfill. The report will contain field observation inspection reports, the results of all construction quality assurance and construction quality control testing required including documentation of any failed test results, descriptions of procedures used to correct the improperly installed material, and results of all retesting performed. The CQA report shall contain record drawings noting any deviation from the approved engineering plans and shall also contain a comprehensive narrative including but not limited to daily reports from the project engineer or engineer's resident project representative and a series of color photographs of major project features.

The report will also include a discussion of all areas which failed initial testing requirements and efforts required to repair the area to within specifications. Areas of failure and destructive testing will be identified on the record drawings. The following construction elements will be discussed in the certification report:

- Earthwork/Subgrade
- Base Soil Barrier
- Geomembrane
- Operational Layer
- Leachate Collection System

The CQA Certification report shall bear the seal of the project engineer and a certification that construction was completed in accordance with:

1. This CQA Plan;
2. The conditions of the permit to construct;
3. The requirements of Rules .1621 and .1624; and
4. Acceptable engineering practices.



A

APPENDIX A – SPECIFICATIONS

This page intentionally left blank.



HDR Engineering, Inc. of the Carolinas
440 S Church Street, Suite 1200
Charlotte, NC 28202-2075
704.338.6700
NC License F0116
hdrinc.com
© 2025 HDR, Inc., all rights reserved

This page intentionally left blank.



BATEMAN CIVIL SURVEY COMPANY
ENGINEERS • SURVEYORS • PLANNERS
2524 RELIANCE AVENUE - APEX, NC 27539
PHONE: (919) 577-1080 FAX: (919) 577-1081
INFO@BATEMANCIVILSURVEY.COM
NCBELS FIRM# C-2378



**Monitoring Well & Piezometer
As-Built Survey**
Catawba County - Blackburn Landfill
Newton, North Carolina

REVISIONS	
1.	
2.	
3.	
4.	
5.	
DESIGNED BY: N/A	
DRAWN BY: JRD	
CHECKED BY: TSS	
SCALE: 1" = 100'	
DATE: 10/09/2024	
JOB NUMBER: 240323A	
SHEET 1 OF 1	

Groundwater Elevation Table
Catawba County - Blackburn Landfill
Newton, North Carolina

Well ID	Well Installation Date	TOC Elevation ² (MSL ⁴)	Top of Rock Depth (ft bgs) ⁵	Constructed Well Depth (ft bgs)	Screened Interval (ft bgs)	Casing Depth (ft bgs)	Open Hole Interval (ft bgs)	Well Diameter (in ⁷)	Aug-24		Oct-24		Nov-24		Dec-24		Jan-25		Feb-25		Mar-25		Apr-25	
									Depth to Water (ft BTOC ⁶)	Groundwater Elevation (MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (MSL)
MW-32 ¹	11/6/2007	884.71	30.0 ⁸	29.5	14.5-29.5	NA	NA	2	21.61	863.12	21.59	863.12	22.29	862.42	22.40	862.31	22.40	862.31	23.86	860.85	23.71	861.00	22.71	862.00
MW-33R ¹	7/22/2008	882.08	30.0 ⁸	27.0	12.0-27.0	NA	NA	2	17.86	864.22	17.92	864.16	18.37	863.71	18.32	863.76	18.20	863.88	19.22	862.86	18.98	863.10	18.67	863.41
MW-35	8/31/2020	905.46	35.0 ⁸	35.0	20.0-35.0	NA	NA	2	32.28	873.18	31.80	873.66	31.63	873.83	31.92	873.54	32.31	873.15	32.35	873.11	31.84	873.62	32.39	873.07
MW-36	9/4/2020	880.15	23.0 ⁸	23.0	8.0-23.0	NA	NA	2	13.18	866.97	13.21	866.94	13.71	866.44	13.75	866.40	13.61	866.54	14.32	865.83	14.19	865.96	14.14	866.01
MW-37	6/26/2024	868.10	37.0	24.0	9.0-24.0	NA	NA	2	15.06	853.04	15.01	853.09	15.69	852.41	15.60	852.50	15.63	852.47	16.64	851.46	16.29	851.81	16.08	852.02
MW-38	6/27/2024	870.62	42.5	30.0	15.0-30.0	NA	NA	2	21.69	848.93	21.76	848.86	22.50	848.12	22.72	847.90	22.90	847.72	23.05	847.57	23.00	847.62	23.27	847.35
MW-39A	6/28/2024	845.81	15.0	15.0	5.0-15.0	NA	NA	2	12.54	833.27	12.63	833.18	13.30	832.51	13.84	831.97	14.43	831.38	13.86	831.95	13.69	832.12	13.90	831.91
MW-39C	8/29/2024	845.51	14.5	35.0	NA ⁷	15.5	15.5-35.0	4	35.40	810.11	12.76	832.75	13.49	832.02	14.08	831.43	14.50	831.01	14.38	831.13	14.20	831.31	14.42	831.09
MW-40	7/2/2024	857.58	45.5	35.0	20.0-35.0	NA	NA	2	25.87	831.71	25.24	832.34	25.84	831.74	26.35	831.23	26.47	831.11	26.76	830.82	26.79	830.79	26.88	830.70
MW-41	6/14/2024	868.29	40.0	36.0	21.0-36.0	NA	NA	2	27.13	841.16	27.01	841.28	27.33	840.96	27.61	840.68	27.65	840.64	28.81	839.48	28.27	840.02	27.85	840.44
MW-42A	7/2/2024	889.07	53.5	37.0	22.0-37.0	NA	NA	2	26.65	862.42	26.45	862.62	27.23	861.84	27.73	861.34	27.80	860.98	27.92	860.98	27.92	861.15	28.07	861.00
MW-42C	8/29/2024	889.71	52.5	64.5	NA	54.0	54.0-64.5	4	30.32	859.39	29.53	860.18	30.17	859.54	30.55	859.16	30.75	858.96	36.80	852.91	36.03	853.68	30.83	858.88
MW-43	7/3/2024	901.67	56.5	37.0	22.0-37.0	NA	NA	2	28.83	872.84	28.16	873.51	28.49	873.18	29.20	872.47	29.41	872.26	29.74	871.93	29.11	872.56	29.96	871.71
PZ-76AB ¹	11/27/2001	909.67	47.0	45.0	35.0-45.0	NA	NA	2	35.41	874.26	34.72	874.95	34.85	874.82	35.45	874.22	35.55	874.12	35.91	873.76	35.26	874.41	36.31	873.36
PZ-76C	8/29/2024	909.78	48.0	59.0	NA	49.0	49.0-59.0	4	NM ¹⁰	NM	34.77	875.01	34.96	874.82	35.55	874.23	35.70	874.08	36.09	873.69	35.91	873.87	36.38	873.40
PZ-210	6/12/2024	878.00	56.5	23.0	8.0-23.0	NA	NA	2	12.01	865.99	12.33	865.67	13.47	864.53	13.30	864.70	13.95	864.05	13.79	864.21	13.69	864.31	14.63	863.37
PZ-211	6/17/2024	883.40	38.5	22.5	7.5-22.5	NA	NA	2	11.54	871.86	11.73	871.67	13.06	870.34	13.00	870.40	12.94	870.46	13.65	869.75	13.61	869.79	14.05	869.35
PZ-212	6/18/2024	879.17	55.0	20.5	5.5-20.5	NA	NA	2	10.38	868.79	10.61	868.56	11.55	867.62	11.15	868.02	11.18	867.99	11.97	867.20	12.02	867.15	12.17	867.00
PZ-213	6/19/2024	872.88	53.5	20.0	5.0-20.0	NA	NA	2	10.01	862.87	10.47	862.41	11.46	861.42	11.35	861.53	11.24	861.64	12.01	860.87	12.10	860.78	12.71	860.17
PZ-214	6/19/2024	869.06	40.0	26.5	11.5-26.5	NA	NA	2	15.84	853.22	16.14	852.92	17.71	851.35	16.90	852.16	18.01	851.05	18.91	850.15	18.86	850.20	19.33	849.73
PZ-215	6/20/2024	866.72	43.5	26.0	11.0-26.0	NA	NA	2	16.77	849.95	16.68	850.04	17.97	848.75	18.29	848.43	18.35	848.37	18.85	847.87	18.79	847.93	19.25	847.47
PZ-216	6/21/2024	872.42	53.5	24.0	9.0-24.0	NA	NA	2	15.09	857.33	15.34	857.08	16.47	855.95	16.38	856.04	17.05	855.37	17.31	855.11	17.22	855.20	17.06	855.36
PZ-217	6/25/2024	866.15	47.0	13.0	3.0-13.0	NA	NA	2	6.08	860.07	6.25	859.90	6.77	859.38	6.46	859.69	6.80	859.35	6.96	859.19	6.92	859.23	7.23	858.92
PZ-218	6/25/2024	859.40	59.0	14.0	4.0-14.0	NA	NA	2	9.30	850.10	9.60	849.80	10.12	849.28	9.82	849.58	11.22	848.18	11.45	847.95	11.39	848.01	10.87	848.53
PZ-219	7/1/2024	851.70	33.5	20.0	5.0-20.0	NA	NA	2	10.77	840.93	10.86	840.84	11.59	840.11	11.23	840.47	11.40	840.30	12.06	839.64	11.98	839.72	12.28	839.42
PZ-220	7/3/2024	847.73	23.5	13.0	3.0-13.0	NA	NA	2	7.15	840.58	7.77	839.96	8.45	839.28	7.38	840.35	7.28	840.01	7.72	840.01	7.70	840.03	8.50	839.23
PZ-221	7/3/2024	873.31	30.0	14.5	4.5-14.5	NA	NA	2	9.49	863.82	10.17	863.14	11.20	862.11	10.72	862.59	10.96	862.35	12.13	861.18	12.03	861.28	12.76	860.55
PZ-222	7/8/2024	871.29	34.0	13.0	3.0-13.0	NA	NA	2	6.87	864.42	7.04	864.25	7.81	863.48	7.62	863.67	7.48	863.81	7.68	863.61	7.54	863.75	8.25	863.04
PZ-223	7/8/2024	870.09	51.0	23.0	8.0-23.0	NA	NA	2	14.67	855.42	14.97	855.12	15.49	854.60	15.20	854.89	15.54	854.55	15.13	854.96	15.07	855.02	15.86	854.23

Created by: CWG; Checked by: ARL

Notes:

- Well data from "September 2023 Semiannual Water Quality Monitoring Report Blackburn Resource Recovery Facility Permit No. 18-03" authored by LaBella Associates Smith in January 2024.
- Well data from "Site Hydrogeologic Report - Expansion Area" authored by Bunnell-Lammons Engineerrg, Inc. on February 7, 2006; Well stick up bent and should not be used for potentiometric map
- Well survey data collected by Bateman Civil Survey Company on October 7 and 8, 2024
- MSL - Mean Sea Level
- ft bgs - feet below ground surface
- Recorded Maximum Borehole Sampling Depth
- NA - Not Applicable
- in - Inches
- ft BTOC - feet Below Top of Casing
- NM - Not measured. Casing stick up was not at final elevation during depth to water sweep

WELL CONSTRUCTION RECORD (GW-1)**1. Well Contractor Information:****DAVID HALL**

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):**Water Supply Well:**

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/26/24 **Well ID#** MW-37**5a. Well Location:****CATAWBA COUNTY LANDFILL**

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)35° 36' 29.09" N 81° 18' 42.50" W**6. Is(are) the well(s):** ☒ Permanent or ☐ Temporary**7. Is this a repair to an existing well:** ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____**9. Total well depth below land surface:** 24.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')**10. Static water level below top of casing:** 5.0 (ft.)
If water level is above casing, use " "**11. Borehole diameter:** 8.0 (in.)**12. Well construction method:** AUGER

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:**13a. Yield (gpm)** _____ **Method of test:** _____**13b. Disinfection type:** _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	9.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
9.0 ft.	24.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	4.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
7.0 ft.	24.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	24.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS**BENTONITE SEAL ~ 4.0 - 7.0 FEET****22. Certification:**

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS**Submit this GW-1 within 30 days of well completion per the following:****24a. For All Wells:** Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617**24b. For Injection Wells:** Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636**24c. For Water Supply and Open-Loop Geothermal Return Wells:** Copy to the county environmental health department of the county where installed**24d. For Water Wells producing over 100,000 GPD:** Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/27/24 Well ID# MW-38

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 30.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 8.0 (ft.)
If water level is above casing, use "+ "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	15.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
15.0 ft.	30.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	10.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
13.0 ft.	30.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	30.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 10.0 - 13.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)**1. Well Contractor Information:****DAVID HALL**

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):**Water Supply Well:**

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/28/24 **Well ID#** MW-39**5a. Well Location:****CATAWBA COUNTY LANDFILL**

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)35° 36' 29.09" N 81° 18' 42.50" W**6. Is(are) the well(s):** ☒ Permanent or ☐ Temporary**7. Is this a repair to an existing well:** ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____**9. Total well depth below land surface:** 15.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')**10. Static water level below top of casing:** 3.0 (ft.)
If water level is above casing, use " + "**11. Borehole diameter:** 8.0 (in.)**12. Well construction method:** AUGER
(i.e. auger, rotary, cable, direct push, etc.)**FOR WATER SUPPLY WELLS ONLY:****13a. Yield (gpm)** _____ **Method of test:** _____**13b. Disinfection type:** _____ **Amount:** _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	5.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
5.0 ft.	15.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	3.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
4.0 ft.	15.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	15.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS**BENTONITE SEAL ~ 3.0 - 4.0 FEET****22. Certification:**

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS**Submit this GW-1 within 30 days of well completion per the following:****24a. For All Wells:** Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617**24b. For Injection Wells:** Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636**24c. For Water Supply and Open-Loop Geothermal Return Wells:** Copy to the county environmental health department of the county where installed**24d. For Water Wells producing over 100,000 GPD:** Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 07/02/24 Well ID# MW-40

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 35.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 10.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	20.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
20.0 ft.	35.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	15.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
18.0 ft.	35.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	35.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 15.0 - 18.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/14/24 Well ID# MW-41

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 36.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 11.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	21.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
21.0 ft.	36.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	16.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
19.0 ft.	36.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	36.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 16.0 - 19.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 07/02/24 Well ID# MW-42

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 35.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 10.0 (ft.)
If water level is above casing, use " "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	20.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
20.0 ft.	35.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	15.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
18.0 ft.	35.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	35.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 15.0 - 18.0 FEET

22. Certification:

David Hall

07/23/24

Signature of Certified Well Contractor

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 07/03/24 Well ID# MW-43

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees: (if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 37.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 11.0 (ft.)
If water level is above casing, use " "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	22.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
22.0 ft.	37.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	17.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
20.0 ft.	37.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	37.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 17.0 - 20.0 FEET

22. Certification:

David Hall

07/23/24

Signature of Certified Well Contractor

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/17/24 Well ID# PZ-210

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 24.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	9.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
9.0 ft.	24.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	4.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
7.0 ft.	24.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	24.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 4.0 - 7.0 FEET

22. Certification:

David Hall

07/23/24

Signature of Certified Well Contractor

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR). Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/17/24 Well ID# PZ-211

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 22.5 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use " "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	7.5 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
7.5 ft.	22.5 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	2.5 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
5.5 ft.	22.5 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	22.5 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 2.5 - 5.5 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/19/24 Well ID# PZ-212

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 20.5 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER

(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	5.5 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
5.5 ft.	20.5 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	3.5 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
4.5 ft.	20.5 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	20.5 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 3.5 - 4.5 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/19/24 Well ID# PZ-213

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees: (if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 20.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	5.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
5.0 ft.	20.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	1.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
3.0 ft.	20.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	20.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 1.0 - 3.0 FEET

22. Certification:



07/23/24

Signature of Certified Well Contractor

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/20/24 Well ID# PZ-214

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 26.5 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use " "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	11.5 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
11.5 ft.	26.5 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	6.5 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
9.5 ft.	26.5 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	26.5 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 6.5 - 9.5 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/20/24 Well ID# PZ-215

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 26.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	11.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
11.0 ft.	26.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	6.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
9.0 ft.	26.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	26.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 6.0 - 9.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/21/24 Well ID# PZ-216

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 24.5 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use "+ "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	9.5 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
9.5 ft.	24.5 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	4.5 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
7.5 ft.	24.5 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	24.5 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 4.5 - 7.5 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/25/24 Well ID# PZ-217

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 13.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use " "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	3.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
3.0 ft.	13.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	1.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
2.0 ft.	13.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	13.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 1.0 - 2.0 FEET

22. Certification:

David Hall

07/23/24

Signature of Certified Well Contractor

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 06/26/24 Well ID# PZ-218

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 14.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use " + "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	4.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
4.0 ft.	14.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	2.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
3.0 ft.	14.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	14.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 2.0 - 3.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 07/01/24 Well ID# PZ-219

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 20.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use " "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	5.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
5.0 ft.	20.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	1.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
3.0 ft.	20.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	20.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 1.0 - 3.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 07/01/24 Well ID# PZ-220

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 13.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	3.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
3.0 ft.	13.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	1.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
2.0 ft.	13.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	13.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 1.0 - 2.0 FEET

22. Certification:



07/23/24

Signature of Certified Well Contractor

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 07/03/24 Well ID# PZ-221

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 14.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use " "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	4.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
4.0 ft.	14.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	2.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
3.0 ft.	14.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	14.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 2.0 - 3.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 07/08/24 Well ID# PZ-222

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 13.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) _____ Method of test: _____

13b. Disinfection type: _____ Amount: _____

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	3.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
3.0 ft.	13.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	1.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
2.0 ft.	13.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	13.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 1.0 - 2.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

DAVID HALL

Well Contractor Name

A - 4459

NC Well Contractor Certification Number

GEOLOGIC EXPLORATION

Company Name

2. Well Construction Permit #:

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:

- ☐ Agricultural ☐ Municipal/Public
☐ Geothermal (Heating/Cooling Supply) ☐ Residential Water Supply (single)
☐ Industrial/Commercial ☐ Residential Water Supply (shared)
☐ Irrigation ☐ Wells > 100,000 GPD

Non-Water Supply Well:

- ☒ Monitoring ☐ Recovery

Injection Well:

- ☐ Aquifer Recharge ☐ Groundwater Remediation
☐ Aquifer Storage and Recovery ☐ Salinity Barrier
☐ Aquifer Test ☐ Stormwater Drainage
☐ Experimental Technology ☐ Subsidence Control
☐ Geothermal (Closed Loop) ☐ Tracer
☐ Geothermal (Heating/Cooling Return) ☐ Other (explain under #21 Remarks)

4. Date Well(s) Completed: 07/08/24 Well ID# PZ-223

5a. Well Location:

CATAWBA COUNTY LANDFILL

Facility/Owner Name

Facility ID# (if applicable)

4017 ROCKY FORD ROAD NEWTON 28658

Physical Address, City, and Zip

CATAWBA

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

35° 36' 29.09" N 81° 18' 42.50" W

6. Is(are) the well(s): ☒ Permanent or ☐ Temporary

7. Is this a repair to an existing well: ☐ Yes or ☒ No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled:

9. Total well depth below land surface: 23.0 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 9.0 (ft.)
If water level is above casing, use " "

11. Borehole diameter: 8.0 (in.)

12. Well construction method: AUGER
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) Method of test:

13b. Disinfection type: Amount:

For Internal Use Only:

14. WATER ZONES

FROM	TO	DESCRIPTION
ft.	ft.	
ft.	ft.	

15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
ft.	ft.	in.		

16. INNER CASING OR TUBING (geothermal closed-loop)

FROM	TO	DIAMETER	THICKNESS	MATERIAL
0.0 ft.	8.0 ft.	2.0 in.	SCH 40	PVC
ft.	ft.	in.		

17. SCREEN

FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL
8.0 ft.	23.0 ft.	2.0 in.	.010	SCH 40	PVC
ft.	ft.	in.			

18. GROUT

FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT
0.0 ft.	3.0 ft.	PORTLAND BENTONITE	SLURRY
ft.	ft.		
ft.	ft.		

19. SAND/GRAVEL PACK (if applicable)

FROM	TO	MATERIAL	EMPLACEMENT METHOD
6.0 ft.	23.0 ft.	20-40	FINE SILICA SAND
ft.	ft.		

20. DRILLING LOG (attach additional sheets if necessary)

FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)
0.0 ft.	23.0 ft.	SILTY SANDY CLAY
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	
ft.	ft.	

21. REMARKS

BENTONITE SEAL ~ 3.0 - 6.0 FEET

22. Certification:

Signature of Certified Well Contractor

07/23/24

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C .0100 or 15A NCAC 02C .0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

This page intentionally left blank.

This page intentionally left blank.



440 S Church Street, Suite 1200
Charlotte, NC 28202-2075
704.338.6700

hdrinc.com

© 2025 HDR, Inc., all rights reserved