

Contingent on State Approval



**CONTRACT DOCUMENTS
GREENSBORO STREET LIFT STATION #2
HAZARD MITIGATION UPGRADE
DWI PROJECT NO.: SRP-W-134-0021
EPA COMMUNITY GRANT NO.: 03D01624
TOWN OF HOLDEN BEACH, NORTH CAROLINA**

Civil Engineering – Green Engineering, P.L.L.C.

NC Firm License: P-0115

Contact: Thomas Dienes, P.E.

Address: 303 Goldsboro Street East
Wilson, NC 27893

Phone: 252-237-5365

Email: t.dienes@greeneng.com

Structural Engineering – MBD Consulting Engineers, PA

Contact: William P. Dixon, P.E.

Address: 911 Norman Street
Conway, SC 29526

Phone: 919-714-9568

Email: wdixon@mbd-eng.com

Electrical Engineering – Dibble & Pledger, P.A.

Contact: Ron Pledger, P.E.

Address: 222 W. Main Street
Washington, NC 27889

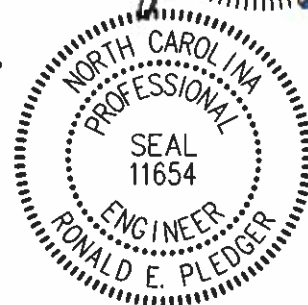
Phone: 252-946-3320

Email: rpledger@dibbleandpledger.com



Ronald E. Pledger 3/6/24

3/6/2024



March 2024



TABLE OF CONTENTS

Advertisement for Bids	2
Instructions to Bidders	9
Bid Form	8
Bid Bond	2
Notice of Award	1
EJCDC Standard Form of Agreement	9
Performance Bond	3
Payment Bond	3
Certificate of Owner’s Attorney	1
General Conditions of the Construction Contract	65
Supplementary Conditions	8
Appendix to General and Supplementary Conditions	3
EXHIBIT B – Additional Contract Provisions for Non-Federal Entity Contracts	18
Under Federal Awards	
NC Division of Water Infrastructure MBE/WBE (DBE) Compliance Supplement	7
Davis Bacon Specifications	10
Wage Rates	5
American Iron and Steel Provisions	6
Built America Buy America Certification	1
Notice to Proceed	1
Contractors Application for Payment	4
Field Order	1
Work Change Directive Form	1
Contract Change Order Form	1
Certificate of Substantial Completion	1
Contractor’s Affidavit of Release of Liens	1



DETAILED SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

0101	PROJECT DESCRIPTION	4
0110	PROJECT MEETINGS	2
0120	SUBMITTALS & SUBSTITUTIONS	4
0140	TEMPORARY FACILITIES AND CONTROLS	4
0150	PROJECT CLOSEOUT	2

DIVISION 2 - SITE WORK

0220	EXCAVATION, FILLING AND GRADING	15
0231	PVC COATED CHAIN LINK FENCING	5
0265	BEDDING & BACKFILL MATERIALS	1
0271	CONTROL OF EROSION, SILTATION & AIR POLLUTION	4
0272A	EXCELSIOR MATTING FOR EROSION CONTROL	2
024119	SELECTIVE DEMOLITION	6

DIVISION 3 – CONCRETE

033000	CAST-IN-PLACE CONCRETE	19
--------	------------------------	----

DIVISION 5 – METALS

051200	STRUCTURAL STEEL FRAMING	9
054000	COLD-FORMED METAL FRAMING	10
055119	METAL GRATING STAIRS	10

DIVISION 6 – WOOD, PLASTICS, AND COMPOSITES

061000	ROUGH CARPENTRY	10
061600	SHEATHING	5
061753	SHOP-FABRICATED WOOD TRUSSES	6
062023	INTERIOR FINISHED CARPENTRY	7

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

072100	THERMAL INSULATION	3
072500	WEATHER BARRIERS	3
074113.16	STANDING-SEAM METAL ROOF PANELS	11
074646	FIBER CEMENT SIDING	5
076200	SHEET METAL FLASHING AND TRIM	11
079200	JOINT SEALANTS	7

DIVISION 8 – OPENINGS

081129	STAINLESS STEEL FLOOD DOORS AND FRAMES	8
081500	FIBERGLASS REINFORCED PLASTIC (FRP) DOORS AND FRAMES	5
083483	FLOOR DOORS	3
085413	FIBERGLASS WINDOWS	6
087100	DOOR HARDWARE	11

DIVISION 9 – FINISHES

0910	HIGH PERFORMANCE COATINGS	8
092216	NON-STRUCTURAL METAL FRAMING	5
092900	GYPSUM BOARD	6
099600	HIGH-PERFORMANCE COATINGS	9

DIVISION 13 – SPECIAL CONSTRUCTION

1341	FACTORY ASSEMBLED VACUUM STATIONS WITH SCADA	6
1343	FACTORY ASSEMBLED CONTROL PANEL – VACUUM SYSTEM	20

DIVISION 15 – MECHANICAL

1510	PIPE: DUCTILE IRON	1
1514	PIPE: PVC-SEWER (SDR 35)	2
1520	PIPE: PVC (SCHEDULE 40)	1
1521	PIPE: PVC (SCHEDULE 80)	1
1530	VALVES (GENERAL)	2
1533	BUTTERFLY VALVES (RESILIENT SEATED)	2
1534	CHECK VALVES	2
1535	PLUG VALVES	3
15500	MECHANICAL GENERAL REQUIREMENTS	10
15501	MECHANICAL SUPPORTS AND ANCHORS	2
15502	MECHANICAL IDENTIFICATION	2
15508	PIPE INSULATION	2
15510	HYDRONIC PIPING	3
15530	REFRIGERANT PIPING	2
15535	REFRIGERATION SPECIALTIES	4
15552	DUCTLESS SPLIT SYSTEM HEAT PUMP	6
15775	UNITARY AIR COOLED CONDENSER	8
15870	POWER VENTILATORS	2
15952	CONTROLS AND INSTRUMENTATION	3

DIVISION 31 – EARTHWORK

316216	VINYL SHEET PILING	5
316219	TIMBER PILES	3

DIVISION – ELECTRICAL

16100	GENERAL ELECTRICAL REQUIREMENTS	5
16111	CONDUIT	3
16123	WIRE AND CABLE	5
16130	BOXES	4
16141	GENERAL PURPOSE WIRING DEVICES	3
16147	PLATE COVERS	2
16190	SUPPORTING DEVICES	2
16195	ELECTRICAL IDENTIFICATION	2
16450	GROUNDING	2
16471	CIRCUIT BREAKERS & PANELBOARDS	3
16483	MOTOR STARTERS	3
16491	DRY TYPE TRANSFORMERS	2
16501	LAMPS	1
16502	BALLAST AND ACCESSORIES	2
16510	LIGHTING FIXTURES	3
16617	AUTOMATIC TRANSFER SWITCH STANDBY POWER	3
16620	GAS DETECTION SYSTEM	10
16623	MOBILE POWER GENERATOR	12

ADVERTISEMENT FOR BIDS

Town of Holden Beach

110 Rothschild Street

Holden Beach, North Carolina 28462

Sealed BIDS for a **Single Prime Contract** for the modifications to the Town of Holden Beach's Greensboro Street Lift Station #2 Hazard Mitigation Upgrade including:

PART A – ARCHITECTURAL AND GENERAL CONSTRUCTION

Construct an above ground, above flood stage structure to accommodate the replacement and relocation of existing pumps, piping, electrical gear and controls presently required to operate the existing vacuum pumping station.

PART B – ELECTRICAL CONSTRUCTION

Remove from the existing below ground structure all existing electrical gear, conduit, cable and controls. Install in the elevated, above flood stage structure electrical gear, conduit, cable and system controls. Grout and fill with a cementitious all existing recessed boxes and conduit openings.

PART C – STATION PIPING AND EQUIPMENT MODIFICATIONS

Install all vacuum pumping equipment, piping, valves and fittings to provide for the proper operation of all equipment being installed and/or relocated to the above ground, above flood stage structure.

PART D – SITE WORK

Construct site improvements to include installation of all drainage and exhaust/vent piping; fencing removal and replacement; access drives and general site restoration.

will be received by the Town of Holden Beach at the Town Hall located at 110 Rothschild Street, Holden Beach, North Carolina. Sealed bids should come to the attention of Town Clerk, Heather Finnell marked Greensboro Lift Station #2 until 3:00 P.M., Thursday, August 1, 2024, and then at said office publicly opened and read aloud. The CONTRACT DOCUMENTS may be examined at the following locations:

Town of Holden Beach – Holden Beach, North Carolina
ConstructConnect – Plan Room – Online Service
Green Engineering, P.L.L.C. – Wilson, North Carolina

Copies of the CONTRACT DOCUMENTS may be obtained at the office of Green Engineering, P.L.L.C. located at 303 Goldsboro Street East; P.O. Box 609; Wilson, North Carolina 27893 upon a ***non-refundable*** payment of \$250.00 for each set.

Pre-bid Conference

A mandatory pre-bid conference is scheduled for 11:30 A.M., Monday, July 15, 2024, at the Town Hall, located at 110 Rothschild Street, Holden Beach, North Carolina.

Instructions to Bidders

This project is being funded through an EPA Community Grant and NCDEQ State Reserve Funds.

Bidders must make positive efforts to utilize businesses owned by minorities and women. The EPA has developed MBE/WBE participation goals of 10.9% for minority-owned and 10.4% for women-owned business enterprises in construction contracts awarded pursuant to NCGS 143-128. Bidders must comply with the EPA and NC Division of Water Infrastructure requirements for MBE/WBE (DBE) documentation.

Bidders must further comply with all Davis-Bacon Act, Build America Buy America Act, and American Iron and Steel Act provision requirements.

The Owner reserves the right to reject any and all bids.

Bidders shall be properly licensed under Chapter 87, General Statutes of North Carolina.

Small, minority and women's businesses and labor surplus area firms are encouraged to submit bids.

The Town of Holden Beach is an equal opportunity employer and service provider.

July 1, 2024
Date

David W. Hewett, Town Manager
Town of Holden Beach

INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

	Page
ARTICLE 1 – DEFINED TERMS	1
ARTICLE 2 – COPIES OF BIDDING DOCUMENTS	1
ARTICLE 3 – QUALIFICATIONS OF BIDDERS	1
ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE	1
ARTICLE 5 – BIDDER'S REPRESENTATIONS	3
ARTICLE 6 – PRE-BID CONFERENCE	4
ARTICLE 7 – INTERPRETATIONS AND ADDENDA	4
ARTICLE 8 – BID SECURITY	4
ARTICLE 9 – CONTRACT TIMES	5
ARTICLE 10 – LIQUIDATED DAMAGES	5
ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS	5
ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS	5
ARTICLE 13 – PREPARATION OF BID	6
ARTICLE 14 – BASIS OF BID	7
ARTICLE 15 – SUBMITTAL OF BID	7
ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID	7
ARTICLE 17 – OPENING OF BIDS	8
ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE	8
ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT	8
ARTICLE 20 – BONDS AND INSURANCE	9
ARTICLE 21 – SIGNING OF AGREEMENT	9
ARTICLE 22 – SALES AND USE TAXES	9



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.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within five days of Owner's request, Bidder shall submit (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:
- A. Evidence of Bidder's authority to do business in the state where the Project is located.
- B. Bidder's state or other contractor license number, if applicable.
- C. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others."
- D. 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 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

- 4.01 *Site and Other Areas*
- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

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

B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

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

4.03 *Site Visit and Testing by Bidders*

- A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.
- B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.
- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder 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.

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

4.04 *Owner's Safety Program*

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

4.05 *Other Work at the Site*

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

ARTICLE 5 – BIDDER'S REPRESENTATIONS

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

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. consider 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 Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;

- F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

- 6.01 A mandatory pre-bid conference has been scheduled for X:xx P.M., Xxxxxday, Xxxxx xx, 2024, located at the Town Hall of 110 Rothschild Street, Holden Beach, North Carolina. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner equal to 5 percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.
- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of

that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.

- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01 The Contract for the Work, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids in the case of a proposed substitute and 5 days prior in the case of a proposed "or-equal." Each such request shall comply with the requirements of Paragraphs 7.04 and 7.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner. Substitutes and "or-equal" materials and equipment may be proposed by Contractor in accordance with Paragraphs 7.04 and 7.05 of the General Conditions after the Effective Date of the Contract.
- 11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or equal" or substitution requests are made at Bidder's sole risk.
- 11.03 If an award is made, Contractor shall be allowed to submit proposed substitutes and "or-equals" in accordance with the General Conditions.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 If required by the bid documents, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work: **1) Vacuum Station/Pump Station Building; 2) Vacuum Station/Pump Station Electrical.**

If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, without an increase in Bid price.

- 12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.
- 12.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.
- 12.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in SC 7.06A.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall 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.”
- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown. The corporate seal shall be affixed and attested by the corporate secretary or an assistant corporate secretary.
- 13.03 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 13.04 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.05 A Bid by an individual shall show the Bidder’s name and official address.
- 13.06 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.07 All names shall be printed in ink below the signatures.

- 13.08 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.09 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.10 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

14.01 Lump Sum

- A. Bidders shall submit a Bid for each PART on a lump sum basis as set forth in the Bid Form.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 Each prospective Bidder is furnished one copy of the Bidding Documents. The Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED". A mailed Bid shall be addressed to the Owner as specified in the Advertisement for Bids.
- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 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, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

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

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 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 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

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

- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.

19.03 Evaluation of Bids

- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner shall announce to all bidders a "Base Bid plus alternates" budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.

and/or

For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.

- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or

Suppliers.

ARTICLE 20 – BONDS AND INSURANCE

20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within 45 days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22 – SALES AND USE TAXES

22.21 Owner is not exempt from State of North Carolina sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall be included in the Bid.

BID FORM

Contingent on State Approval

**Town of Holden Beach
Greensboro Street Lift Station #2
Hazard Mitigation Upgrade
Holden Beach, North Carolina**

TABLE OF CONTENTS

	Page
ARTICLE 2 – Bidder’s Acknowledgements	1
ARTICLE 3 – Bidder’s Representations	2
ARTICLE 4 – Bidder’s Certification	3
ARTICLE 5 – Basis of Bid	3
ARTICLE 6 – Time of Completion	7
ARTICLE 7 – Attachments to this Bid.....	7
ARTICLE 8 – Defined Terms	8
ARTICLE 9 – Bid Submittal.....	8

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

***Town of Holden Beach
110 Rothschild Street
Holden Beach, North Carolina 28462***

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 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Advertisement and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for **120 days** after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.



ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

- A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
<i>None</i>	
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- E. 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 any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder’s safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

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

ARTICLE 4 – BIDDER’S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, 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.

ARTICLE 5 – BASIS OF BID

- 5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

**SINGLE PRIME CONTRACT
FOR THE
TOWN OF HOLDEN BEACH – VACUUM SEWER STATION #2 MODIFICATIONS**

BASE BID

PART A – ARCHITECTURAL AND GENERAL CONSTRUCTION

The Bidder will furnish all equipment, labor, materials, tools and supervision to complete all Architectural and General Construction for the complete renovation of the existing Vacuum Pump Station #2 including all demolition, reinforced concrete, above ground structure and all other items shown on the Drawings and/or included in the Specification for the Lump Sum Price of:

<i>One Million, Three Hundred Ninety-Five Thousand, Seven Hundred Nine</i>	Dollars and	
<i>Zero</i>	Cents (\$	<u>1,395,709.00</u>)

TOTAL PART A \$ 1,395,709.00

PART B – ELECTRICAL CONSTRUCTION

The Bidder will furnish all equipment, labor, materials, tools and supervision to complete all Electrical Construction for the complete renovation of the existing Vacuum Pump Station #2 including all electrical demolition, grouting and filling all recessed boxes and conduit openings called for, and all new electrical gear, conduit, cable, system controls, and all other items shown on the Drawings and/or included in the Specifications. Work shall also include all Electrical Construction required to provide electrical service for the Owner's existing temporary vacuum pump skid at Vacuum Pump Stations #2, #3, & #4 as shown on the Drawings for the Lump Sum Price of:

<i>Seven Hundred Fifty Thousand</i>	Dollars and	
<i>Zero</i>	Cents (\$	<u>750,000.00</u>)

TOTAL PART B \$ 750,000.00



PART C – STATION PIPING AND EQUIPMENT MODIFICATIONS

The Bidder agrees to furnish all labor, materials, equipment, tools and supervision and all else necessary to provide, construct, erect and place into operation one (1) duplex vacuum pump system; one (1) temporary duplex vacuum pump system; all piping, valves, fitting and removal of the existing vacuum pump system and controls for the Lump Sum Price of:

One Million, Two Hundred Sixty-Five Thousand, Seventeen Dollars and _____
Zero Cents (\$ 1,265,017.00).

TOTAL PART C \$ 1,265,017.00

PART D – SITE WORK

The Bidder will furnish all labor , materials, equipment, tools and supervision and all else necessary to perform all outside site work to include demolition, fencing, retaining walls, media filter bed, drives, piping, fittings, valves, hatches, and site restoration and all other items as shown on the Drawings and/or included in the Specifications for the Lump Sum Price of:

Four Hundred Eighty-Eight Thousand, Two Hundred Seventy-Four Dollars and _____
Zero Cents (\$ 488,274.00).

TOTAL PART D \$ 488,274.00

TOTAL BASE BID PARTS A-D \$ 3,899,000.00



**TOWN OF HOLDEN BEACH
GREENSBORO STREET LIFT STATION #2
HAZARD MITIGATION UPGRADE
ADDITIONAL INFORMATION REQUIRED**

PROPOSED MAJOR SUPPLIERS:

Fortiline

Core & Main

PROPOSED SUBCONTRACTORS:

Frye Fence

Concrete Cowboys

Jessie & Myers Construction Company

PROJECT REFERENCES:

The Wooten Company – Eric Olsen – 919-264-0186

Samet Corporation – David Bascom – 919-703-0263

City of Myrtle Beach, SC – Frankie Collins – 843-918-2085



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

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

- A. Required Bid security;
- B. NC Division of Water Infrastructure MBE/WBE (DBE) Compliance Supplement – Good Faith Efforts Form (2 pages);
- C. NC Division of Water Infrastructure MBE/WBE (DBE) Compliance Supplement – Table A;
- D. List of Proposed Subcontractors;
- E. List of Proposed Suppliers;
- F. List of Project References;
- G. Build America Buy America Certification;
- H. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;



ARTICLE 8 – DEFINED TERMS

8.01 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 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

Terrahawk, LLC

By:

[Signature]

[Printed name] ***K. Daniel Horne***

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature]

[Printed name] ***Brandon Mitchell***

Title: ***Estimator***

Submittal Date: ***August 22, 2024***

Address for giving notices:

1001 Goodworth Drive, Suite 105

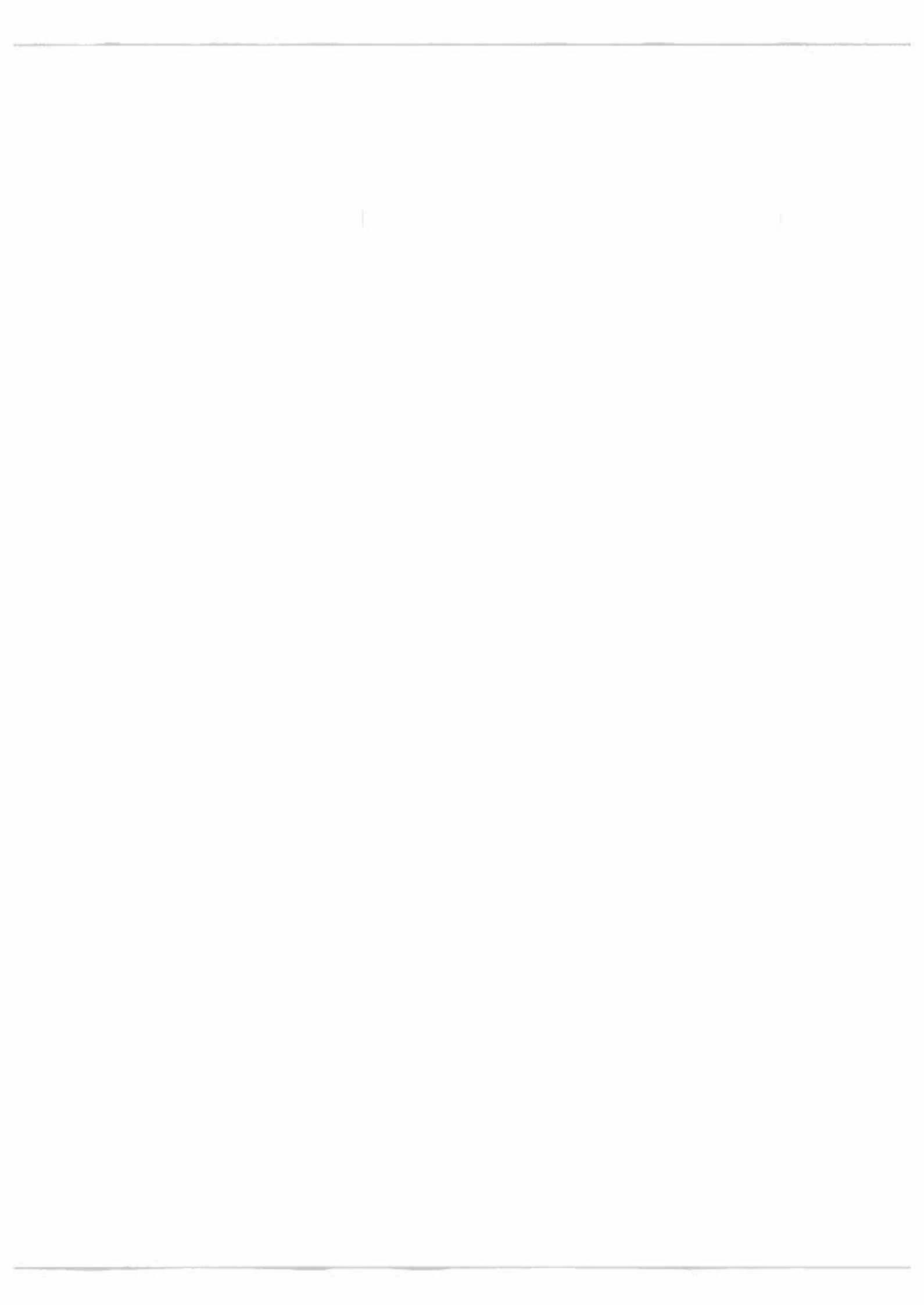
Apex, North Carolina 27539

Telephone Number: ***919-372-8982***

Fax Number: ***919-372-8875***

Contact Name and e-mail address: ***bmitchell@terrahawkn.com***

Bidder's License No.: ***75880***
(where applicable)



BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (Name and Address):

SURETY (Name, and Address of Principal Place of Business):

OWNER (Name and Address):

Town of Holden Beach
110 Rothschild Street
Holden Beach, NC 28462

BID

Bid Due Date:

Description (Project Name— Include Location):

BOND

Bond Number:

Date:

Penal sum

\$

(Words)

(Figures)

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

BIDDER

SURETY

(Seal)

(Seal)

Bidder's Name and Corporate Seal

Surety's Name and Corporate Seal

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

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 shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur 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 shall 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 shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall 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 shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall 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 Registered or Certified Mail, return receipt requested, postage pre-paid, and shall 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 shall 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 shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

NOTICE OF AWARD

Date of Issuance:

Contingent on State Approval

Owner: **Town of Holden Beach, North Carolina** Owner's Contract No.:

Engineer: **Green Engineering, P.L.L.C.** Engineer's Project No.: **20-030.1**

Project: **Greensboro Street Lift Station #2 Hazard Mitigation Upgrade** Contract Name: **Greensboro Street Lift Station #2 Hazard Mitigation Upgrade**

Bidder: **Terrahawk, LLC**

Bidder's Address: **1001 Goodworth Drive, Suite 105
Apex, North Carolina 27539**

TO BIDDER:

You are notified that Owner has accepted your Bid dated [**August 22, 2024**] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

Greensboro Street Lift Station #2 Hazard Mitigation Upgrade, DWI Project No.: SRP-W-134-0021, EPA Community Grant No:03D01624, Town of Holden Beach, North Carolina

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

The Contract Price of the awarded Contract is: \$ **3,899,000.00** *[note if subject to unit prices, or cost-plus]*

[Five (5)] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically. *[revise if multiple copies accompany the Notice of Award]*

a set of the Drawings will be delivered separately from the other Contract Documents.

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

1. Deliver to Owner **[Five (5)]** counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

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

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

Owner: **Town of Holden Beach, North Carolina** Contractor: **Terrahawk, LLC**

By: **David W. Hewett** By:

Title: **Town Manager, Town of Holden Beach** Title: **Managing Member**

Date Issued:

Copy: Engineer



AGREEMENT
BETWEEN OWNER AND CONTRACTOR
FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

THIS AGREEMENT is by and between Town of Holden Beach, North Carolina ("Owner") and Terrahawk, LLC ("Contractor").

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:

*Town of Holden Beach
Greensboro Street Lift Station #2
Hazard Mitigation Upgrade
Holden Beach, North Carolina*

ARTICLE 2 – THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows:

*Town of Holden Beach
Greensboro Street Lift Station #2
Hazard Mitigation Upgrade
Holden Beach, North Carolina*

ARTICLE 3 – ENGINEER

3.01 *The Project has been designed by Green Engineering, P.L.L.C. (Engineer), which is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.*

ARTICLE 4 – CONTRACT TIMES

4.01 *Time of 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 completed within 240 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 270 days after the date when the Contract Times commence to run.

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Contractor shall pay Owner \$ 1,000.00 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.

After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$1,000.00 for each day that expires after such time until the Work is completed and ready for final payment.

4.04 *Special Damages*

[Deleted]

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):

PART A – ARCHITECTURAL AND GENERAL CONSTRUCTION

The Bidder will furnish all equipment, labor, materials, tools and supervision to complete all Architectural and General Construction for the complete renovation of the existing Vacuum Pump Station #2 including all demolition, reinforced concrete, above ground structure and all other items shown on the Drawings and/or included in the Specification for the Lump Sum Price of:

<i>One Million, Three Hundred Ninety-Five Thousand, Seven Hundred Nine</i>	Dollars and	
<u>Zero</u>	Cents (\$	<u>1,395,709.00</u>)
TOTAL PART A		\$ <u>1,395,709.00</u>

PART B – ELECTRICAL CONSTRUCTION

The Bidder will furnish all equipment, labor, materials, tools and supervision to complete all Electrical Construction for the complete renovation of the existing Vacuum Pump Station #2 including all electrical demolition, grouting and filling all recessed boxes and conduit openings called for, and all new electrical gear, conduit, cable, system controls, and all other items shown on the Drawings and/or included in the Specifications. Work shall also include all Electrical Construction required to provide electrical service for the Owner's existing temporary vacuum pump skid at Vacuum Pump Stations #2, #3, & #4 as shown on the Drawings for the Lump Sum Price of:

<u>Seven Hundred Fifty Thousand</u>	Dollars and	
<u>Zero</u>	Cents (\$	<u>750,000.00</u>)

TOTAL PART B \$ 750,000.00

PART C – STATION PIPING AND EQUIPMENT MODIFICATIONS

The Bidder agrees to furnish all labor, materials, equipment, tools and supervision and all else necessary to provide, construct, erect and place into operation one (1) duplex vacuum pump system; one (1) temporary duplex vacuum pump system; all piping, valves, fitting and removal of the existing vacuum pump system and controls for the Lump Sum Price of:

<u>One Million, Two Hundred Sixty-Five Thousand, Seventeen</u>	Dollars and	
<u>Zero</u>	Cents (\$	<u>1,265,017.00</u>)

TOTAL PART C \$ 1,265,017.00

PART D – SITE WORK

The Bidder will furnish all labor , materials, equipment, tools and supervision and all else necessary to perform all outside site work to include demolition, fencing, retaining walls, media filter bed, drives, piping, fittings, valves, hatches, and site restoration and all other items as shown on the Drawings and/or included in the Specifications for the Lump Sum Price of:

<u>Four Hundred Eighty-Eight Thousand, Two Hundred Seventy-Four</u>	Dollars and	
<u>Zero</u>	Cents (\$	<u>488,274.00</u>)

TOTAL PART D \$ 488,274.00

TOTAL BASE BID PARTS A-D \$ 3,899,000.00

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.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the date established at the pre-construction conference 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 Work completed (with the balance being 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 of the entire construction to be provided under the Contract Documents, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 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 in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the rate of 8 percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
 - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
 - E. 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 Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
 - F. 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.
 - G. 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.
 - H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 - I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
 - J. 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.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 Contents

- A. The Contract Documents consist of the following:
1. This Agreement (pages 1 to 9, inclusive).
 2. Performance bond (pages 1 to 3, inclusive).
 3. Payment bond (pages 1 to 3, inclusive).
 4. Other bonds. – Bid Bond (pages 1 to 2, inclusive).
 5. General Conditions (pages 1 to 65, inclusive).
 6. Supplementary Conditions (pages 1 to 13, inclusive).
 7. Appendix to General and Supplementary Conditions (pages 1 to 3, inclusive).
 8. Notice of Award (pages 1 to 1, inclusive).
 9. Certificate of Owner’s Attorney (pages 1 to 1, inclusive).
 10. Specifications as listed in the table of contents of the Project Manual.
 11. Drawings (not attached but incorporated by reference) consisting of _____ sheets with each sheet bearing the following general title: **Town of Holden Beach – Greensboro Street Lift Station #2 Hazard Mitigation Upgrade, Holden Beach, North Carolina.**
 12. Addenda (numbers None to _____, inclusive).
 13. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor’s Bid (pages 1 to 8, inclusive).
 14. 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 (pages 1 to 1, inclusive).
 - b. Work Change Directives (pages 1 to 1, inclusive).
 - c. Change Orders (pages 1 to 1, inclusive).
 - d. Field Orders (pages 1 to 1, inclusive).
 - e. Certificate of Substantial Completion (pages 1 to 1, inclusive).
 - f. Contractor’s Affidavit of Release of Liens (pages 1 to 1, inclusive).
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, 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 Documents.

10.03 *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.

10.04 *Severability*

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

10.05 *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 10.05:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process 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.
- B. The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of [40 CFR part 33](#) in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

10.06 *Other Provisions*

10.06 Contingent Upon Approval.

- A. The parties agree that this Agreement is subject to approval by the State of North Carolina and the U.S. Environmental Protection Agency (EPA), and in any event that such approval is not granted, this agreement shall be void.

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

This Agreement will be effective on _____, **2024** (which is the Effective Date of the Contract).

OWNER: **Town of Holden Beach, North Carolina**

CONTRACTOR: **Terrahawk, LLC**

By: David W. Hewett

By: K. Daniel Horne

Title: Town Manager

Title: Managing Member

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

Attest: _____

Attest: _____

Title: _____

Brandon Mitchell
Title: Estimator

Address for giving notices:

Address for giving notices:

110 Rothschild Street

1001 Goodworth Drive, Suite 105

Holden Beach, North Carolina 228462

Apex, North Carolina 27539

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

License No.: L75880
(where applicable)

NOTE TO USER: Use in those states or other jurisdictions where applicable or required.



PERFORMANCE BOND

CONTRACTOR (name and address):

SURETY (name and address of principal place of business):

OWNER (name and address):

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description (name and location):

BOND

Bond Number:

Date (not earlier than the Effective Date of the Agreement of the Construction Contract):

Amount:

Modifications to this Bond Form: None See Paragraph 16

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

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (seal)

Surety's Name and Corporate Seal (seal)

By: _____
Signature

By: _____
Signature (attach power of attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

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

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 shall 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 shall 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 shall 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 shall 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 shall 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 shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall 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 shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than 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 may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after 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 shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall 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 shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall 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 shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:



PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 18

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

CONTRACTOR AS PRINCIPAL

SURETY

_____ *(seal)*

Contractor's Name and Corporate Seal

_____ *(seal)*

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

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

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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 satisfy 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 shall 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 shall be applicable.
 13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall 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 shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall 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:
 1. The name of the Claimant;
 2. The name of the person for whom the labor was done, or materials or equipment furnished;
 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;
 4. A brief description of the labor, materials, or equipment furnished;
 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;
 6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 7. The total amount of previous payments received by the Claimant; and
 - 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 shall be 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 shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.
 18. Modifications to this Bond are as follows:
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

CERTIFICATE OF OWNER'S ATTORNEY

CERTIFICATE OF OWNER'S ATTORNEY

PROJECT NAME: Greensboro Street Lift Station #2 Hazard Mitigation Upgrade

CONTRACTOR NAME: Terrahawk, LLC

I, the undersigned, Sydnee Moore, the duly authorized and acting legal representative of Town of Holden Beach, do hereby certify as follows: I have examined the attached Contract(s) and performance and payment bond(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

Sydnee Moore

Name

September 6, 2024

Date

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



Issued and Published Jointly by



These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

To prepare supplementary conditions that are coordinated with the General Conditions, use EJCDC's Guide to the Preparation of Supplementary Conditions (EJCDC® C-800, 2013 Edition). The full EJCDC Construction series of documents is discussed in the Commentary on the 2013 EJCDC Construction Documents (EJCDC® C-001, 2013 Edition).

Copyright © 2013:

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

5.06	Hazardous Environmental Conditions at Site	17
Article 6 – Bonds and Insurance		19
6.01	Performance, Payment, and Other Bonds	19
6.02	Insurance—General Provisions	19
6.03	Contractor’s Insurance	20
6.04	Owner’s Liability Insurance	23
6.05	Property Insurance	23
6.06	Waiver of Rights	25
6.07	Receipt and Application of Property Insurance Proceeds	25
Article 7 – Contractor’s Responsibilities		26
7.01	Supervision and Superintendence	26
7.02	Labor; Working Hours	26
7.03	Services, Materials, and Equipment.....	26
7.04	“Or Equals”	27
7.05	Substitutes	28
7.06	Concerning Subcontractors, Suppliers, and Others	29
7.07	Patent Fees and Royalties	31
7.08	Permits	31
7.09	Taxes	32
7.10	Laws and Regulations	32
7.11	Record Documents.....	32
7.12	Safety and Protection.....	32
7.13	Safety Representative	33
7.14	Hazard Communication Programs	33
7.15	Emergencies	34
7.16	Shop Drawings, Samples, and Other Submittals.....	34
7.17	Contractor’s General Warranty and Guarantee.....	36
7.18	Indemnification	37
7.19	Delegation of Professional Design Services	37
Article 8 – Other Work at the Site		38
8.01	Other Work	38
8.02	Coordination	39
8.03	Legal Relationships.....	39

Article 9 – Owner’s Responsibilities.....	40
9.01 Communications to Contractor.....	40
9.02 Replacement of Engineer.....	40
9.03 Furnish Data.....	40
9.04 Pay When Due.....	40
9.05 Lands and Easements; Reports, Tests, and Drawings.....	40
9.06 Insurance.....	40
9.07 Change Orders.....	40
9.08 Inspections, Tests, and Approvals.....	41
9.09 Limitations on Owner’s Responsibilities.....	41
9.10 Undisclosed Hazardous Environmental Condition.....	41
9.11 Evidence of Financial Arrangements.....	41
9.12 Safety Programs.....	41
Article 10 – Engineer’s Status During Construction.....	41
10.01 Owner’s Representative.....	41
10.02 Visits to Site.....	41
10.03 Project Representative.....	42
10.04 Rejecting Defective Work.....	42
10.05 Shop Drawings, Change Orders and Payments.....	42
10.06 Determinations for Unit Price Work.....	42
10.07 Decisions on Requirements of Contract Documents and Acceptability of Work.....	42
10.08 Limitations on Engineer’s Authority and Responsibilities.....	42
10.09 Compliance with Safety Program.....	43
Article 11 – Amending the Contract Documents; Changes in the Work.....	43
11.01 Amending and Supplementing Contract Documents.....	43
11.02 Owner-Authorized Changes in the Work.....	44
11.03 Unauthorized Changes in the Work.....	44
11.04 Change of Contract Price.....	44
11.05 Change of Contract Times.....	45
11.06 Change Proposals.....	45
11.07 Execution of Change Orders.....	46
11.08 Notification to Surety.....	47
Article 12 – Claims.....	47

12.01	Claims	47
Article 13	– Cost of the Work; Allowances; Unit Price Work.....	48
13.01	Cost of the Work	48
13.02	Allowances	50
13.03	Unit Price Work.....	51
Article 14	– Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....	52
14.01	Access to Work.....	52
14.02	Tests, Inspections, and Approvals.....	52
14.03	Defective Work.....	53
14.04	Acceptance of Defective Work.....	53
14.05	Uncovering Work	53
14.06	Owner May Stop the Work	54
14.07	Owner May Correct Defective Work.....	54
Article 15	– Payments to Contractor; Set-Offs; Completion; Correction Period.....	55
15.01	Progress Payments.....	55
15.02	Contractor’s Warranty of Title	58
15.03	Substantial Completion	58
15.04	Partial Use or Occupancy	59
15.05	Final Inspection	59
15.06	Final Payment.....	59
15.07	Waiver of Claims	61
15.08	Correction Period	61
Article 16	– Suspension of Work and Termination.....	62
16.01	Owner May Suspend Work.....	62
16.02	Owner May Terminate for Cause.....	62
16.03	Owner May Terminate For Convenience	63
16.04	Contractor May Stop Work or Terminate	63
Article 17	– Final Resolution of Disputes	64
17.01	Methods and Procedures.....	64
Article 18	– Miscellaneous.....	64
18.01	Giving Notice.....	64
18.02	Computation of Times.....	64
18.03	Cumulative Remedies	64

18.04	Limitation of Damages	65
18.05	No Waiver	65
18.06	Survival of Obligations	65
18.07	Controlling Law	65
18.08	Headings.....	65

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 form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *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, or both; 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, or both; 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; or (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. 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), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree 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 the 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. *Engineer*—The individual or entity named as such in the Agreement.
21. *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.
22. *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. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *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.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *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.
28. *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.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *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.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *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.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *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.
36. *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.

37. *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 furnished by Owner which are designated for the use of Contractor.
38. *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.
39. *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.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *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.

48. *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 the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the 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:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. 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. 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 Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner's Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), 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 executed 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 specifically 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 *Initial Acceptance of Schedules*

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

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items 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 items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 Intent

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall 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.

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, shall mean 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, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 Documents 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 Documents 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 shall 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 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 thereunder.
- 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 give written notice to Owner and Contractor 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 editions, 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 shall preclude 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 thirtieth 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 sixtieth day after the day of Bid opening or the thirtieth 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 shall 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 shall 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 shall 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 the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall 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 utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. 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.
- E. Paragraph 8.03 governs 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.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 Availability of Lands

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- 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; 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 7.12, 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 at law; 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 shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site 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 known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); 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 upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

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 either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 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 the necessity of Owner's obtaining 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 above; 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. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, 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 conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
 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; or
 - 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 as 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, or both, then any such adjustment shall 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, or both, 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.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. 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 in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

- becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- 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. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, 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. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - 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;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. 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, or both, then any such adjustment shall 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, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. 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 Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. 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; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for 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, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, 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.
- 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 or 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.H shall obligate 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 shall obligate 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 all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, 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 shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. 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.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

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. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements 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 and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. 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, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of 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.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect 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 shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *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:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall 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, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. 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); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. 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.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *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. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
1. include at least the specific coverages provided in this Article.
 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 4. remain in effect at least until final payment (and longer if expressly required in this Article) 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 Documents.
 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. 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.

6.05 *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 full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed 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.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- 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 notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* 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 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. 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 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 Subcontractors, all individuals or entities identified in the Supplementary Conditions as 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. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. 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:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial 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.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work 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 any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 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 6.05 shall 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, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

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

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, 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.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the 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 material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- 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 shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment 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 material or equipment under the circumstances described below. To the extent possible such requests shall 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 material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.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 material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall 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 that specified, and
 - 3) be suited to the same use as that 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 that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall 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 shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity 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 five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. 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, Suppliers, or other individuals or entities 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, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, 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, Supplier, or other individual or entity, whether initially or as a replacement, shall 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 fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create 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.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, 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.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of 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

7.09 *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.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work 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 shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give 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 notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *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.

7.12 *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. 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.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when 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.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. 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.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor 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).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall 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.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

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 threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified 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
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

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.D.

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. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction 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 shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 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.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 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, shall 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, Sample, or other submittal shall 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.D.4.
- E. *Resubmittal Procedures:*
1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
 2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
 3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

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 and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. 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 shall 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 and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their 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 shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

- Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
 - D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
 - E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

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 utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. 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.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, 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.

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 at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. 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 shall 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. When applicable, any such equitable adjustment in Contract Price shall 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 is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 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. 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 to 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.
- C. 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 to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, 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 shall 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 Documents (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 10.08. 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 *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 Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *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.

10.07 *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.

10.08 *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, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 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 10.08 shall also apply to the Resident Project Representative, if any.

10.09 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 (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 Amending and Supplementing Contract Documents

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not 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, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* 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 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: 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. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *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. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes 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 shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate 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.

11.03 *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.

11.04 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall 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); or
 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 11.04.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 11.04.C).

- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.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 five 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 shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall 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 will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *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 shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; 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. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. 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. The supporting data shall 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. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall 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.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *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 that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 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 11.02, (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 in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *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 shall be submitted 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; and
 - 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.
- 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 shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall be incorporated in a Change Order 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. 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 shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall 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. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, 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 property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

EJCDC® C-700, Standard General Conditions of the Construction Contract.

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as 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 shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 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. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

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 on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

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, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 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 will 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 therewith 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 shall 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 shall 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 shall 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 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 shall 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 special 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, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, 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 shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

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 rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 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 on account of 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. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- 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, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 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 on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of 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 that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated 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;
 - l. there are other items entitling 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 shall 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 shall be treated as an amount due as determined by Paragraph 15.01.C.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 seven 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 shall 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 seven 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 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 6.05 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 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall 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 disputes that Contractor believes are unsettled; 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 Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall 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. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. 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. *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.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- 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 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 terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then 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 other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not 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, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall 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) ten 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) 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 seven 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 shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; 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 on account of loss of anticipated overhead, profits, or revenue, 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 seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 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, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph 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; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising 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; or
 - 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 Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

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 shall not constitute a waiver of that provision, nor shall 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 or completion of the Contract or termination 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 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.



SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

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

TABLE OF CONTENTS

		<i>Page</i>
SC-1.01.A.8	Change Order	2
SC-1.01.A.48	Change Directive	2
SC-1.01.A.49	Weather Conditions	2
SC-2.06.B	Electronic Transmittals	2
SC-4.01.A	Commencement of Contract Times; Notice to Proceed	2
SC-4.05.C.2	Delays in Contractor's Progress	2
SC - 5.03	Subsurface and Physical Conditions	2
SC - 5.06	Hazardous Environmental Conditions	2
SC-6.03	Contractor's Liability Insurance	2
SC-6.05.A.1	Property	4
SC-7.04.A	Or Equals	4
SC-7.04.A.1	Or Equals	4
SC-7.06.A	Concerning Subcontractors, Suppliers, and Others	4
SC-7.06.B	Concerning Subcontractors, Suppliers, and Others	4
SC-7.06.E	Concerning Subcontractors, Suppliers, and Others	4
SC-10.03	Project Representative	4
SC-13.02C	Contingency Allowance	7
SC-15.01.B.3	Application for Payments	8
SC-15.01.B.4	Application for Payments	8
SC-15.01.D.1	Payment Becomes Due	8
SC-15.02.A	Contractor's Warrant of Title	8
SC-15.03.B	Substantial Completion	8



SC 1.01.A.8 Add the following language at the end of last sentence of Paragraph 1.01.A.8:

The Change Order form to be used on this Project is EJCDC C-941. Agency approval is required before Change Orders are effective.

SC 1.01.A.48 Add the following language at the end of the last sentence of Paragraph 1.01.A.48:

A Work Change Directive cannot change Contract Price or Contract Times without a subsequent Change Order.

SC 1.01.A.49 Add the following new Paragraph after Paragraph 1.01.A.48:

Abnormal Weather Conditions - Conditions of extreme or unusual weather for a given region, elevation, or season as determined by Engineer. Extreme or unusual weather that is typical for a given region, elevation, or season should not be considered Abnormal Weather Conditions.

SC 2.06.B Delete Paragraph 2.06.B and replace it with the term [Deleted].

SC 4.01.A Amend the last sentence of Paragraph 4.01.A by striking out the following words:

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

SC 4.05.C.2 Amend Paragraph 4.05.C.2 by striking out the following text: "abnormal weather conditions;" and inserting the following text:

Abnormal Weather Conditions;

SC 5.03 Delete Paragraphs 5.03.A and 5.03.B in their entirety and insert the following:

- A. No reports of explorations or tests of subsurface conditions at or adjacent to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site, are known to Owner.**

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.**
- B. Not Used.**

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

- K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:**

1. **Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:**

State:	<u>Statutory</u>
Federal, if applicable (e.g., Longshoreman's):	<u>Statutory</u>
Employer's Liability:	<u>Statutory</u>

2. **Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:**

General Aggregate	\$ <u>2,000,000</u>
Products - Completed Operations Aggregate	\$ <u>1,000,000</u>
Personal and Advertising Injury	\$ <u>1,000,000</u>
Each Occurrence (Bodily Injury and Property Damage)	\$ <u>1,000,000</u>

Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.

3. **Automobile Liability under Paragraph 6.03.D. of the General Conditions:**

Combined Single Limit of	\$ <u>1,000,000</u>
--------------------------	---------------------

4. **Excess or Umbrella Liability under Paragraph 6.03.E. of the General Conditions:**

Per Occurrence	\$ <u>5,000,000</u>
General Aggregate	\$ <u>5,000,000</u>

5. **Contractor's Pollution Liability:**

Each Occurrence	\$ <u>Not applicable</u>
General Aggregate	\$ <u>Not applicable</u>

If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. **Additional Insureds: In addition to Owner and Engineer, include as additional insureds the following: *Engineer's Consultants***

SC-6.05.A.1 Add the following new subparagraph after subparagraph 6.05.A.1:

- a. **In addition to Owner, Contractor, and all Subcontractors, include as insureds the following:**

Engineer and Engineer's Consultants

SC 7.04.A Amend the third sentence of Paragraph 7.04.A by striking out the following words:

Unless the specification or description contains or is followed by words reading that no like, equivalent, or 'or-equal' item is permitted.

SC 7.04.A.1 Amend the last sentence of Paragraph a.3 by striking out "and;" and adding a period at the end of Paragraph a.3.

SC 7.04.A.1 Delete paragraph 7.04.A.1.a.4 in its entirety and insert the following in its place:

[Deleted]

SC 7.06.A Amend Paragraph 7.06.A by adding the following text to the end of the Paragraph:

The Contractor shall not award work valued at more than fifty percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC 7.06.B Delete paragraph 7.06.B in its entirety and insert the following in its place:

[Deleted]

SC 7.06.E Amend the second sentence of Paragraph 7.06.E by striking out "Owner may also require Contractor to retain specific replacements; provided, however, that".

SC-10.03 Delete Paragraph 10.03A in its entirety and insert the following paragraph in its place:

The Engineer will furnish a Resident Project Representative to represent the Engineer in observing the progress and quality of the work installed on this project. The duties, responsibilities, and limitations of authority of the Resident Project Representative will be as stated in the Supplementary Conditions, specifically as provided in Paragraph 10.03.B and Paragraph 10.08.

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

- B. **The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.**

1. **General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with**

- Owner only with the knowledge of and under the direction of Engineer.
2. **Schedules:** Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
 3. **Conferences and Meetings:** Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
 4. **Liaison:**
 - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
 5. **Interpretation of Contract Documents:** Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
 6. **Shop Drawings and Samples:**
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
 7. **Modifications:** Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
 8. **Review of Work and Rejection of Defective Work:**
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of

the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. Inspections, Tests, and System Start-ups:

- a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.

12. Payment Requests: Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

EJCDC® C-800, Supplementary Conditions.

Copyright © 2013 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. All rights reserved.

13. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

14. Completion:

- a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
- b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
- c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

SC 13.02.C Delete Paragraph 13.02.C in its entirety and insert the following in its place:

[Deleted]

SC 15.01.B.3 Add the following language at the end of paragraph 15.01.B.3:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of the Contractor.

SC 15.01.B.4 Add the following new Paragraph after Paragraph 15.01.B.3:

The Application for Payment form to be used on this Project is EJCDC C-620.

SC 15.01.B.5 Add the following new Paragraph after Paragraph 15.01.B.4:

By signing payment application and recommending payment, Contractor certifies they have reviewed documentation for all products and materials submitted for payment, and the certifications are sufficient to demonstrate compliance with Build America, Buy America Act requirements.

SC 15.01.D.1 Delete Paragraph 15.01.D.1 in its entirety and insert the following in its place:

The Application for Payment with Engineer's recommendations will be presented to the Owner for consideration. If the Owner finds the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01.E will become due twenty (20) days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC 15.02.A Amend Paragraph 15.02.A by striking out the following text: "no later than seven days after the time of payment by Owner" and insert "no later than the time of payment by Owner."

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 not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall 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 Article 15.**

SC 15.06.A.3 Delete Paragraph 15.06.A.3 in its entirety.



APPENDIX TO GENERAL AND SUPPLEMENTARY CONDITIONS

1. HEALTH AND SAFETY REGULATIONS FOR CONSTRUCTION

The Contractor shall be responsible for the safety, efficiency, and adequacy of his equipment and methods, and for any damage which results from their failure or their improper construction, maintenance, or operation.

The Contractor shall maintain a current and accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under this Contract.

2. NORTH CAROLINA SALES TAX REPORTS

In order that the Owner may fully recover all taxes to which he is legally entitled, which were paid on construction materials by the Contractor, the following procedures shall be followed by the Contractor on this project:

- A. The Contractor shall furnish the Owner, through the Engineer, documentary evidence showing materials used and sales taxes paid by the Contractor and each Subcontractor.
- B. The documentary evidence shall consist of a certified statement by the Contractor, and each of his Subcontractors individually, showing total purchases of materials from each separate vendor and total sales taxes paid each vendor. The certified statement shall show the name of the vendor, the invoice number, or numbers, covered and inclusive dates of such invoices. Copies of each invoice shall be attached to the certified statement.
- C. Materials used from the Contractor's or Subcontractor's warehouse stock shall be shown in the certified statement at warehouse stock prices.
- D. The Contractor shall not be required to certify the Subcontractor's statements.
- E. The Contractor shall submit this documentary evidence to the Engineer monthly, covering all items involved during the pay period, along with his request for payment. Prior to final project acceptance and payment, the Contractor shall furnish to the Engineer a sworn affidavit that all project items on which N. C. Sales Tax has been paid appears in the project documentation.

3. BASIS FOR DETERMINING RESPONSIVENESS AND RESPONSIBILITY OF LOW BIDDER

For this Contract, responsiveness is defined by:

- A. The completeness and regularity of the Bid Form.
- B. A Bid Form without modifications unless requested in the technical specifications.

Responsibility may be based on whether the Bidder:

- A. Maintains a permanent place of business.
- B. Has adequate equipment to do the work properly and within the time limit established.
- C. Has adequate financial status to meet his obligations contingent to work.

4. WITHHOLDING PAYMENT

- A. The Engineer may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any approved partial payment estimate to such extent as may be necessary to protect the Owner from loss on account of:
 - (a) Defective work not remedied.
 - (b) Claims filed or reasonable evidence indicating probable filing of claims.
 - (c) Failure to Contractor to make payments properly to subcontractors or for material or labor.
 - (d) A reasonable doubt that the work can be completed for the balance then unpaid.
 - (e) Damage to another Contractor.
 - (f) Performance of work in violation of the terms of the contract documents.
- B. Where work on unit price items are substantially complete but lack clean-up and/or corrections ordered by the Engineer, amounts shall be deducted from unit prices in partial payment estimates to amply cover such clean-up and corrections.
- C. When the above grounds are cured, payment shall be made for amounts withheld because of them.

5. PERMITS

All work performed shall be in strict accordance with the terms and conditions of the permits issued by the landowner or controlling authority. Should there be a conflict between these contract documents and the permits, the more stringent condition, as determined by the Engineer, shall prevail.

6. RAIN DAYS

The following climatological summary, published by the Southeast Regional Climate Center, will be utilized to evaluate contractors' requests for additional contract time due to inclement weather:

Mean Number of Days With 0.10 Inches or Greater of Rain			
January	7	July	8
February	7	August	7
March	7	September	5
April	6	October	5
May	7	November	5
June	7	December	6

Credit for rain days will be allowed, and will begin to accrue, only when they exceed the number of expected rain days shown in the chart above for each respective month.

7. CONFLICTS IN GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS AND/OR APPENDIX

Should there be any conflict between the General Conditions, Supplementary Conditions and/or Appendix, the more stringent condition, as determined by the Engineer, shall prevail.

EXHIBIT B

Additional Contract Provisions for Non-Federal Entity Contracts Under Federal Awards:

Where applicable, the provisions found at 2 C.F.R. 200 Appendix II will be included in all contracts executed as a result of this RFQ.

A. REMEDIES:

"Each of the parties hereto acknowledges and agrees that, in the event of any breach of any covenant or agreement contained in this Agreement by the other party, monetary damages may be inadequate with respect to any such breach and the non-breaching party may have no adequate remedy at law. It is accordingly agreed that each of the parties hereto shall be entitled, in addition to any other remedy to which they may be entitled at law or in equity, to seek injunctive relief and/or to compel specific performance to prevent breaches by the other party hereto of any covenant or agreement of such other party contained in this Agreement. Any specific right or remedy provided in this Agreement will not be exclusive but will be cumulative of all other rights and remedies."

B. TERMINATION FOR CAUSE AND CONVENIENCE:

Termination for Breach. If either party shall at any time fail to meet any of its obligations hereunder and shall fail to correct such default within thirty (30) days after the non-breaching party shall have given written notice to it thereof, the non-breaching party shall be entitled to notify the other party that it intends to terminate this Agreement unless such default is corrected, and may so terminate ten (10) days after the end of such thirty (30) day period if such default is continuing; provided that if such default by the breaching party shall be a recurring default and the breaching party does not reasonably satisfy the non-breaching party that such defaults shall cease to occur, the non-breaching party shall be entitled to terminate this Agreement upon the occurrence of such default and the other party shall not be entitled to correct such default."

Termination for Convenience- Either party can terminate the agreement with 30 days notice in writing to the other party. The contractor would be paid for work performed and goods procured as of the termination date.

C. EQUAL EMPLOYMENT OPPORTUNITY:

"During the performance of this Agreement, the Contractor agrees as follows:

Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of federally assisted construction contract" in 41 CFR Part 60-1.3 must include equal opportunity clause provided under 41 CFR Part 60 1.4(b) in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12318, 12935, 3 CRF Part, 1964-1965 Comp., p. 339) as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment opportunity" and implementing regulations at 41 CFR part 60, " Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

- (1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender, identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

- (2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- (3) The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.
- (4) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible

for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions as may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

- (8) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

D. Davis-Bacon Act, as amended (40 U.S.C. 3141-3148).

When required by Federal program legislation, all prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141–3144, and 3146–3148) as supplemented by Department of Labor regulations (29 CFR Part 5, “Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction”). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, “Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States”). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

Sections 3141 -3148 included below for your convenience as obtained from the Department of Labor.

Sec. 3141. Definitions

The following definitions apply:

- (1) Federal government.- The term "Federal Government" has the same meaning that the term "United States" had in the Act of March 3, 1931 (ch. 411, 46 Stat. 1494) (known as the Davis-Bacon Act).²
- (2) Wages, scale of wages, wage rates, minimum wages, and prevailing wages.- The terms "wages", "scale of wages", "wage rates", "minimum wages", and "prevailing wages" include-
 - (A) the basic hourly rate of pay; and
 - (B) for medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the forgoing, for unemployment benefits, life insurance, disability and sickness insurance, or accident insurance, for vacation and holiday pay, for defraying the costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the

contractor or subcontractor is not required by other federal, state, or local law to provide any of those benefits, the amount of-

- (i) the rate of contribution irrevocably made by a contractor or subcontractor to a trustee or to a third person under a fund, plan, or program; and
- (ii) the rate of costs to the contractor or subcontractor that may be reasonably anticipated in providing benefits to laborers and mechanics pursuant to an enforceable commitment to carry out a financially responsible plan or program which was communicated in writing to the laborers and mechanics affected.

Sec. 3142. Rate of wages for laborers and mechanics

- (a) Application.- The advertised specifications for every contract in excess of \$2,000, to which the Federal Government or the District of Columbia is a party, for construction, alteration, or repair, including painting and decorating, of public buildings and public works of the Government or the District of Columbia that are located in a State or the District of Columbia and which requires or involves the employment of mechanics or laborers shall contain a provision stating the minimum wages to be paid various classes of laborers and mechanics.
- (b) Based on Prevailing Wage.- The minimum wages shall be based on the wages the Secretary of Labor determines to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the civil subdivision of the State in which the work is to be performed, or in the District of Columbia if the work is to be performed there.
- (c) Stipulations Required in Contract.- Every contract based upon the specifications referred to in subsection (a) must contain stipulations that-
 - (1) the contractor or subcontractor shall pay all mechanics and laborers employed directly on the site of the work, unconditionally and at least once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the advertised specifications, regardless of any contractual

relationship which may be alleged to exist between the contractor or subcontractor and the laborers and mechanics;

- (2) the contractor will post the scale of wages to be paid in a prominent and easily accessible place at the site of the work; and
- (3) there may be withheld from the contractor so much of accrued payments as the contracting officer considers necessary to pay to laborers and mechanics employed by the contractor or any subcontractor on the work the difference between the rates of wages required by the contract to be paid laborers and mechanics on the work and the rates of wages received by the laborers and mechanics and not refunded to the contractor or subcontractors or their agents.
- (d) Discharge of Obligation.- The obligation of a contractor or subcontractor to make payment in accordance with the prevailing wage determinations of the Secretary of Labor, under this subchapter and other laws incorporating this subchapter by reference, may be discharged by making payments in cash, by making contributions described in section 3141(2)(B)(i) of this title, by assuming an enforceable commitment to bear the costs of a plan or program referred to in section 3141(2)(B)(ii) of this title, or by any combination of payment, contribution, and assumption, where the aggregate of the payments, contributions, and costs is not less than the basic hourly rate of pay plus the amount referred to in section 3141(2)(B) of this title.
- (e) Overtime Pay.- In determining the overtime pay to which a laborer or mechanic is entitled under any federal law, the regular or basic hourly rate of pay (or other alternative rate on which premium rate of overtime compensation is computed) of the laborer or mechanic is deemed to be the rate computed under section 3141(2)(A) of this title, except that where the amount of payments, contributions, or costs incurred with respect to the laborer or mechanic exceeds the applicable prevailing wage, the regular or basic hourly rate of pay (or other alternative rate) is the amount of payments, contributions, or costs actually incurred with respect to the laborer or mechanic minus the greater of the amount of contributions or costs of the types described in section 3141(2)(B) of this title actually incurred with respect to the laborer or mechanic or the amount determined under section 3141(2)(B) of this title but not actually paid.

Sec. 3143. Termination of work on failure to pay agreed wages

Every contract within the scope of this subchapter shall contain a provision that if the contracting officer finds that any laborer or mechanic employed by the contractor or any subcontractor directly on the site of the work covered by the contract has been or is being paid a rate of wages less than the rate of wages required by the contract to be paid, the Federal Government by written notice to the contractor may terminate the contractor's right to proceed with the work or the part of the work as to which there has been a failure to pay the required wages. The Government may have the work completed, by contract or otherwise, and the contractor and the contractor's sureties shall be liable to the Government for any excess costs the Government incurs.

Sec. 3144. Authority of Comptroller General to pay wages and list contractors violating contracts

- (a) Payment of Wages.-
 - (1) In general.- The Comptroller General shall pay directly to laborers and mechanics from any accrued payments withheld under the terms of a contract any wages found to be due laborers and mechanics under this subchapter.
 - (2) Right of action.- If the accrued payments withheld under the terms of the contract are insufficient to reimburse all the laborers and mechanics who have not been paid the wages required under this subchapter, the laborers and mechanics have the same right to bring a civil action and intervene against the contractor and the contractor's sureties as is conferred by law on persons furnishing labor or materials. In those proceedings it is not a defense that the laborers and mechanics accepted or agreed to accept less than the required rate of wages or voluntarily made refunds.
- (b) List of Contractors Violating Contracts.-
 - (1) In general.- The Comptroller General shall distribute to all departments of the Federal Government a list of the names of persons whom the Comptroller General has found to have disregarded their obligations to employees and subcontractors.
 - (2) Restriction on awarding contracts.- No contract shall be awarded to persons appearing on the list or to any firm, corporation, partnership, or association in which the persons have an interest until three years have elapsed from the date of publication of the list.

- Sec. 3146. Effect on other federal laws
- This subchapter does not supersede or impair any authority otherwise granted by federal law to provide for the establishment of specific wage rates.
- Sec. 3147. Suspension of this subchapter during a national emergency
- The President may suspend the provisions of this subchapter during a national emergency.
- Sec. 3148. Application of this subchapter to certain contracts
- This subchapter applies to a contract authorized by law that is made without regard to section 3709 of the Revised Statutes (41 U.S.C. 5), or on a cost-plus-a-fixed-fee basis or otherwise without advertising for proposals, if this subchapter otherwise would apply to the contract

E. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT:

The regulation at 29 C.F.R. § 5.5(b) provides contract clause language concerning compliance with the Contract Work Hours and Safety Standards Act.

Compliance with the Contract Work Hours and Safety Standards Act.

- (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$26 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.
- (3) Withholding for unpaid wages and liquidated damages. The Town of Holden Beach shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is

held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

- (4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section

F. RIGHTS TO INTERVENTION MADE UNDER A CONTRACT OR AGREEMENT

If the Federal award meets the definition of "funding agreement" under 37 CFR 401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

G. CLEAN AIR ACT AND THE FEDERAL WATER POLLUTION CONTROL ACT

Clean Air Act

- (1) The contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
- (2) The contractor agrees to report each violation to the Town of Holden Beach and understands and agrees that the Town of Holden Beach will, in turn, report each violation as required to assure notification to the EPA, and the appropriate Environmental Protection Agency Regional Office.
- (3) The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by EPA.

Federal Water Pollution Control Act

- (1) The contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
- (2) The contractor agrees to report each violation to the Town of Holden Beach and understands and agrees that the Town of Holden Beach will, in turn, report each violation as required to assure notification to the EPA and the appropriate Environmental Protection Agency Regional Office.
- (3) The contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by EPA.

H. DEBARMENT AND SUSPENSION

Suspension and Debarment

A contract award must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235) "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or

otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

Specifically, a contract for goods or services is a covered transaction if any of the following applies:

- (1) The contract is awarded by a participant in a nonprocurement transaction that is covered under § 180.210, and the amount of the contract is expected to equal or exceed \$25,000.
- (2) The contract requires the consent of an official of a Federal agency. In that case, the contract, regardless of the amount, always is a covered transaction, and it does not matter who awarded it. For example, it could be a subcontract awarded by a contractor at a tier below a nonprocurement transaction, as shown in the appendix to this part.
- (3) The contract is for Federally-required audit services.

(c) A subcontract also is a covered transaction if,—

- (1) It is awarded by a participant in a procurement transaction under a nonprocurement transaction of a Federal agency that extends the coverage of paragraph (b)(1) of this section to additional tiers of contracts (see the diagram in the appendix to this part showing that optional lower tier coverage); and
- (2) The value of the subcontract is expected to equal or exceed \$25,000

See executive orders 12549, 12689 for additional clarification

- (1) This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- (2) The contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.
- (3) This certification is a material representation of fact relied upon by Town of Holden Beach. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to Town of Holden Beach, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
- (4) The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

I. BYRD ANTI-LOBBYING AMENDMENT

Byrd Anti-Lobbying Amendment, 31 U.S.C. § 1352 (as amended) Contractors who apply or bid for an award of \$100,000 or more shall file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the awarding agency.

d. Required Certification.

If applicable, contractors must sign and submit to the non-federal entity the following certification. APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official

Name and Title of Contractor's Authorized Official

Date

J. PROCUREMENT OF RECOVERED MATERIALS

A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquire during the proceeding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery, and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

- (i) In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired--
 - Competitively within a timeframe providing for compliance with the contract performance schedule;
 - Meeting contract performance requirements; or
 - At a reasonable price.
- (ii) Information about this requirement, along with the list of EPA designated items, is available at EPA's Comprehensive Procurement Guidelines website, <https://www.epa.gov/smm/comprehensiveprocurement-guideline-cpg-program>.
- (iii) The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act."

K. PROHIBITION ON CERTAIN TELECOMMUNICATION AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Recipients and subrecipients are prohibited from obligating or expending loan or grant funds to:

- (1) Procure or obtain;
- (2) Extend or renew a contract to procure or obtain; or

(3) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in [Public Law 115–232](#), section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

(i) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

(ii) Telecommunications or video surveillance services provided by such entities or using such equipment.

(iii) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

(b) In implementing the prohibition under Public Law 115–232, section 889, subsection (f), paragraph (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.

(c) See Public Law 115–232, section 889 for additional information.

(d) See also § 200.471.

L. DOMESTIC PREFERENES FOR PROCUREMENT

As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.

(b) For purposes of this section:

(1) “Produced in the United States” means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

(2) "Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

BUILD AMERICA, BY AMERICA

Recipients are required to ensure that procurement plans comply with BABA requirements prior to grants being awarded. Requirements call for all the iron, steel, manufactured products, and construction materials used in the project to be produced in the United States.

AMERICAN IRON AND STEEL

Recipients are required to use iron and steel products that are produced in the United States for the construction, alteration, maintenance, or repair of a public water system or treatment works. AIS requirements correspond to a subset of BABA requirements, therefore recipients in compliance with BABA are in compliance with AIS.

Additional Requirements/Recommendations

PROCUREMENT

The contractor agrees to comply with all procurement guidelines as outlined in North Carolina law and to Federal laws and Uniform Guidance procurement regulations.

M. ACCESS TO RECORDS. The following access to records requirements apply to this contract:

- (1) The Contractor agrees to provide The Town of Holden Beach, the State of North Carolina, the EPA and any other authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.
- (2) The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
- (3) The Contractor agrees to provide the EPA or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.
- (4) In compliance with the Disaster Recovery Act of 2018, the Town of Holden Beach and the Contractor acknowledge and agree that no language in this contract is intended to prohibit audits or internal reviews by the EPA or the Comptroller General of the United States.

N. NO OBLIGATION BY FEDERAL GOVERNMENT

““The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the non-Federal entity, contractor, or any other party pertaining to any matter resulting from the contract.”

O. PROGRAM FRAUD AND FALSE OR FRADULENT STATEMENTS OR RELATED ACTS

“The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor’s actions pertaining to this contract.”

I have read and understand these additional provisions as outlined in Exhibit B

Signature

Date

NC Division of Water Infrastructure MBE/WBE (DBE) Compliance Supplement Instructions

(This package combines the various aspects of State of NC HUB program requirements and Federal DBE requirements into a single compliance supplement in order to eliminate redundancy and ambiguity)

Item	What to do with it
Good Faith Efforts Form	Provided by all bidders to be responsive Only low bidder's form is submitted to the State
Table A (Summary of firms on job)	Provided by all bidders to be responsive Only low bidder's form is submitted to the State
Table B (per item being subbed)	Provided by low bidder if SRF project or SRP/SEL* that obtains less than 10% M/WBE utilization (see page 2)
Provide documentation of anything you did that is mentioned later in this supplement	- Proof of trade paper advertisement - Printouts of DBE sources used - Solicitation emails and/or letters
Additional Forms for SRF Projects (these forms are currently not applicable)	
6100-3 (per M/WBE firm)	Provided by low bidder if SRF project
6100-2	Distributed to M/WBE firms if SRF project
Subs submit concerns on 6100-2 forms to:	Michael Pigram Region 4, Atlanta Federal Center 61 Forsyth Street Atlanta, GA 30303-8960

NOTES on this Compliance Supplement

Verifiable Goals

- EPA MBE/WBE participation goals: MBE 10.9%
WBE 10.4%

These are goals that the State reports against and are not quotas. The good faith efforts must be adhered to and all forms provided regardless of what percentage utilization is achieved.

- State of NC MBE/WBE participation goal: 10% (combined)

Table B is not required for SRP and SEL projects if you achieve 10% utilization.

DBE (MBE or WBE) Certification

In order for a firm to count towards the goals, a firm must be properly certified. Table A and Table B both provide spaces to note who certified the firm. The North Carolina Department of Administration and North Carolina Department of Transportation are the most common certifications we see listed. Division of Water Infrastructure staff verify all certifications listed.

For SRF projects, please note the EPA's six Good Faith Efforts found in 40 CFR 33

Filling out the Good Faith Efforts Form and providing Table B (if subcontracting is achieved) constitutes compliance with EPA's six good faith efforts.

(1) Ensure MBE/WBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and local Government recipients, this will include placing MBE/WBEs on solicitation lists and soliciting them whenever they are potential sources.

(2) Make information of forthcoming opportunities available to MBE/WBEs and arrange time for contracts and establish delivery schedules, where requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.

(3) Consider in the contracting process whether firms competing for large contracts could subcontract with MBE/WBEs. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities in order to increase opportunities for participation by MBE/WBEs in the competitive process.

(4) Encourage contracting with a consortium of MBE/WBEs when a contract is too large for one of these firms to handle individually.

(5) Use the services and assistance of the SBA and the MBDA.

(6) If the prime contractor awards subcontracts, require the prime contractor to take the steps in subparagraphs (1)-(5) of this section.

Pertinent State of North Carolina Administrative Code Regarding M/WBE Compliance. The provisions in this Compliance Supplement constitute compliance with the Rules below.

Owner Requirements	01 NCAC 30I .0306
Contractor Requirements	01 NCAC 30I .0308

Resources

Some sources for identifying MBE/WBE (DBE) firms

- <https://www.ips.state.nc.us/vendor/SearchVendor.aspx> (NCDOA)
- <https://www.ebs.nc.gov/VendorDirectory/default.html> (NCDOT)
- http://dsbs.sba.gov/dsbs/search/dsp_dsbs.cfm (US SBA)

Some sources for finding minority trade papers for potential solicitation advertisements and Federal advertising options

- <http://web.sba.gov/subnet/> (US SBA Subnet advertising website)
- <https://www.mbda.gov/> (US Dept. of Commerce)
- <https://ncadmin.nc.gov/businesses/hub> (NC HUB Office)

Good Faith Efforts Form

Attempts to provide subcontracting opportunities for MBE/WBE firms.

Per 01 NCAC 30I .0101, 50 points must be claimed below by the bidder.

(This is identical to State of NC Affidavit A)

- 1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- 2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- 3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- 4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- 5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- 6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- 7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- 8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- 9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- 10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

Results of Good Faith Efforts Undertaken (you must check one box below)

- No subcontractors are being used for this contracted work. Fill out Table A listing only the Prime Contractor. (This statement takes the place of State of NC Affidavit B)
- Subcontractors are being used. Fill out Table A and B for each trade. **Each Table B lists 3.**
- Subcontractors are being used. If any Table B has fewer than 3 solicitations you must also advertise in an M/WBE trade paper and indicate what source of M/WBE firms you used (*must list at least one*). Some possible papers and sources of M/WBE firms are listed in the Instructions of this Supplement.

Name of the Trade Paper: _____

Submit proof of advertisement with package

M/WBE Sources: Source: _____ Source: _____

Submit printouts from M/WBE source(s)

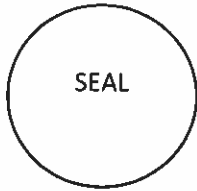
Certification Statement and Affidavit of Contractor.

The below affidavit constitutes compliance with 01NCAC 30I .0308(7)(a) and (b) and takes the place of State of North Carolina Affidavits C and D.

I have read the information in this compliance supplement and all information provided to the State in this package is accurate and true to the extent of my knowledge including the calculated percentages and the good faith efforts presented herein.

Prime Contractor Company Name (Print)

Prime Contractor Representative (Sign & Date)



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public _____

My Commission Expires _____

Certification of Project Owner/Funding Applicant

Funding Applicant (City, Town etc)

Applicant Authorized Representative (Sign & Date)

Division of Water Infrastructure Project Number

Table A: Prime Contractor and list of selected subcontractors

List Prime and ALL of the selected subcontractors (both DBE's and non-DBE's) being used on the project. Each Trade listed on this sheet should have a completed Table B: Subcontract Solicitation List showing the DBE firms contacted and given _____ opportunities to bid.

Company Name (list prime first then subs)	Company Address and Phone	Trade (Above) and Price (Below)	MBE or WBE and certifying agency if applicable	(State use only) Listed in EPLS as Debarred?
		\$		
		\$		
		\$		
		\$		

Calculate M/WBE utilization as a percent (00.00%) of the prime contract. Limited to 100% even if the Prime is a DBE.

MBE and WBE subs total	\$
Prime Contract Price	\$ _____%

Note: Table A substitutes for both the State of NC "Identification of Minority Participation" form and EPA Form 6100 4.

Table B: Subcontract Solicitation List

Table B is required if:

- 1) Project is Federally funded (SRF) OR;
- 2) Project is a State Reserve Project or State Emergency Loan (SRP or SEL) and Utilization % on Table A is less than 10%
- 3)

Trade: _____ (enter the trade being solicited, paving, hauling etc.)

List the firm being used on the project first. If three MBE or WBE firms are not listed, additional information must be provided showing advertisements and/or sources used to identify MBE/WBE subs. Use as many of these sheets as are necessary to cover every trade being subbed out.

Company Name	Company Address and Phone	MBE or WBE and certifying agency if applicable.	How was this firm contacted (email, letter, phone) and what was the result of the solicitation?*

*Must submit copies of emails or letters. If phone calls were made this sheet can serve as documentation of calls.

MBE/WBE (DBE) – Change or Add a Subcontractor Form

According to EPA guidance on 40 CFR 33.302

If a DBE subcontractor fails to complete work under the subcontract for any reason, the recipient must require the prime contractor to employ the six good faith efforts described in §33.301 if soliciting a replacement subcontractor.

Please provide the information below **if the subcontracted work in question was included in previously submitted good faith efforts documentation:**

Prime Contractor:

Subcontracted work:

Previous Subcontractor:

Reason this firm did not complete the work:

New subcontractor and DBE status: MBE WBE N/A

If this is a new trade being subcontracted, or was not documented in the original Project Bid Information submittal to the State then good faith efforts to solicit a DBE firm must be documented. As the original DBE instructions indicate, please provide a Table B from those original instructions, showing all the DBE firms contacted to perform this work. If three (3) firms are not listed on Table B, then additionally you must submit proof of an advertisement in a minority trade paper and evidence that there were not three reasonably available firms in the work area. The EPA provides in 33.301(a) that good faith efforts are to be carried out "...to the fullest extent practicable...". If solicitations were not carried out due to being impracticable, please attach this explanation to this form.

Please follow the steps below for new subcontracted work:

Indicate the new trade being subcontracted:

Indicate the firm being used and DBE status: MBE WBE N/A

Attach Table B

(For State Use) Is this sub debarred? Yes No

Project Owner/Applicant:

Project Number:

Signature of Prime Contractor's Representative

Davis-Bacon Instructions for SRF Projects

To be included in the Contract Documents:

- The entire contents of 29 CFR 5.5
- The appropriate wage determination (usually Heavy). This determination must be the most current and have been in effect at least 10 days prior to bid opening. If a wage determination for the project location is not available, then the Statewide wage determination may be used. If it takes longer than 90 days to execute contracts and the wage determination changes, then the new wage rates must be incorporated into the contract. Wage Determinations can be found at:
https://beta.sam.gov/search?index=wd&is_active=true&date_filter_index=0&date_rad_selection=date&wdType=dbra&page=1

During Construction:

- Post the Davis-Bacon Poster
<https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/fedprojc.pdf>
- Post the appropriate wage rates. These should be the ones included in the specifications and any new classifications approved by the Department of Labor.
- Weekly payrolls are to be maintained onsite for all subject contractors and subcontractors. Number them for each week of the construction period including weeks that do not have payroll. Form WH 347 is suggested. Do not submit these to the State SRF office, submit them to the municipality for review. Link to Form WH 347 -
<https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347.pdf>
- The municipality will conduct interviews with employees when there are irregularities concerning wages being paid. Use Standard Form 1445.
- For additional wage classification approvals, complete form SF 1444 found at this link:
https://www.nps.gov/dscw/upload/sf1444-classificationrateauthorizationrequest_7-14-06.pdf
Email this form to: whd-cbaconformance_incoming@dol.gov

The entire contents of this package is:

- 1) These Instructions
- 2) 29 CFR 5.5
- 3) Davis-Bacon Poster
- 4) Payroll form WH 347

29 CFR §5.5 Contract provisions and related matters.

(a) The Agency head shall cause or require the contracting officer to insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in §5.1, the following clauses (or any modifications thereof to meet the particular needs of the agency, *Provided*, That such modifications are first approved by the Department of Labor):

(1) *Minimum wages.* (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in §5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by

the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) *Withholding.* The (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) *Payrolls and basic records.* (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show

that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under §5.5(a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5(a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the (write the name of the agency) or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) *Apprentices and trainees*—(i) *Apprentices*. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) *Trainees*. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In

addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) *Equal employment opportunity.* The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) *Compliance with Copeland Act requirements.* The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) *Contract termination: debarment.* A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) *Compliance with Davis-Bacon and Related Act requirements.* All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) *Disputes concerning labor standards.* Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) *Certification of eligibility.* (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) *Contract Work Hours and Safety Standards Act.* The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by §5.5(a) or §4.6 of part 4 of this title. As used in this paragraph, the terms *laborers* and *mechanics* include watchmen and guards.

(1) *Overtime requirements.* No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) *Withholding for unpaid wages and liquidated damages.* The (write in the name of the Federal agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) *Subcontracts.* The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in §5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

EMPLOYEE RIGHTS UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

PREVAILING WAGES

You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT

Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY

If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.



For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627



WWW.WAGEHOUR.DOL.GOV



Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

Rev. Dec. 2008

OMB No.: 1235-0008
Expires: 01/31/2015

NAME OF CONTRACTOR OR SUBCONTRACTOR ADDRESS _____

PAYROLL NO. _____ PROJECT AND LOCATION _____

PROJECT OR CONTRACT NO. _____

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) TYPE OF EMPLOYMENT	(3) WORK CLASSIFICATION	(4) DAY AND DATE	(5)							(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS				(9) NET WAGES PAID FOR WEEK
				(5) TOTAL HOURS									FICA	WITH- HOLDING TAX	OTHER	TOTAL DEDUCTIONS	
				HOURS WORKED EACH DAY													

While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.3(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.4(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine if employees have received legally required wages and fringe benefits.

Public Burden Statement

We estimate that it will take an average of 55 minutes to complete this collection, including time for reviewing instructions, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W., Washington, D.C. 20210

Date _____
 I, _____ (Name of Signatory Party) _____ (Title)
 do hereby state:

(1) That I pay or supervise the payment of the persons employed by _____ (Contractor or Subcontractor) _____ on the _____ (Building or Work) _____, that during the payroll period commencing on the _____ day of _____, and ending the _____ day of _____, all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said _____ (Contractor or Subcontractor) _____ from the full

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967, 76 Stat. 357, 40 U.S.C. § 3145), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:
 (a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS
 — in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

— Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE
<p>THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.</p>	

"General Decision Number: NC20240015 01/05/2024

Superseded General Decision Number: NC20230015

State: North Carolina

Construction Type: Building

Counties: Brunswick and Pender Counties in North Carolina.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	<ul style="list-style-type: none">◆ Executive Order 14026 generally applies to the contract.◆ The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	<ul style="list-style-type: none">◆ Executive Order 13658 generally applies to the contract.◆ The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

IRON0848-003 07/01/2023

	Rates	Fringes
IRONWORKER.....	\$ 28.00	17.10

PLUM0421-006 07/01/2023

	Rates	Fringes
PIPEFITTER.....	\$ 33.96	13.48

SUNC2018-015 08/08/2023

	Rates	Fringes
BRICKLAYER.....	\$ 19.13	0.00
CARPENTER, Excludes Form Work....	\$ 19.64	4.54
CEMENT MASON/CONCRETE FINISHER...\$	16.72 **	0.00
ELECTRICIAN.....	\$ 22.15	5.93
FORM WORKER.....	\$ 14.51 **	1.88
LABORER: Common or General.....\$	12.20 **	1.43
LABORER: Mason Tender - Brick...\$	13.17 **	0.00
LABORER: Mason Tender - Cement/Concrete.....\$	15.26 **	0.00
LABORER: Pipelayer.....	\$ 16.33 **	3.11
OPERATOR: Backhoe/Excavator/Trackhoe.....\$	21.00	2.89
OPERATOR: Bulldozer.....	\$ 17.54	2.63
OPERATOR: Forklift.....	\$ 16.75 **	0.00
OPERATOR: Grader/Blade.....	\$ 22.68	3.27
OPERATOR: Roller.....	\$ 15.31 **	1.46
PAINTER.....	\$ 15.55 **	1.05
PLUMBER.....	\$ 23.11	0.00
ROOFER.....	\$ 18.26	4.38
SHEET METAL WORKER.....	\$ 19.67	13.27
TRUCK DRIVER: Dump Truck.....\$	15.98 **	2.93

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

=====
** Workers in this classification may be entitled to a higher
minimum wage under Executive Order 14026 (\$17.20) or 13658

(\$12.90). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

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

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

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

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

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

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor

200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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

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

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

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

4.) All decisions by the Administrative Review Board are final.

=====

END OF GENERAL DECISION"

American Iron and Steel (AIS)

Guidance for Clean Water SRF Projects in North Carolina

This State guidance summarizes the requirements under Subsection 436(a)(2) of the Consolidated Appropriations Act of 2014 that SRF recipients only use iron and steel products produced in the United States. The Environmental Protection Agency has provided full guidance on the requirements at the following website:

http://water.epa.gov/grants_funding/aisrequirement.cfm.

Recipients of subject SRF awards must submit the executed Certification for SRF Projects and any waiver requests, with their Bid Information Package. The recipient will not receive any funds if the State has not received these items.

Manufacturers can use the template “Compliance Certification” to document that materials are “produced in the United States”

Contents

1. Certification for SRF Projects
2. Waiver Instructions
3. Materials covered by AIS
4. Template *Compliance Certification* for Materials Covered by AIS
5. Template *De Minimis* list

American Iron and Steel (AIS)

Certification for SRF Projects

Recipients of subject SRF awards must submit **this executed form and any waiver requests** with their Bid Information package to the State SRF program in order to receive funding.

The (Applicant) certifies that their contractors performing construction, alteration, maintenance and repair of the public treatment works under project number _____ will comply with subsection 436 (a)(2) of the Consolidated Appropriations Act of 2014 and only use iron and steel products produced in the United States.

Contractor	Owner
(print) _____	(print) _____
(sign and date) _____	(sign and date) _____

American Iron and Steel (AIS)

Waiver Instructions

Approved national waivers can be found at this website:

http://water.epa.gov/grants_funding/aisrequirement.cfm

Please note, that a national waiver for “de minimis” iron and steel components has been approved. A table is included in this document for use in documenting what items are to be considered as covered under this waiver. Note that no single de minimis item can be more than 1% of the total material cost of the project and the total of all de minimis items must not exceed 5% of the **total material cost of the project**.

Waiver Requests are provided for in subsection 436(b) of the Act. It states they will be granted if the Administrator of the EPA finds that:

- (1) Applying subsection (a) would be inconsistent with the public interest;
- (2) Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
- (3) Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Submit waiver requests to mark.hubbard@ncdenr.gov. The State will forward these to the EPA at cwsrfwaiver@epa.gov for a final determination. A checklist of items for a complete waiver application package can be found in the EPA guidance document for AIS found here:

http://water.epa.gov/grants_funding/upload/AIS-final-guidance-3-20-14.pdf

American Iron and Steel (AIS)

Materials Covered by AIS

Lined and unlined pipes and fittings, manhole covers, municipal castings (detailed below), hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel (detailed below), reinforced precast concrete and construction materials (detailed below). Products must be composed of greater than 50% iron and steel measured by cost and permanently incorporated into the project to be subject to the provision.

<u>Municipal Castings</u>	<u>Structural Steel</u>	<u>Construction Material</u>
Access Hatches Ballast Screen Benches Bollards Cast Bases Cast Iron Hinged Hatches Cast Iron Riser Rings Catch Basin Inlet Cleanout/Monument Boxes Construction Covers and Frames Curb and Corner Guards Curb Openings Detectable Warning Plates Downspout Shoes Drainage Grates, Frames and Inlets Inlets Junction Boxes Lampposts Manhole Covers, Rings, Frames and Risers Meter Boxes Service Boxes Steel Hinged Hatches Steel Riser Rings Trash Receptacles Tree Grates Tree Guards Trench Grates Valve Boxes, Covers and Risers	Wide Flange shapes I-beams Channels Angles Tees Zees H-piles Sheet piling Tie Plates Cross Ties (note: at least one dimension must be 3 inches or greater to be subject)	Wire Rod Bar Angles Concrete Reinforcing Bar Wire Wire Cloth Wire Rope and Cables Tubing Framing Joists Trusses Fasteners Welding Rods Decking Grating Railings Stairs Access Ramps Fire Escapes Ladders Wall Panels Dome Structures Roofing Ductwork Surface Drains Cable Hanging Systems Manhole Steps Fencing and Fence Tubing Guardrails Doors Stationary Screens

Mechanical and electrical components, equipment and systems are not subject to AIS. See the EPA guidance for details.

American Iron and Steel (AIS)

Template Compliance Certification For Materials Covered By AIS

Company Name:

Company Address:

SRF Project name and project number:

I _____, certify that the following products were produced at the following location or steps in the production of the listed products, occurred at the following location:

Location:

Product

Step in production (Final production, melting, bending, etc.)

1)

2)

3)

Therefore, these materials are “produced in the United States”

(signature and title of company representative)

(date)

American Iron and Steel (AIS)

Template *De Minimis* List

<u>Item</u>	<u>Cost</u>

Total De Minimis Cost: _____

Total Material Cost For Project: _____

De Minimis Cost Is _____ % of total material costs

Build America, Buy America (BABA) Certification

The Contractor acknowledges to and for the benefit of the Town of Holden Beach ("Owner") and the US EPA (the "Funding Authority") that it understands the goods and services under this Agreement are being funded with federal monies and have statutory requirements commonly known as "Build America, Buy America;" that requires all of the iron and steel, manufactured products, and construction materials used in the project to be produced in the United States ("Build America, Buy America Requirements") including iron and steel, manufactured products, and construction materials provided by the Contactor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Owner and Funding Authority (a) the Contractor has reviewed and understands the Build America, Buy America Requirements, (b) all of the iron and steel, manufactured products, and construction materials used in the project will be and/or have been produced in the United States in a manner that complies with the Build America, Buy America Requirements, unless a waiver of the requirements is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the Build America, Buy America Requirements, as may be requested by the Owner or the Funding Authority. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Owner or Funding Authority to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Owner or Funding Authority resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the Funding Authority or any damages owed to the Funding Authority by the Owner). If the Contractor has no direct contractual privity with the Funding Authority, as a lender or awardee to the Owner for the funding of its project, the Owner and the Contractor agree that the Funding Authority is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the Funding Authority.

Contractor

(print) _____

(sign and date) _____

NOTICE TO PROCEED

Contingent on State Approval

Owner:	<i>Town of Holden Beach, North Carolina</i>	Owner's Contract No.:	
Contractor:	<i>Terrahawk, LLC</i>	Contractor's Project No.:	
Engineer:	<i>Green Engineering, P.L.L.C.</i>	Engineer's Project No.:	<i>20-030.1</i>
Project:	<i>Greensboro Street Lift Station #2 Hazard Mitigation Upgrade</i>	Contract Name:	<i>Greensboro Street Lift Station #2 Hazard Mitigation Upgrade</i>
		Effective Date of Contract:	

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on _____, 20____.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, [the date of Substantial Completion is _____, and the date of readiness for final payment is _____.

Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds and loss payees) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

Owner:	<i>Town of Holden Beach, North Carolina</i>	Contractor:	<i>Terrahawk, LLC</i>
By:	<i>David W. Hewett</i>	By:	
Title:	<i>Town Manager, Town of Holden Beach</i>	Title:	<i>Managing Member</i>
Date Issued:			

Copy: Engineer



Contractor's Application for Payment No. _____

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

To (Owner) Project: Owner's Contract No. _____	Application Date: _____ Via (Engineer) Engineer's Project No. _____
Application Period: From (Contractor): _____ Contract: Contractor's Project No. _____	

Application For Payment Change Order Summary

Approved Change Orders	Additions	Deductions
TOTALS		

**NET CHANGE BY
CHANGE ORDERS** _____

1. ORIGINAL CONTRACT PRICE..... \$ _____
2. Net change by Change Orders..... \$ _____
3. Current Contract Price (Line 1 ± 2)..... \$ _____
4. TOTAL COMPLETED AND STORED TO DATE
(Column F total on Progress Estimates)..... \$ _____
5. RETAINAGE:

a. X	Work Completed..... \$ _____
b. X	Stored Material..... \$ _____
c.	Total Retainage (Line 5.a + Line 5.b)..... \$ _____
6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)..... \$ _____
7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$ _____
8. AMOUNT DUE THIS APPLICATION..... \$ _____
9. BALANCE TO FINISH, PLUS RETAINAGE
(Column G total on Progress Estimates + Line 5.c above)..... \$ _____

<p>Contractor's Certification</p> <p>The undersigned Contractor certifies to the best of its knowledge, the following:</p> <p>(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment.</p> <p>(2) Title to all Work materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens - security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and</p> <p>(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.</p>	Payment of \$ _____ (Line 8 or other - attach explanation of the other amount)
Contractor's Signature by _____	(Engineer) _____ (Date)
Date _____	(Date)
Funding or Financing Entity (if applicable) _____	(Date)

Progress Estimate - Unit Price Work

Contractor's Application

For (Contract)		Application Number:									
Application Period		Application Date									
Bid Item No	Item Description	Contract Information				Estimated Quantity Installed	Value of Work Installed to Date	Materials Presently Stored (not in C)	Total Completed and Stored to Date (D + E)	% (F / B)	Balance to Finish (B - F)
		Item Quantity	Units	Unit Price	Total Value of Item (\$)						
Totals											

Date of Issuance:	Effective Date:
Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

Contractor is hereby directed to promptly execute this Field Order, issued in accordance with General Conditions Paragraph 11.01, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference: _____
Specification(s) _____ Drawing(s) / Detail(s) _____

Description:

Attachments:

ISSUED:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____
Date: _____	Date: _____

Copy to: Owner

Work Change Directive No.

Date of Issuance: _____ Effective Date: _____
 Owner: _____ Owner's Contract No.: _____
 Contractor: _____ Contractor's Project No.: _____
 Engineer: _____ Engineer's Project No.: _____
 Project: _____ Contract Name: _____

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

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

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

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

Contract Price \$ _____ [increase] [decrease].
 Contract Time _____ days [increase] [decrease].

Basis of estimated change in Contract Price:

- Lump Sum Unit Price
- Cost of the Work Other

RECOMMENDED:	AUTHORIZED BY:	RECEIVED:
By: _____ Engineer (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
 Title: _____

Date of Issuance: _____

Effective Date: _____

Owner: _____

Owner's Contract No.: _____

Contractor: _____

Contractor's Project No.: _____

Engineer: _____

Engineer's Project No.: _____

Project: _____

Contract Name: _____

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

Description: _____

Attachments: *[List documents supporting change]*

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES <i>[note changes in Milestones if applicable]</i>
Original Contract Price: \$ _____	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. ___ to No. ___: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: _____ Engineer (if required)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
Title: _____

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Town of Holden Beach, North Carolina	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Engineer:	Green Engineering, P.L.L.C.	Engineer's Project No.:	20-030.1
Project:	Greensboro Street Lift Station #2 Hazard Mitigation Upgrade	Contract Name:	Greensboro Street Lift Station #2 Hazard Mitigation Upgrade

This [preliminary] [final] Certificate of Substantial Completion applies to:

- All Work The following specified portions of the Work:

Date of Substantial Completion

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

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

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: None
 As follows

Amendments to Contractor's responsibilities: None
 As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

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

EXECUTED BY ENGINEER:		RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____	By: _____	By: _____
Title: _____	Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____	Date: _____

CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS

TO: (OWNER)

PROJECT INFORMATION
(Name & Location)

CONTRACT DATE

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED
HERE TO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: _____

Address: _____

By: _____

Notary:

Subscribed and sworn to before me this date:

Signature Notary Public: _____

Printed Name: _____

My Commission Expires: _____

DIVISION I - GENERAL REQUIREMENTS

DETAILED SPECIFICATIONS

SECTION 0101 - PROJECT DESCRIPTION

PART 1.00 - GENERAL

1.01 Description

The work included in these Specifications the Project Drawings and the Contract Documents for this Project is to be performed under one (1) Contract with the following four (4) Sub Parts:

Part A – Architectural and General Construction

Part B – Electrical Construction

Part C – Station Piping and Equipment Modifications

Part D – Site Work

The intent of this Section is to provide a general project description to aid each Bidder in understanding the overall scope of the project and the work included in the Contract.

1.02 Construction Sequence

The time limit provided for the performance of this Contract is 270 calendar days.

Work must progress such that operation of the existing pump station will not be interrupted at any time except for scheduled shutdowns coordinated with the Owner and Engineer and only for very short periods of time (<2 hours). No service interruptions shall be permitted between Memorial Day and Labor Day.

PART 2.00 - PRODUCTS

All material and product descriptions are included in the other applicable Sections of these Specifications and/or as shown on the Project Drawings.

PART 3.00 - EXECUTION

3.01 Part A - Architectural and General Construction

The work within this portion of the Project will include, but not be limited to the following:

1. Lower Level – Install structural steel columns; metal stairs; stud wall with access door with hardware.
2. Ground Level – Demolish and remove existing access stairs to lower level and seal existing opening; saw cut/core drill penetrations for roof scuttle, metal stairs and pipe penetrations; install breakaway walls; install aluminum roof scuttle, FRP double doors with hardware; install monorail and electrical hoist.
3. Second Level - Construct an above ground reinforced concrete and metal stud and wood framed structure to house a new duplex vacuum pump system to replace the existing duplex vacuum pump system presently operating in the “Lower Level”.

Included in this portion of the work will be the erection of an elevated reinforced concrete structure consisting of columns and slab; floor and wall penetrations; a metal stud and wood framed pump building complete with all carpentry, walls, paint, weather barrier, ceilings, insulation, windows, FRP doors with hardware, metal roofing, metal grated stairs, storm shades, brackets, gutters, downspouts, floor hatch, structural steel framing, monorail and electric hoist.

Part B – Electrical Construction

The work within this portion of the project will include, but not be limited to, the following:

1. Lower Level – Upon completion of all electrical components on the Second Level required to put the new vacuum pumping system into operation, the contractor will remove all abandoned electrical components (panels, conduit, cable, lighting, fans, ventilation, etc.) and permanently seal all remaining openings to prevent water migration into this area of the pump station.

Install all electrical gear; conduit; wire and cable; system control wires; unit heaters, ventilation fans and ductwork, gas detection system components, lighting fixtures, switches, boxes, cover plates and receptacles.

2. Ground Level – Install all lighting fixtures, switches, gas detection system components, pump alarm light and horn, conduit, cable and receptacles. Route generator conduit and connection to generator pad as shown on the electrical drawings. Provide electrical service to electric hoist and Owner’s existing temporary duplex vacuum pump skid.

3. Second Level – Work included on this level will include the installation of all electrical gear; conduit; wire and cable; grounding; system control wires; circuit breakers and panelboards, duplex pump control system; transformers; lighting fixtures (inside and outside); automatic transfer switch and receptacle; boxes and cover plates; extend new pump cables to re-feed existing duplex submersible pumps in lower level, provide power to SCADA system and install HVAC system. Duplex Pump Control System will be procured by the Owner and provided to the Contractor for installation.

Extend new pump cables to re-feed existing duplex submersible pumps in lower level.

Provide electrical service for Owner's existing temporary duplex vacuum pump skid.

The OWNER will furnish a SCADA system complete with antenna. All conduit and cable shall be provided by the contractor in the locations as shown on the drawings.

4. Town of Holden Beach Vacuum Pump Station No. 3 - Provide electrical service for Owner's existing temporary duplex vacuum pump skid.
5. Town of Holden Beach Vacuum Pump Station No. 4 - Provide electrical service for Owner's existing temporary duplex vacuum pump skid.

Part C – Station Piping and Equipment Modifications

The work within this portion of the project will include, but not be limited to, the following:

1. Lower Level – Install all piping, valves and fitting required to transfer service from the existing duplex vacuum pump skid to the new installed duplex vacuum pump skid to be located on the upper level.

Install piping, valves and fittings from existing vacuum tank piping up to new duplex pump skid and to temporary vacuum pump skid on ground level.

Once duplex vacuum pump system is placed into service on second level, remove all vacuum pumps, piping, valves and fittings and deliver to Public Works Facility (\pm 7 miles).

Remove existing duplex pump skid base and repair any remaining concrete surfaces damaged.

Modify discharge piping on sewage pumps to accept new flowmeter. Replace check valves on sewage pump discharge and header piping and plug valves on vacuum lines into vacuum collection tank.

2. Ground Level – Install all PVC vacuum piping, ductile iron vacuum pump(s) exhaust piping, PVC condensate drain, and vacuum and exhaust piping connections for Owner's temporary vacuum pump skid.
3. Second Level – Install duplex vacuum pump skid; PVC vacuum pipe, PVC condensate drain and 3" exhaust piping to connect with 8" D.I. header pipe beneath floor slab.

Duplex Pump Skid and controls will be procured by the Owner and provided to the Contractor for installation.

Note: Work in this Part will include placing into operation the temporary vacuum pump system in such a fashion as to maintain continuous system operation throughout the construction of the project.

Part D – Site Work

The work within this portion of the Project will include but not be limited to the following:

Remove existing vinyl fencing, stack, tie, and deliver to the Owner's Public Works facility. Remove portions of existing media filter bed retaining wall and all existing filter bed media.

Install temporary chain-link fencing to protect the project site during construction.

Install new vinyl sheet pile retaining wall system in locations as shown on the drawing. Fill existing media filter bed to grades shown on the drawings after removing all unsuitable material.

Install new media filter bed complete with timber walls, visqueen barrier, perforated schedule 40 PVC exhaust and underdrain piping, solid schedule 80 PVC exhaust piping underdrain piping, stone fill, and wood chip media.

Install schedule 80 PVC roof drain and media filter bed water disposal system proposed around perimeter of building.

Install concrete pad for portable generator, concrete apron at building double doors, and 8-inch thick compacted CABC gravel drives where shown on the site plan.

Install new coated chain link fence and gates in locations as shown on the drawings. All fence system components will be polymer coated.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

DETAILED SPECIFICATIONS

SECTION 0110 - PROJECT MEETINGS

PART 1.00 - GENERAL

1.01 Description

The work covered in this section includes attendance and participation in (1) preconstruction conference and monthly project meetings.

The purpose of the preconstruction conference is to enable all of the parties having an interest in this project to meet, exchange preliminary ideas and schedules, and lay the groundwork for the project.

The periodic project meetings shall be conducted by the Engineer throughout the construction period to enable orderly review of progress during construction and to provide for systematic discussion of problems.

These periodic project meetings, in general, will be held monthly at the job site, or at a location and time schedule mutually acceptable to the Contractor, Engineer, and other involved parties.

1.02 Quality Assurance

Persons designated by the Contractor to attend and participate in project meetings shall have all required authority to commit the Contractor to solutions as agreed upon in the project meetings.

1.03 Submittals

A. Agenda Items

To the maximum extent possible, advise the Engineer, at least 24 hours in advance of the project meeting, regarding all items to be added to the agenda.

B. Minutes

The Engineer will compile minutes of each project meeting and will distribute copies to the Owner and the Contractor. The Contractor may make and distribute such other copies as he wishes.

PART 2.00 - PRODUCTS

No products are required in this Section.

PART 3.00 - EXECUTION

3.01 Meeting Schedule

Coordinate with Engineer to establish a mutually acceptable schedule for project meetings.

3.02 Meeting Location

If possible, project meetings shall be held at the job site; otherwise, location will be worked out with Engineer.

3.03 Attendance

The Contractor shall have a representative present at the preconstruction conference and all periodic project meetings, unless previous arrangements are approved by the Engineer.

To the maximum extent practicable, the Contractor shall assign the same person or persons to represent his interest at all project meetings throughout the construction period. Subcontractors, suppliers, and others may be invited to attend project meetings in which their aspects of the work are involved.

END OF SECTION

DIVISION I - GENERAL REQUIREMENTS

DETAILED SPECIFICATIONS

SECTION 0120 - SUBMITTALS & SUBSTITUTIONS

PART 1.00 - GENERAL

1.01 Description

Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.

To ensure that the specified materials and products are furnished and installed in accordance with the design intent, the herein established procedures shall be followed for submittal of design data and for its review and approval, or rejection, by the Engineer.

1.02 Product Handling

Make all pre-submittals, shop drawings, requests for substitutions, and other items in strict accordance with the provisions of this Section of the specifications.

PART 2.00 - PRODUCTS

2.01 Pre-submittals and Shop Drawings

Data shall include all drawings, design, performance curves, construction materials, installation requirements, capabilities, and any additional information available to allow the Engineer to adequately evaluate the product for the proposed application.

Scale of drawings shall be sufficiently large to show all pertinent features of the items and its method of connection to the work.

Number of sets of each submittal shall be as follows:

- A. Pre-submittals - 2 sets
- B. Shop Drawings - 5 sets

2.02 Colors

Unless the precise color is specifically described in the Contract Documents, whenever a choice of color is available in a specified product, submit accurate color charts to the Engineer for his review and selection.

2.03 Substitutions

A. Engineer's approval required:

1. The Contract is based on the materials, equipment, and methods described in the Contract Documents.
2. The Engineer will consider proposals for substitution of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Engineer to evaluate the proposed substitution.
3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Engineer.

B. "Or equal":

1. Where the phrase "or equal" or "or approved equal" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal unless the item has been specifically approved for this work by the Engineer.
2. The decision of the Engineer shall be final.

2.04 Operation and Maintenance Manuals

A. General:

O&M Manuals shall be furnished by the manufacturer for all equipment, unless otherwise specifically directed by the Engineer. These manuals shall be prepared in durable binders approximately 8 1/2" by 11" in size and with at least the following items:

1. Identification on, or readable through, the front cover stating general nature of the manual.
2. Neatly typewritten index near the front of the manual, furnishing immediate information as to location in the manual of all emergency data regarding the installation.

3. Complete instructions regarding operation and maintenance of all equipment involved.
4. Complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.
5. Copy of all guarantees and warranties issued.

B. Extraneous data:

Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete, or otherwise clearly indicate, all manufacturer's data with which this installation is not concerned.

C. Number of copies required:

Unless otherwise specifically directed by the Engineer, deliver three (3) copies of the manual to the Engineer.

2.05 Other Submittals Required

- A. Construction Schedule - Updated every 4 months
- B. Project Cash Flow (Cumulative)
- C. Monthly Partial Payment Requests
- D. Sales Tax Reports
- E. Subcontractor Approval Request
- F. Bonds for Highway Department (where applicable)
- G. Insurance Certificate for Railroad (where applicable)
- H. Payrolls (EPA & HUD Projects only)
- I. As-Built Construction Drawings

PART 3.00 - EXECUTION

3.01 Prequalification of Equipment

When the detailed specification for any equipment or material requires prequalification, these submittals shall be sent or delivered to the Engineer at least ten (10) days prior to the scheduled date for receiving and opening bids.

3.02 Shop Drawings

The Contractor shall submit shop drawings to the Engineer for all products, equipment, and material to be used on this project, regardless of whether the item is listed in the specifications or not. Pipe manufacturer's certification of materials shall be acceptable

for specified items.

Shop drawings should be submitted at least fifteen (15) days in advance of anticipated project usage to allow for the Engineer's review and approval, or rejection.

Unapproved items shall not be acceptable on this project.

3.03 Submittal Schedule

The following provides a listing of the minimum submittal times for the other items listed in Part 2.00 of this specification:

- A. Colors - Fifteen (15) days prior to need
- B. O&M Manuals - Prior to 40% project completion
- C. Construction Schedule - Prior to preconstruction conference
- D. Projected Cash Flow - Prior to preconstruction conference
- E. Partial Payment Requests - Monthly
- F. Sales Tax Reports - Monthly, with Payment Requests
- G. Payrolls - Weekly (when required)
- H. Subcontractor Approval Request - Fifteen (15) days prior to need
- I. Highway Bonds - Seven (7) days prior to highway work
- J. Railroad Bonds - Fifteen (15) days prior to railroad work

3.04 Miscellaneous Submittals

To be resolved with the Engineer at least fifteen (15) days prior to need.

3.05 As-Built Construction Drawings

The Contractor shall maintain and keep up-to-date a set of "as-built" drawings of the project work. These shall be protected and kept on the project for inspection. At project completion these "as-built" drawings shall be turned over to the Engineer.

3.06 Submittal Revisions

A revised Construction Schedule shall be submitted to the Engineer within seven (7) days after the construction progress varies 10% or more from the current Construction Schedule for two consecutive months, or at any other time when the Contractor desires to permanently alter the planned schedule.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

DETAILED SPECIFICATIONS

SECTION 0140 - TEMPORARY FACILITIES AND CONTROLS

PART 1.00 - GENERAL

1.01 Description

The temporary facilities and controls covered in this Section include, but are not necessarily limited to:

- A. All utilities, including water, sewer, gas, electricity and/or telephone, except as noted otherwise in these specifications
- B. Field offices and sheds
- C. Storage yards
- D. Sanitary facilities
- E. Safety measures

1.02 Product Handling

Use all means necessary to maintain temporary facilities and control in proper and safe condition throughout progress of the work. In the event of loss or damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

PART 2.00 - PRODUCTS

2.01 Temporary Utilities

A. General:

Each contractor shall provide and pay all costs for all gas, water, and electric required for the performance of the work, by he or his subcontractors.

B. Temporary gas and water:

C. Temporary electricity:

- (1) Furnish and install all necessary temporary wiring.

- (2) Furnish and install area distribution boxes so located that the individual trades may use their own construction-type extension cords to obtain adequate power and artificial lighting at all points where required by inspectors and for safety (when required for buildings).

2.02 Field Office

When field offices are located at the job, the Contractor shall make the field office available to the Engineer or his representatives.

2.03 Sanitary Facilities

Furnish and install all required temporary toilet buildings with sanitary toilets for use of all workmen; comply with all minimum requirements of the Health Department or other public agency having jurisdiction; maintain in a sanitary condition at all times.

2.04 Safety Measures

The Contractor shall comply with all safety and health requirements of:

- A. Contract General Conditions; Special Conditions; Supplemental Conditions; FmHA, EPA, and/or HUD Conditions (when applicable)
- B. Occupational Safety and Health Act of 1970 (P.L. 91-596) with any amendments
- C. North Carolina Department of Labor
- D. U.S. Department of Labor Safety and Health Regulations promulgated under Section 107 of the Contract Work Hours and Safety Standards Act (P.L. 91-54)
- E. Associated General Contractors' "Manual of Accident Prevention in Construction"
- F. Local Health Department

2.05 Use of Explosives

When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property. The Contractor shall be responsible for any and all damage or injury to persons or property resulting from the use of explosives. Such responsibility shall include, but shall in no way be limited to all damages arising from all forms of trespass to adjacent property as a result of blasting by the Contractor.

All explosives shall be stored in a secure manner, in compliance with all laws, and all such storage places shall be marked clearly "DANGEROUS EXPLOSIVES."

The Contractor shall notify each public utility company having facilities in close proximity to the site of the work of his intention to use explosives. This notice shall be given sufficiently in advance to enable the utility companies to take whatever steps they may consider necessary to protect their property from injury. The Contractor shall also give the Engineer, all occupants of adjacent property, and all other Contractors working in or near the project notice of his intention to use explosives.

2.06 Protection and Restoration of Property

The Contractor shall be responsible for the protection from his activities of all public and private property on and adjacent to the work and shall use every reasonable precaution necessary to prevent damage or injury thereto. He shall use suitable precautions to prevent damage to pipes, conduits, and other underground structures, and to poles, wires, cables, and other overhead structures.

The Contractor shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer has witnessed or otherwise referenced their location and shall not remove them until directed.

The Contractor shall be responsible for the removal, preservation, and resetting of all mail boxes disturbed by the construction operations. The mail boxes and their supports, when reset, shall be left in as good a condition as they were before removal. The Contractor will not be required to furnish new material except as required to repair damage resulting from construction operations.

The Contractor will be held responsible for all damage or injury to property of any character resulting from any act, omission, negligence, or misconduct in the prosecution of the work. When any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, negligence, or misconduct in the execution of the work, he shall either restore at his own expense such property to a condition similar or equal to that existing before such damage or injury was done, or shall make good such damage or injury in a manner acceptable to the owner of the damaged property. In case of failure on the part of the Contractor to restore such property or make good such damage or injury the Project Owner may be the Contractor's expense repair, rebuild, or otherwise restore such property in such manner as the Engineer may consider necessary.

PART 3.00 - EXECUTION

3.01 Removal

Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the work; remove all such temporary facilities and control as rapidly as progress of the work will permit or as directed by the Engineer.

END OF SECTION

DIVISION 1 - GENERAL REQUIREMENTS

DETAILED SPECIFICATIONS

SECTION 0150 - PROJECT CLOSEOUT

PART 1.00 - GENERAL

1.01 Description

The work covered by this Section includes, but is not limited to, the following items:

- A. Final Project Inspections
- B. Operation and Maintenance Manuals

PART 2.00 - PRODUCTS

2.01 Final Inspections

At such time as the Contractor and the Project Inspector together agree that the Work has been completed in accordance with the project drawings and the contract documents, the Contractor shall request, in writing, that the Engineer conduct a final inspection.

The Engineer shall notify the other parties who need to make inspections, including where applicable but not limited to the Owner, USDA Rural Development, N.C. Department of Transportation, N.C. Department of Environmental Quality.

The Engineer shall coordinate the final inspections with the Owner, the Contractor and all others requiring such inspections.

Upon completion of his final inspection, the Engineer shall provide the Contractor with his "punch list" of items needing additional work. Punch lists from other agencies involved shall be provided to the Contractor also for his attention and correction.

When the Contractor has completed all work to the satisfaction of all agencies involved, the Engineer shall issue to the Contractor a letter of project acceptance, stating the acceptance date and the project warranty period.

2.02 Operation and Maintenance Manuals

The Contractor shall bind and furnish operation and maintenance manuals as required by these detailed specifications for all equipment items in accordance with the Submittals schedule.

PART 3.00 - EXECUTION

Shall be as described in these Detailed Specifications.

END OF SECTION

DIVISION 2 – SITE WORK

DETAILED SPECIFICATIONS

SECTION 0220 – EXCAVATION, FILLING AND GRADING

PART 1.00 - GENERAL

1.01 Description

Excavating, filling, and grading required for this work includes, but is not necessarily limited to:

- A. Excavating for footings and foundations
- B. Filling and backfilling to attain indicated grades
- C. Trenching and trench backfilling
- D. Rough and finish grading of the site
- E. Furnishing and installing granular cushion under all interior concrete slabs on grade

1.02 Quality Assurance

The General Contractor shall employ and pay for an independent testing laboratory to perform all testing as specified herein. The laboratory selected shall be subject to approval by the Engineer.

A. Testing Services

1. Testing Services to be provided by testing laboratory include the following:
 - a. Test the Contractor's proposed materials in the laboratory and/or field for compliance with the Specifications.
 - b. Perform field moisture content and density tests to assure that the specified compaction of backfill materials has been obtained.
 - c. Report all test results to the Engineer and the Contractor.
2. Authority and Duties of Testing Agency: Technicians representing the testing laboratory shall inspect the materials in the field and perform tests, and shall report their findings to the Engineer and the Contractor. When the materials furnished or work performed fails to fulfill specification requirements, the technician will direct the attention of the Engineer and the Contractor to such failure.
 - a. The technician shall not act as foremen or perform other duties for the Contractor. Work will be checked as it progresses, but failure to

detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Engineer for final acceptance. Technicians are not authorized to revoke, alter, relax, enlarge, or release any requirements of the specifications, nor to approve or accept any portion of the work.

3. Responsibilities and duties of Contractor: The use of testing services shall in no way relieve the Contractor of his responsibility to furnish materials and construction in full compliance with the Drawings and Specifications.
 - a. Secure and deliver to the Engineer or to the testing agency, without cost, preliminary representative samples of the materials he proposed to use and which are required to be tested.
 - b. Furnish such casual labor as is necessary to obtain and handle samples at the Project or at other sources of material.
 - c. Advise the testing agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.

B. Reference Standards:

The Contractor shall comply with applicable provisions and recommendations of the following:

1. ASTM D 422, Particle-Size Analysis of Soils.
2. ASTM D 423, Liquid Limit of Soils.
3. ASTM D 427, Shrinkage Factors of Soils.
4. ASTM D 698, Moisture-Density Relations of Soils, using 5.5 lb (2.5 kg) Rammer and 12-in. (304.8 mm Drop).
5. ASTM D 1140, Amount of Material in Soils Finer than the No. 200 Sieve.
6. ASTM D 1556, Density of Soil in Place by the Sand-Conc Method.
7. ASTM D 1557, Moisture-Density Relations of Soils, using 10.0 lb (4.5 kg) Rammer and 18-in. (457 mm) Drop.
8. ASTM D 2166, Unconfined Compressive Strength of Cohesive Soil.
9. ASTM D 36, Structural Steel.
10. ASTM A 328, Steel Sheet Piling.

C. Test Reports

1. Submit copies of the following reports directly to Engineer from the testing service, with copy to the Contractor:
 - a. Tests on borrow material.
 - b. Footing subgrade.
 - c. Field density tests.
 - d. Optimum moisture - maximum density curve for each soil used for

- e. backfill.
Tests of actual unconfined compressive strength or bearing tests of each strata.

1.03 Job Conditions

A. Dust Control

Use all means necessary to control dust on and near the work and on and near any off-site borrow areas if such dust is caused by the Contractor's operations during performance of the work or if resulting from the condition in which the Contractor leaves the project site.

Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors, and other work operations on the site.

B. Protection

Use all means necessary to protect all materials of this section before, during and after installation. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

PART 2.00 - MATERIALS

2.01 Fill Material, General

A. Approval Required

All fill material shall be subject to approval of the Engineer.

B. Notification

For approval of imported fill material, notify the Engineer at least four working days in advance of intention to import material, designate the proposed borrow area, and permit the Engineer to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

2.02 On-site Fill Material

All on-site fill material shall be soil-rock mixture which is free from organic matter and other deleterious substance. It shall contain no rocks or lumps over four inches in greatest dimension and not more than 15% of the rocks or lumps shall be larger than 2 inches in greatest dimension.

2.03 Imported Fill Material

All imported fill material shall meet the requirements of Section 2.02 above and shall, in addition, be predominantly granular with a maximum particle size of two inches and a plasticity index of 12 or less.

2.04 Fill Beneath Foundations

All fill material placed within two feet of the base of building footings and/or slabs shall have a plasticity index of 15 or less.

2.05 Granular Cushion

The granular cushion material to be installed under floor slabs as shown on the drawing shall be a clean mineral aggregate with particle sizes grading within the following limits:

Passing 1" mesh	100%
Passing #8 sieve	5% or less
Passing #200 sieve	1% or less

N. C. Department of Transportation gradation size 57 is acceptable for this application.

2.06 Trench and Structural Backfill

A. On-Site Fill Material

All on-site fill material used for trench and structural backfill shall meet the requirements of Section 2.02 above.

B. Imported Cohesionless Material

All imported cohesionless material used for trench and structural backfill shall be free from organic substance and other deleterious matter, shall be subject to the approval of the Engineer, and shall be in particle size grading within the following limits:

Passing the number four sieve:	100%
Passing the number 200 sieve:	3% maximum

2.07 Other Materials

All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the approval of the Engineer.

PART 3.00 - EXECUTION

3.01 General

Prior to all work of this Section, become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this Section.

Do not allow or cause any of the work performed or installed to be covered up or enclosed by work of this Section prior to all required inspections, tests, and approvals.

Should any of the work be so enclosed or covered up before it has been approved, uncover all such work at no additional cost to the Owner.

After the work has been completely tested, inspected, and approved, make all repairs and replacements necessary to restore the work to the condition in which it was found at the time of uncovering, all at no additional cost to the Owner.

3.02 Finish elevations and lines

For the setting and establishing of finish elevations and lines, the Owner through his Engineer shall provide to the Contractor sufficient plans, monuments, bench marks and/or references for the Contractor to properly stake and construct the project in accordance with the project drawings.

The Contractor shall take all necessary precautions to preserve all monuments, bench marks, and references provided for this project, and if lost or disturbed, shall immediately replace such to the approval of the Engineer at no cost to the Owner.

3.03 Excavation

A. General

1. All excavation shall be unclassified and shall be included in the lump sum price bid for the project.
2. The Contractor shall be responsible for the definite location of existing facilities within the area of his excavation for work under this Contract. Care shall be exercised during such location work to avoid damaging and/or disrupting the affected facility. The Contractor shall be responsible for repairing, at his expense, damage to any structure, piping, or utility caused by his work.
3. If blasting is required, the Contractor shall comply with all laws, ordinances, applicable safety code requirements, and regulations relative to the handling, storage, and use of explosives and the protection of life and property. The Contractor shall be responsible for any and all damage caused

- by his blasting operations. Suitable methods shall be employed to confine all materials lifted by blasting within the limits of the excavation or trench.
- a. All rock which cannot be handled and compacted as earth shall be kept separate from other excavated materials and shall not be mixed with backfill or embankment materials except as specified or directed.
 - b. All blasting and rock excavation shall be included in the lump sum price bid for the Project. No additional payment will be made for rock excavation.
4. Sheeting and shoring shall be provided as necessary for the protection of the work and for the safety of personnel. The clearances and types of the temporary structures, insofar as they affect the character of the finished work, will be subject to the approval of the Engineer, but the Contractor shall be responsible for the adequacy of all sheeting, bracing, cofferdamming, etc. No separate payment is to be made for providing or removing steel or wood sheet piling; payment shall be considered as having been included in the price bid for the Contract. All shoring, bracing and sheeting shall be removed as the excavations are backfilled and in a manner such as to prevent injurious caving; or, if so directed by the Engineer, because in his opinion, removal would be damaging to structures or personnel, shall be left in place. Sheeting left in place shall be cut off 3 feet below the surface. Payment for sheeting left in place shall be considered as having been included in the Contract Price. All sheeting and bracing must be maintained until replaced by other sheeting and bracing or until the permanent construction is able to withstand lateral pressures from soil water. Remove sheeting and bracing from excavations unless otherwise ordered in writing by the Engineer. Removal shall be done so as to not cause injury to the work. Removal shall be equal on both sides of excavations to ensure no unequal loads on pipe or structure. Defer removal of sheeting and bracing, where removal may cause soil to come into contact with concrete until the concrete has cured a minimum of 7 days.
5. All excavation within the grading limits of the Project shall be performed to the lines and grades indicated on the Drawings. All excavation shall be performed in the manner and sequence as required for the work.
- a. Excavation work shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.
 - b. Subgrades shall be firm, dense, and thoroughly compacted to a 90 percent maximum density. The finished elevation or stabilized

subgrades shall not be above subgrade elevations shown on the Drawings.

- c. Exposed soil after excavations have been made shall be protected against detrimental damage and change in condition from physical disturbance and rain. Wherever possible, concrete footings shall be done the same day the excavation is made. If this is not done, the footing excavations shall be properly protected.
6. All excavated materials that meet the requirements for backfill shall be stockpiled within the site (but not less than 25 feet from the surface borders of any excavation) for use as backfill, or for providing final site grades. All excavated materials which are not considered suitable for fill, and any surplus or excavated material which is not required for fill shall be disposed of by the Contractor. Upon completion of the work all on-site waste and disposal areas shall be cleaned and the debris removed from the site.

B. Excavations for Structures:

1. Excavations for the construction of structures shall be carefully made to the depths indicated or required. Bottoms for footings, slabs, and grade beams shall be level, clean and clear of loose material, the lower sections true to size. Footings, slab, and grade beam bottoms shall be approved by the Engineer before any concrete is placed thereon.
2. When the excavation has reached the design subgrade, the exposed subgrade shall be proof rolled using a 25-ton pneumatic tire roller. Proof rolling operation shall be inspected by the Engineer. Any soft or unconsolidated zones or areas detected by proof rolling operations shall be undercut as directed by the Engineer. The undercut subgrade shall be sacrificed to a minimum depth of 6-inches and compacted to a minimum of 95 percent of the maximum density as determined by ASTM D 1557. After the undercut subgrade has been sacrificed and compacted the undercut shall be backfilled with select backfill to the design subgrade elevation in accordance with Section 3.07.B. The final subgrade shall be inspected and approved by the Engineer.
3. In excavations for structures, where, in the opinion of the Engineer, the ground, not affected by high water level, is spongy or otherwise unsuitable for the contemplated foundation, the Contractor will be required to remove such unsuitable earth and replace it with suitable material properly compacted.
4. Excavations for structures which have been carried below the depths indicated shall be refilled to the proper grade with select backfill material properly compacted as specified herein.

5. All structure excavations shall be hand-trimmed to permit the placing of full widths, and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.
6. Excavation shall be extended a minimum of two feet on each side of structures, footings, etc. unless otherwise shown or specified.

C. Roadway Excavations

1. Roadway excavation shall consist of excavation for the roadways in conformity with lines, grades, cross sections, and dimensions shown on the Drawings and shall include the excavation of all unsuitable material from the subgrade.
2. The subgrade shall be compacted to 90 percent maximum density.

D. Trench Excavations

1. Trenches shall be excavated to a width which will provide adequate working space and clearances for proper pipe installation, jointing, and embedment, and ductbank installation.
 - a. Where pipe elevations are not shown on the Drawings, trenches shall be excavated to a depth sufficient to provide a minimum cover over the top of the pipe of 3 feet.
 - b. Unless otherwise shown ductbank trenches shall be excavated to provide a minimum cover over ductbanks of 3 feet.
 - c. Subgrades for electrical ductbank shall be compacted to 90 percent maximum density.
2. Where necessary to reduce earth load on pipe trench banks to prevent sliding, or caving, banks may be cut back on slopes which shall not extend lower than 12 inches above the top of the pipe.
3. Except where otherwise required, pipe trenches shall be excavated 6 inches below the underside of the pipe to provide for the installation of granular embedment pipe foundation material.
4. Where in earth, trench bottoms for 6 inch or smaller pipe may be excavated below the pipe subgrade and granular embedment material provided as specified or the trench bottom may be graded to provide uniform and continuous support (between bell holes or end joints) of the installed pipe.
5. Over-depths in trench excavation shall be backfilled with select backfill material properly compacted. Whenever unsuitable material that is incapable of properly supporting the pipe is encountered in the undercut required for bedding material, the unsuitable material shall be removed to

the depth required and the trench backfilled to the proper grade with select backfill material properly compacted.

6. Bell holes shall provide adequate clearance for tools and methods used in installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.
7. Where existing piping or ductbank constructed by others cross the new pipeline or new electrical ductbank trench excavation, they shall be adequately supported and protected from damage due to construction. All methods for supporting and maintaining these facilities shall be subject to approval by the Engineer. Care shall be taken to insure that the grades and alignment of piping and electrical ductbanks constructed by others are maintained and that the pipe joints are not disturbed. Backfill shall be carefully placed and taped to prevent damage or future settlement. Any damage or misalignment of piping or electrical ductbanks constructed by others due to construction or settlement shall be repaired by the Contractor at his expense.

3.04 Preparation of Subgrade

A. Stripping

After the site has been cleared, the Contractor shall strip the vegetation and topsoil to a depth of at least 12 inches below the original elevation in the area beneath the building. This topsoil shall be stockpiled for later use in landscaping the site.

B. Scarifying

After the site has been cleared, stripped, and excavated to within six inches of the specified depths for recompaction, scarify the exposed surface to a minimum depth of six inches, thoroughly moisture condition, and compact to the requirements specified for fill below.

C. Leveling

Remove all ruts, hummocks, and other uneven surfaces by surface grading prior to placement to fill.

3.05 Excess Water Control

A. Unfavorable Weather

Do not place, spread, or roll any fill material during unfavorable weather

conditions.

Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

B. Flooding

Provide berms or channels to prevent flooding of subgrade; promptly remove all water collecting in depressions.

C. Softened Subgrade

Where soil has been softened or eroded by flooding or placement during unfavorable weather, remove all damaged areas and recompact as specified for fill and compaction below.

D. Dewatering

Provide and maintain at all times during construction, ample means and devices with which to promptly remove and dispose of all water from every source entering the excavations or other parts of the work.

Dewater by means which will ensure dry excavations and the preservation of the final lines and grades of bottoms of excavations.

3.06 Fill and Compaction

A. Filling

After subgrade compaction has been approved by the Engineer, spread approved fill material in layers not exceeding six inches in uncompacted thickness.

B. Moisture Conditioning

Water or aerate the fill material as necessary and thoroughly mix to obtain a moisture content which will permit proper compaction.

C. Compaction, General

Compact each soil layer to at least the specified minimum degree; repeat compaction process until plan grade is attained.

D. Degree of Compaction Requirements
(By Standard Proctor, except where noted)

1. Structural fill:
Densify all structural fill, including recompacted existing fill and backfill, to a minimum degree of compaction of 90%.
2. Pavement areas:
Compact the upper six inches of fill in pavement areas to a minimum degree of compaction of 95%.
3. Trenches in building and pavement areas:
Building and pavement areas are defined, for the purpose of this paragraph, as extending a minimum of five feet beyond the building and/or pavement. Compact cohesion backfill material to a minimum degree of compaction of 90%.
Compact the upper six inches of backfill in pavement areas to a minimum degree of compaction of 95%.
Densify cohesionless backfill material to a minimum relative density of 70% as determined by the ASTM test designated as D-2049-69.
Compact materials of questionable cohesion to either as minimum degree of compaction of 90% or a minimum relative density of 70%, whichever results in the greater dry density.

3.07 Grading

A. General

Except as otherwise directed by the Engineer, perform all rough and finish grading required to attain the elevations indicated on the Drawings.

B. Grading Tolerances

1. Rough grade
Building and parking areas: Plus or minus 0.1 foot
2. Finish grade
Granular cushion under concrete slabs: Plus or minus 0.05 foot
Parking areas: Plus or minus 0.1 foot
Landscaped areas: Plus or minus 0.1 foot

C. Treatment After Completion of Grading

After grading is completed and the Engineer has finished his inspection, permit no further excavation, filling, or grading except with the approval of and inspection of the Engineer.

Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.08 Excavating for Footings

A. Preparation

To minimize differential settlement, it is essential that earth surfaces upon which footings will be placed be compacted to the approval of the Engineer and in accordance with the compaction requirements established in this Section of these Specifications.

Verify that all compaction is complete and approved prior to excavating for footings.

B. Excavating

Excavate to the established lines and grades.

Cut off bottom of trenches level and remove all loose soil.

Where soft spots are encountered, undercut all defective material and replace with suitable backfill or lean concrete.

3.09 Placing Granular Cushion

Carefully place the granular cushion in areas to receive concrete slabs on grade, uniformly attaining the thickness indicated on the Drawings and providing all required transition planes.

3.10 Trenching

A. General

Perform all trenching required for the installation of items where trenching is not specifically described in other Sections of these Specifications.

Make all trenches open vertical construction with sufficient width to provide free working space at both sides of the trench and around the installed item as required for joining, backfilling, and compacting.

B. Depth

Trench as required to provide the elevations shown on the Drawings.

Where elevations are not shown on the drawings, trench to sufficient depth to give a minimum of 36 inches of fill above the top of the pipe measured from the adjacent finished grade.

C. Correction of Faulty Grades

Where trench excavation is inadvertently carried below proper elevations, backfill with material approved by the Engineer and then compact to provide a firm and unyielding subgrade and/or foundation to the approval of the Engineer and at no additional cost to the Owner.

D. Trench Bracing

Properly support all trenches in strict accordance with all pertinent rules and regulations.

Brace, sheet, and support trench walls in such a manner that they will be safe and that the ground alongside the excavation will not slide or settle, and that all existing improvements of every kind, whether on public or private property, will be fully protected from damage.

In the event of damage to such improvements, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

Arrange all bracing, sheeting, and shoring so as to not place stress on any portion of the completed work until the general construction thereof has proceeded far enough to provide sufficient strength.

E. Removal of Trench Bracing

Exercise care in the drawing and removal of sheeting, shoring, bracing, and timbering to prevent collapse or caving of the excavation faces being supported.

F. Grading and Stockpiling Trenched Material

Control the stockpiling of trenched material in a manner to prevent water running into the excavations.

Do not obstruct surface drainage but provide means whereby storm and waste waters are diverted into existing gutters, other surface drains, or temporary drains.

3.11 Foundation For Pipes

A. General

Grade the trench bottoms to provide a smooth, firm, and stable foundation free of rock points throughout the length of the pipe.

B. Foundation Material

Place a minimum of six inches of the specified cohesionless material in the bottom of the trench when directed by the Engineer.

C. Subsurface Conditions

In areas where soft, unstable materials are encountered at the surface upon which cohesionless material is to be placed, remove the unstable material and replace it with material approved by the Engineer; make sufficient depth to develop a firm foundation for the item being installed.

If the need for such overexcavation has been occasioned by an act or failure to act on the part of the Contractor, make the overexcavation and replacement at no additional cost to the Owner.

D. Shaping

At each joint in pipe, recess the bottom of the trench as required into the firm foundation in such a manner as to relieve the bell of the pipe of all load and to ensure continuous bearing of the pipe barrel on the firm foundation.

Accurately shape all pipe subgrade and fit the bottom of the trench to the pipe shape.

3.12 Bedding for Pipes

A. General

To ensure that adequate and uniform support is provided both under and along the sides of the pipe, stone bedding material must also be utilized for haunching at least up to the spring line of all PVC and ABS pipe. PVC pipe subject to flooding should be bedded in stone one (1) foot above top of pipe. This bedding shall be included in the price of bid for work being performed, and will not be paid for extra.

Take special care to provide firm bedding support on the underside of the pipe and fittings for the full length of the pipe.

B. Material

Acceptable bedding material shall be a granular, non-cohesive material which shall have a 95% passing a 3/4 inch sieve and 95% retained on a #4 sieve.

C. Other bedding procedures and materials may be used if prior written approval has been obtained from the Engineer.

3.13 Backfill for Pipes

A. Using On-Site Materials

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content which will facilitate compaction, shall be placed alongside the pipe in layers not exceeding 6 inches in depth. Care shall be taken to insure thorough compaction of the fill under the haunches of the pipe. Each layer shall be thoroughly compacted by rolling, tamping and mechanical rammers, or by hand tamping with heavy iron tampers, the tamping face area of which shall not exceed 25 square inches. The method of filling and compacting shall be continued until the fill has reached an elevation 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and thoroughly compacted the layers not exceeding 6 inches.

B. Using Imported Cohesionless Material

After the pipe has been bedded, cover and fill the remaining portion of the trench with the specified cohesionless material and densify as specified in this Section.

3.14 Cleaning Up

Upon completion of the work of this Section, immediately remove all debris and excess earth material from the site.

END OF SECTION

DIVISION 2 – SITE WORK

DETAILED SPECIFICATIONS

SECTION 0231 - PVC COATED CHAIN LINK FENCING

PART 1.00 - GENERAL

1.01 Section Includes

- A. PVC coated chain link fencing and accessories described in this Specification will be installed in the location(s) shown on the drawings.

1.02 Related Sections

- A. Section 033000 - Cast-In-Place Concrete

1.03 Submittals

- A. Shop drawings: Layout of fences and gates with dimensions, details, and finishes of components, accessories, and post foundations.
- B. Product data: Manufacturer's catalog cuts indicating material compliance and specified options.
- C. Samples: Color selection for PVC finishes. If requested, samples of materials (e.g., fabric, wires, and accessories).

1.04 Special Warranty

- A. Provide manufacturer's standard limited warranty that its chain link fence system is free from defects in material and workmanship including cracking, peeling, blistering and corroding for a period of 15-years from the date of installation and acceptance by the Engineer.

PART 2.00 - PRODUCTS

2.01 Manufacturer

- A. From qualified manufacturers having a minimum of five years experience manufacturing PVC coated chain link fencing will be acceptable by the architect as

equal, if approved in writing, ten days prior to bidding, and if they meet the following specifications for design, size gauge of metal parts and fabrication.

- B. Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

2.02 Chain Link Fence Fabric

- A. PVC coated, 6 mil to 10 mil thickness, thermally fused to zinc-coated steel core wire: Per ASTM F668 Class 2b. Core wire tensile strength 75,000 psi.
- B. Size: Helically wound and woven to height of 6 feet as indicated on drawings with 2-inch diamond mesh, 9 gauge, with a core wire diameter of .148-inches and a break load of 1290 pounds per foot. Color Black ASTM F934.
- C. Top and bottom fabric selvage shall be knuckled.

2.03 Steel Fence Framing

- A. Steel pipe - Type I: ASTM F 1083, standard weight schedule 40 ; minimum yield strength of 30,000 psi; sizes as indicated. Hot-dipped galvanized with minimum average 1.8 oz/ft² of coated surface area.
- B. PVC-Coated finish: In accordance with ASTM F1043, apply supplemental color coating of 10 to 15 mils in Black color to match fabric.
- C. End Gate and Corner Post - 3-inch OD, 5.79 lbs/ft;
Line (intermediate) - Post 2-1/2-inch OD, 3.65 lbs/ft;
Rail and Braces - 1-5/8-inch OD, 2.27 lbs/ft.

2.04 Gate

Gates shall be installed in all locations shown on the drawings and shall be the widths as indicated. Gate frame shall be made of 2-inch OD hot-dip galvanized pipe, weight, 2.72 pounds per linear foot. Corner fittings shall be of heavy pressed steel or malleable iron castings. Gate shall be provided complete with malleable iron ball and socket hinges, catch, and stop. Hinges shall permit the gate to swing back against fence - 180 degrees. Color of all gate material will be Black.

All gate components will have PVC coated finish as specified in other paragraphs of this Specification.

2.05 Accessories

- A. Chain link fence accessories: [ASTM F 626] Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing.
- B. Post caps: PVC-coated Formed steel, weather tight closure cap for tubular posts. Provide one cap for each post. (Where top rail is used, provide tops to permit passage of top rail.)
- C. Top rail and brace rail ends: PVC-coated pressed steel per ASTM F626, for connection of rail and brace to terminal posts.
- D. Sleeves: Lengths of top rails to be connected using 6-inch PVC coated sleeves that allow for expansion or contraction of the rail.
- E. Tie Wire: PVC-coated 9 gauge galvanized steel or aluminum for attachment of chain link fabric to posts and rails. Hog rings attach fabric to tension wire to be 12 -1/2 GA .
- F. Brace and tension (stretcher bar) bands: PVC-coated pressed steel.
- G. Tension (stretcher) bars made of one continuous piece of steel or aluminum, 3/16" x 3/4-inch. Provide one bar per end or gate post and two bars per corner or pull post.
- H. Tension wire: PVC applied to metallic coated steel wire: Per ASTM F 1664 Class 2 a, 6 gauge, 0.192-inch diameter core wire with tensile strength of 75,000 psi.
- I. Truss rods & tightener: PVC-coated steel rods with minimum diameter of 5/16-inches. Capable of withstanding a tension of minimum 2,000 lbs.
- J. Nuts and bolts are galvanized but not vinyl coated. PVC touch up paint will be required to color coat nuts and bolts. Touch up paint color will be black to match fabric and post.
- K. Bottom Locking Slats: Provide high density polyethylene bottom lock privacy Slat with wind load and privacy factor of 80%. The slats will have a flat tubular shape with inside reinforced leg. The width of the Slat will be 1 3/32-inches to match the 2-inch wire mesh. The color of the Slat shall be green.

2.06 Setting Materials

- A. Concrete: Minimum 28-day compressive strength of 3,000 psi.

PART 3.00 - EXECUTION

3.01 Examination

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries of work are clearly established.

3.02 Chain Link Fence Framing Installation

- A. Install chain link fence in accordance with ASTM F 567 and manufacturer's instructions.
- B. Locate terminal post at each fence termination, or every 500 feet, or change in horizontal or vertical direction of 15° or more.
- C. Space line posts uniformly [at 10' on center].
- D. Concrete set [terminal] [and] [gate] posts: Drill holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6-inch deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36-inch below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.
- E. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.
- F. Bracing: Install horizontal pipe brace at mid-height for fences 6 foot and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.
- G. Tension wire: Provide tension wire at bottom of fabric [and at top, if top rail is not specified]. Install tension wire before stretching fabric and attach to each post with ties. Secure tension wire to fabric with 12-1/2 gauge, 0.0985-inch hog rings 24-inch oc.
- H. Top rail: Install lengths, 21-foot. Connect joints with sleeves for rigid connections for expansion/contraction.
- I. Center rails are to be installed when shown on drawings.
- J. Bottom rails (optional) to be installed when shown on drawings.

3.03 Chain Link Fabric Installation

- A. Fabric: Install fabric on security side and attach so that fabric remains in tension after pulling force is released. Leave approximately 2-inch between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15-inch on center and to rails, braces, and tension wire at 24-inch on center.
- B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands spaced maximum of 15-inch on center.

3.04 Accessories

- A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.
- B. Fasteners: Install nuts on side of fence opposite fabric side for added security.

3.05 Cleaning

- A. Clean up debris and unused material, and remove from the site.

END OF SECTION

DIVISION 2 - SITE WORK

DETAILED SPECIFICATIONS

SECTION 0265 - BEDDING & BACKFILL MATERIALS

PART 1.00 - GENERAL

1.01 Description

This Section covers the stone bedding and soil or stone backfill materials used in pipe line construction, and other similar installations where shown on the drawings, required in the specifications or as directed by the Engineer.

1.02 Quality Assurance

Materials shall meet the requirements of Part 2.00 of these specifications, and shall be acceptable to the Engineer.

PART 2.00 - MATERIALS

2.01 Stone Bedding

Bedding material shall have ninety-five (95) percent passing a three-fourths (3/4) inch (19.0-mm) sieve and ninety-five (95) percent retained on a number four (4) (4.75-mm) sieve.

2.02 Select Backfill

Where other than local material is used for backfill above the foundation, such material will be classified as select backfill. This material shall be a soil material which meets the requirements of AASHTO M 145 for class A-2-4 soils. This material shall be a well graded gravelly, silty, or clayey sand with a plasticity index equal to or less than ten (10), and liquid limit equal to or less than forty (40).

PART 3.00 - EXECUTION

3.01 Installation

The usage and installation of stone bedding shall be in accordance with the specification for the particular item being installed.

END OF SECTION

DIVISION 2 - SITE WORK

DETAILED SPECIFICATIONS

SECTION 0271 - CONTROL OF EROSION, SILTATION, AND POLLUTION

PART 1.00 - GENERAL

1.01 Description

The Contractor shall take whatever measures are necessary to minimize soil erosion and siltation, water pollution, and air pollution caused by his operations. The Contractor shall also comply with the applicable regulations of all legally constituted authorities relating to pollution prevention and control. The Contractor shall keep himself fully informed of all such regulations which in any way affect the conduct of the work, and shall at all times observe and comply with all such regulations. In the event of conflict between such regulations and the requirements of the specifications, the more restrictive requirements shall apply.

The Engineer will limit the area over which construction operations are performed whenever the Contractor's operations do not make effective use of construction practices and temporary measures which will minimize erosion, or whenever construction operations have not been coordinated to effectively minimize erosion, or whenever permanent erosion control features are not being completed as soon as permitted by construction operations.

1.02 Submittals

All materials to be used on this project for erosion control, water and air pollution control, and/or dust control shall have been approved by the Engineer prior to being used. Submittals for the Engineer's approval shall be in five (5) copies.

1.03 Quality Assurance

All work under this Section shall be in full compliance with the North Carolina Sedimentation Pollution Control Act of 1973 and all Rules and Regulations promulgated pursuant to the provisions of this act.

PART 2.00 - MATERIALS

2.01 Silt Fence

Either wood posts or steel posts may be used. Wood posts shall be a minimum of 6 feet

long, at least 3 inches in diameter, and straight enough to provide a fence without noticeable misalignment. Steel posts shall be 5 feet long, 1 3/4" wide, and have projections for fastening the wire to the fence.

Wire fence fabric shall be at least 32 inches high, and shall have at least 6 horizontal wires. Vertical wires shall be spaced 12 inches apart. The top and bottom wires shall be at least 10 gauge. All other wires shall be at least 12 1/2 gauge.

Engineering of geotextile filter fabric such as Trevira 1115 or Mirafi 140 shall be at least 24 inches wide and shall weigh at least 4.5 ounces per square yard. Other materials may be used provided these materials have been approved by the Engineer.

Wire staples shall be a No. 9 staple and shall be at least 1 1/2 inches long.

2.02 Other Materials

Any additional materials required for usage in this Section shall be approved by the Engineer prior to being used.

PART 3.00 - EXECUTION

3.01 Erosion and Siltation Control

The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent the eroding of soil and the silting of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces, or other property.

Excavated materials shall not be deposited, nor shall earth dikes or other temporary earth structures be constructed, in rivers, streams, or impoundments.

Frequent fording of live streams with construction equipment will not be permitted; therefore, temporary bridges or other structures shall be used wherever frequent stream crossings are necessary. Unless otherwise approved in writing by the Engineer, mechanized equipment shall not be operated in live streams except as may be necessary to construct channel changes and to construct or remove temporary or permanent structures.

Temporary and permanent erosion control measures shall be provided as shown on the plans or as directed by the Engineer. Temporary measures shall be installed during the initial stages of construction for the areas they serve. All permanent erosion control work shall be incorporated into the project at the earliest practicable time. Temporary erosion control measures shall be coordinated with permanent erosion control measures and all other work on the project to assure economical, effective, and continuous erosion control throughout the construction and post construction period and to minimize siltation of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces, or other

property.

Temporary erosion control measures shall include but not be limited to the use of temporary berms, dikes, dams, drainage ditches, silt basins, silt ditches, slope drains, structures, vegetation, mulches, mats, netting, gravel, or any other methods or devices that are necessary. Temporary erosion control measures may include work outside the right of way or construction limits where such work is necessary as a result of construction such as borrow pit operations, haul roads, plant sites, equipment storage sites, and disposal of waste or debris. The Contractor shall be liable for all damages to public or private property caused by silting or slides originating in waste areas used by the Contractor.

The Contractor shall stabilize graded slopes within 15 working days or 30 calendar days (whichever is shorter) or at completion of any phase of grading. Permanent stabilization shall be completed within 30 working days or 120 calendar days (whichever is shorter) after construction completion.

Erosion control measures installed by the Contractor shall be acceptably maintained at a minimum of 50% of the original sediment storage capacity by the Contractor until such time as a satisfactory, permanent growth of grass is established. The Contractor shall remove the erosion control measures when directed by the Engineer, after the areas they serve have been stabilized.

State (and local, where required) erosion control approvals, for measures to be performed by the Contractor, shall be obtained by the Engineer prior to the initiation of any construction.

3.02 Water and Air Pollution

The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent pollution of rivers, streams, and water impoundments. Pollutants such as chemicals, fuels, lubricants, bitumens, raw sewage, and other harmful waste shall not be discharged into or alongside of rivers, streams, or impoundments, or into natural or manmade channels leading thereto.

The Contractor shall comply with all State or local air pollution regulations throughout the life of the project.

3.03 Dust Control

The Contractor shall control dust throughout the life of the project within the project area and at all other areas affected by the construction of the project, including, but not specifically limited, unpaved secondary roads, haul roads, access roads, disposal sites, borrow and material sources, and production sites. Dust control shall not be considered effective where the amount of dust creates a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property.

The Contractor will not be directly compensated for any dust control measures necessary, as this work will be considered incidental to the work covered by the various contract items.

3.04 Sanctions

Failure of the Contractor to fulfill any of the requirements of this article may result in the Engineer ordering the stopping of construction operations until such failure has been corrected. Such suspension of operations will not justify an extension of contract time.

Failure on the part of the Contractor to perform the necessary measures to control erosion, siltation, and pollution will result in the Engineer notifying the Contractor to take such measures. In the event that the Contractor fails to perform such measures within 24 hours after receipt of such notice, the Engineer may suspend the work as provided above, or may proceed to have such measures performed. The cost of such work performed by other forces will be deducted from monies due the Contractor on his contract.

END OF SECTION

DIVISION 2 – SITE WORK

DETAILED SPECIFICATIONS

SECTION 272A - EXCELSIOR MATTING FOR EROSION CONTROL

PART 1.00 - GENERAL

1.01 Description

The Contractor shall install excelsior roll matting over the seed and mulch at the following locations:

- A. On all dam embankments
- B. On any other disturbed areas around buildings, pump stations, and lagoons where the slopes are 3:1 or steeper
- C. Other areas as designated on the drawings or as directed by the Engineer

No asphalt tack will be required in areas where matting is to be used.

PART 2.00 - MATERIALS

2.01 General

Matting for erosion control shall be excelsior matting. Other acceptable matting material manufactured especially for erosion control may be used when approved by the Engineer in writing prior to being used.

2.02 Excelsior Matting

The excelsior blanket shall consist of a machine produced matt of curled wood excelsior of 80% 6-inch or longer fiber length with consistent thickness and the fiber evenly distributed over the entire area of the blanket. The top side of each blanket shall be covered with a photodegradable extruded plastic mesh. The blanket shall be made smolder resistant without the use of chemical additives. The staples shall be made of wire 0.091 inches in diameter or greater. "U" shaped with legs 6 inches in length and a 1-inch crown. Size and gauges of staples used will vary with soil conditions. The staples shall be driven vertically into the ground spaced approximately two (2) linear yards apart on each side, and one row in the center alternatively spaced between each side. (60 staples on each blanket) Use a common row of staples on adjoining blankets.

2.03 Wire Staples

Staples shall be machine made of No. 11 gage new steel wire formed into a "U" shape.

The size when formed shall be not less than 6 inches in length with a throat of not less than 1 inch in width.

PART 3.00 – EXECUTION

3.01 Placing of Matting

Placing of matting shall be done immediately following mulching.

Matting shall be unrolled in the direction of the flow of water and shall be applied without stretching so that it will lie smoothly but loosely on the soil surface. The upchannel or top of slope end of each piece of matting shall be buried in a narrow trench at least 5 inches deep and tamped firmly. After the end of the matting is buried, the trench shall be closed and tamped firmly. Where one roll of matting ends and a second roll begins, the end of the upper roll shall be brought over the buried end of the second roll so that there will be a 6-inch overlap. Check slots shall be constructed at each 50 feet longitudinally in the matting or as directed by the Engineer. These slots shall be narrow trenches at least 5 inches deep. The matting shall be folded over and buried to the full depth of the trench, after which the trench shall be closed and firmly tamped. Where 2 or more widths of matting are laid side by side, the overlap shall be at least 4 inches.

Staples shall be placed across matting at ends, junctions, and check slots and shall be spaced approximately 10 inches apart.

Staples shall be placed along the outer edges and down the center of each strip of matting and shall be spaced 3 feet apart. Staples shall also be placed along all lapped edges 2 to 3 feet apart.

In the installation of erosion control matting on cut or fill slopes the Engineer may require adjustments in the trenching or stapling requirements to fit individual slope conditions.

3.02 Maintenance of Matting

The Contractor shall maintain matting until all work on the project has been completed and accepted. Prior to acceptance of the project, if any staples have become loosened or raised or if the matting becomes loose or torn, or undermined for any reason, the damaged areas shall be reshaped, reseeded, and refertilized, and the matting shall be acceptably repaired or replaced. Where matting becomes loose or raised above the surface of the ground, the matting shall be acceptably repaired, replaced, or removed, as directed by the Engineer. The repair of damaged areas shall be performed at no cost to the Owner.

END OF SECTION

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- C. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at **Project site**.
 - 1. Inspect and discuss condition of construction to be selectively demolished.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.
- D. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Designer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 1. Hazardous materials will be removed by Owner before start of the Work.
 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Designer and Owner. Hazardous materials will be removed by Owner under a separate contract.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.9 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- B. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems and protect them against damage.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling.
- B. Temporary Shoring: Design, provide, and maintain shoring and bracing as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 4. Maintain fire watch during and for at least two hours after flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Designer, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to local regulations/requirements.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Piers/Columns.
 - 2. Beams/Slabs.
 - 3. Walls.
- B. Related Requirements:
 - 1. Section 099600 "High Performance Coatings" for surface coatings.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans; subject to compliance with requirements.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Ready-mix concrete manufacturer.
 - c. Concrete Subcontractor.
 - d. Special concrete finish Subcontractor.
 - 2. Review inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness, concrete repair procedures, and concrete protection.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Qualification Data: For Installer and manufacturer. For concrete testing agency.
- E. Welding certificates.
- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- G. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Waterstops.
 - 6. Curing compounds.
 - 7. Floor and slab treatments.
 - 8. Bonding agents.
 - 9. Adhesives.
 - 10. Semirigid joint filler.
 - 11. Joint-filler strips.
 - 12. Repair materials.
- H. Field quality-control test reports.
- I. Minutes of preinstallation meeting.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. **Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
 - C. **Testing Agency Qualifications:** An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade I, according to ACI CP-01 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
 - D. **Source Limitations:** Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
 - E. **Welding:** Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
 - F. **ACI Publications:** Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete"
 - 2. ACI 318, "Building Code Requirements for Structural Concrete"
 - 3. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - 4. ACI 347, "Guide to Formwork for Concrete"
 - G. **Concrete Testing Service:** Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. **Steel Reinforcement:** Deliver, store, and handle steel reinforcement to prevent bending and damage.
 - B. **Waterstops:** Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Products: Subject to compliance with requirements, provide one of the products specified.
 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Reinforcing Bars for Welding: ASTM A706, deformed.
- C. Plain-Steel Wire: ASTM A 82.
- D. Deformed-Steel Wire: ASTM A 496.
- E. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- F. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
 3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 1. Portland Cement: ASTM C 150. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class C or F.
 2. Blended Hydraulic Cement: ASTM C 595.
- B. Normal-Weight Aggregates: ASTM C 33.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Maximum Coarse-Aggregate Size: 1-1/2 inches for footings/walls, 3/4" for slabs.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

2.7 WATERSTOPS

A. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

1. Products:
 - a. Deneef Construction Chemicals; Swellseal.
 - b. Greenstreak; Hydrotite.
 - c. Mitsubishi International Corporation; Adeka Ultra Seal.
 - d. Progress Unlimited, Inc.; Superstop.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products:
 - a. Burke by Edoco; BurkeFilm.
 - b. ChemMasters; Spray-Film.
 - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
 - d. Dayton Superior Corporation; Sure Film.
 - e. Euclid Chemical Company (The); Eucobar.
 - f. Meadows, W. R., Inc.; Sealtight Evapre.
 - g. Sika Corporation, Inc.; SikaFilm.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1-D, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. **Cement Binder:** ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. **Primer:** Product of topping manufacturer recommended for substrate, conditions, and application.
3. **Aggregate:** Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. **Compressive Strength:** Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. **Cementitious Materials:** Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. **Admixtures:** Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. **Columns, Beams, Slabs:** Proportion normal-weight concrete mixture as follows:
 1. **Minimum Compressive Strength:** 4500 psi at 28 days.
 2. **Slump Limit:** 3-5 inches.
Air Content: 5 percent, plus or minus 1-1/2 percent at point of delivery for 3/4-inch nominal maximum aggregate size.

2.13 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.5 WATERSTOPS

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.
- G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
 - 1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
 - 2. After broadcasting and tamping, apply float finish.
 - 3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.10 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3.11 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least **one** month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.13 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor shall engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports. Costs for testing and inspection of concrete shall be paid by Contractor.
- B. Inspections:
1. Verification of use of approved design mixture.
 2. Concrete placement, including conveying and depositing.
 3. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure four standard (6") cylinder specimens for each composite sample. Alternate diameter cylinders may be considered.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test laboratory-cured (6"x12") specimens as follows: one at 7 days for information, one set of two specimens at 28 days for acceptance, and reserve one cylinder as necessary. If 4"x8" specimens are used by testing agency, three cylinders shall be tested at 28 days for acceptance.
 - a. A compressive-strength test shall be the average compressive strength from the set of two (6"x12") or three (4"x8") specimens obtained from same composite sample and tested at 28 days.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Structural steel, including steel lintel beams shown on structural framing plan.

- B. Related Requirements:

- 1. Section 055119 "Metal Grating Stairs" for other steel items not defined as structural steel.
 - 2. Section 099600 "High Performance Coatings" for surface-preparation and painting requirements.

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment Drawings.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
1. Power source (constant current or constant voltage).
 2. Electrode manufacturer and trade name, for demand critical welds.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Shear stud connectors.
 3. Shop primers.
 4. Nonshrink grout.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control and special inspection reports.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Comply with applicable provisions of the following specifications and documents:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M, Grade 50 (345).
- B. Channels, Angles: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade C, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
 1. Weight Class: As shown on drawings.
 2. Finish: Black except where indicated to be galvanized.
- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Shear Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
 - C. Headed Anchor Rods: ASTM F 1554, Grade 36, straight with hex head.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- 2.3 PRIMER
- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
 - B. Galvanizing Repair Paint: ASTM A 780/A 780M.
- 2.4 GROUT
- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
- 2.5 FABRICATION
- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
 - B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
 - C. Bolt Holes: Cut, drill or punch standard bolt holes perpendicular to metal surfaces.
 - D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
 - E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."

Town of Holden Beach

Vacuum Sewer Station #2 Modifications

- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened, unless otherwise noted.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
 - 6. Surfaces enclosed in interior construction.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 - 5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
 - 6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
 9. SSPC-SP 8, "Pickling."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils (0.038 mm).

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 2. Galvanize lintels and shelf angles located in exterior walls.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened, unless otherwise noted.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

- A. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- B. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Load-bearing wall framing.
- 2. Exterior non-load-bearing wall framing.

B. Related Requirements:

- 1. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

B. Shop Drawings:

- 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
- 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Miscellaneous structural clips and accessories.
- E. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- E. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS

2.1 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 - 1. Grade: ST50H (ST340H).
 - 2. Coating: G60 (Z180).
- B. Steel Sheet for Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Grade: 50 (340), Class 1.
2. Coating: G60 (Z180).

2.2 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm), 16 gage.
 2. Flange Width: 1-5/8 inches (41 mm).
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).
 2. Flange Width: 1-1/4 inches (32 mm).
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch (1.37 mm).
 2. Flange Width: 2 inches (51 mm).

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
 2. Flange Width: 1-5/8 inches (41 mm).
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
 2. Flange Width: 1-1/4 inches (32 mm).

2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.
- C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
 1. Uses: Securing cold-formed steel framing to structure.
 2. Type: Torque-controlled expansion anchor or adhesive anchor.
 3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.
 4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).
- D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M, MIL-P-21035B or SSPC-Paint 20.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1-part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.7 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - 1. Anchor Spacing: To match stud spacing.
- B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch (3 mm) between the end of wall-framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
 - 2. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
 - I. Install horizontal bridging in stud system, spaced vertically 48 inches (1220 mm). Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges, and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
 - J. Install steel sheet diagonal bracing straps to both stud flanges; terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
 - K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- 3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION
- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
 - B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings.
 - C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
 - D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
1. Install solid blocking at 96-inch (2440-mm) centers.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- 3.6 INTERIOR NON-LOAD-BEARING WALL INSTALLATION
- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to studs and anchor to building structure.
 4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.7 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.8 FIELD QUALITY CONTROL

- A. Field and shop welds will be subject to testing and inspecting.
- B. Testing agency will report test results promptly and in writing to Contractor and Engineer.
- C. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055119 - METAL GRATING STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Industrial Class stairs with steel-grating treads.
 - 2. Aluminum railings attached to metal stairs.
 - 3. Aluminum handrails attached to walls adjacent to metal stairs.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs and railings.
 - 1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, blocking for attachment of wall-mounted handrails, and items with integral anchors, that are to be embedded in concrete or masonry.
 - 2. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.
- D. Schedule installation of railings so wall attachments are made only to completed walls.
 - 1. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal grating stairs and the following:
 - 1. Gratings.
 - 2. Woven-wire mesh.
 - 3. Welded-wire mesh.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

4. Shop primer products.
5. Grout.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachment to other work.
2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
3. Include plan at each level.
4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.

- C. Delegated-Design Submittal: For stairs and railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State in which Project is located.

- B. Welding certificates.

- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification.

1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
2. Protect steel members and packaged materials from corrosion and deterioration.
3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.

- a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design stairs and railings, including attachment to building construction.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
 - 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to $L/360$.
- C. Structural Performance of Railings: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
 - b. Infill load and other loads need not be assumed to act concurrently.
 - 3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Component Importance Factor: 1.5.

2.2 METALS

- A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- D. Steel Bars for Grating Treads: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
- E. Steel Wire Rod for Grating Crossbars: ASTM A 510/A 510M.
- F. Aluminum Bars for Grating Treads: ASTM B 221 (ASTM B 221M) extruded aluminum, alloys as follows:
 - 1. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
 - 2. 6061-T1, for grating crossbars.
- G. Steel Tubing for Railings: ASTM A 500/A 500M (cold formed).
 - 1. Provide galvanized finish for exterior installations and where indicated.
- H. Steel Pipe for Railings: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish for exterior installations and where indicated.
- J. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- K. Cast-Abrasive Nosings: Cast iron, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both.

2.3 FASTENERS

- A. General: Provide Type 304 stainless-steel fasteners and accessories.
 - 1. Select fasteners for type, grade, and class required.
- B. Fasteners for Anchoring Railings to Other Construction: Type 304 stainless steel.
- C. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- D. Anchor Bolts: ASTM F 593, Type 304 stainless steel, of dimensions indicated; with nuts, ASTM A 594; and, where indicated, stainless steel flat washers.
- E. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 - 1. Material: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.4 MISCELLANEOUS MATERIALS

- A. Welding Electrodes: Comply with AWS requirements.
- B. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."
- C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for exterior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Assemble stairs and railings in shop to greatest extent possible.
 - 1. Disassemble units only as necessary for shipping and handling limitations.
 - 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
 - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated.
 - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish # 3 - Partially dressed weld with spatter removed.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
 2. Locate joints where least conspicuous.
 3. Fabricate joints that are exposed to weather in a manner to exclude water.
 4. Provide weep holes where water may accumulate internally.
- 2.6 FABRICATION OF STEEL-FRAMED STAIRS
- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Industrial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
1. Fabricate stringers of steel channels.
 - a. Stringer Size: As required to comply with "Performance Requirements" Article.
 - b. Provide closures for exposed ends of channel stringers.
 - c. Finish: Galvanized.
 2. Construct platforms and tread supports of steel channel headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.
 - a. Provide closures for exposed ends of channel framing.
 - b. Finish: Galvanized.
 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.
 4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below.
 - a. Locate hanger rods and struts where they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.
 5. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."
1. Fabricate treads and platforms from welded steel grating with 1-by-3/16-inch (25-by-5-mm) bearing bars at 1 1/16-inch (17 mm) o.c. and crossbars at 4 inches (100 mm) o.c.
 2. Fabricate grating treads with cast-abrasive nosing and with steel angle or steel plate carrier at each end for stringer connections.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- a. Secure treads to stringers with bolts.
- 3. Fabricate grating platforms with nosing matching that on grating treads.
 - a. Secure grating to platform framing with bolts.
- D. Risers: Open.
- E. Toe Plates: Provide toe plates around openings and at edge of open-sided floors and platforms, and at open ends and open back edges of treads.
 - 1. Material and Finish: Steel plate to match finish of other steel items.
 - 2. Fabricate to dimensions and details indicated.

2.7 FABRICATION OF STAIR RAILINGS

- A. Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads. Railing system shall be Decorative Speed Rail with Wire Mesh Infill by Hollaender Interna-Rail or equivalent.
 - 1. Rails and Posts: 1-5/8-inch diameter rails and posts.
 - 2. Mesh Infill: shall be 2" square wire mesh with continuous perimeter U-channel frame.
- B. Connections: Fabricate railings with prefabricated connections.
 - 1. Fabricate connections that are exposed to weather in a manner that excludes water.
 - a. Provide weep holes where water may accumulate internally.
 - 2. Cope components at connections to provide close fit, or use fittings designed for this purpose.
 - 3. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- C. Form changes in direction of railings as follows:
 - 1. As detailed.
 - 2. By bending or by inserting prefabricated elbow fittings.
- D. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required.
 - 1. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- G. Connect posts to stair framing by bolting unless otherwise indicated. All connections and fasteners shall be stainless steel.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 2. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
 3. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt, with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.

2.8 FINISHES

- A. Finish metal stairs after assembly.
- B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.
1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLING METAL STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
 - 1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
 - 1. Grouted Baseplates: Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces.
 - a. Clean bottom surface of baseplates.
 - b. Set steel-stair baseplates on wedges, shims, or leveling nuts.
 - c. After stairs have been positioned and aligned, tighten anchor bolts.
 - d. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.
 - e. Promptly pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
 - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
 - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - 2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
 - 3. Comply with requirements for welding in "Fabrication, General" Article.

3.3 INSTALLING RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
 - 1. Space posts at spacing indicated or, if not indicated, as required by design loads.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).
4. Secure posts and rail ends to building construction as follows:
 - a. Anchor posts to steel by bolting to steel supporting members.
 - b. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post-installed anchors and bolts.

B. Attach handrails to wall with wall brackets.

1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
2. Secure wall brackets to building construction as follows:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.

3.4 REPAIR

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099600 "High-Performance Coatings."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055119

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Wood furring and grounds.
4. Plywood backing panels.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 061753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Fire-Retardant-Treated wood.
 - 3. Power-driven fasteners.
 - 4. Post-installed anchors.
 - 5. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
1. Application: All interior partitions.
 2. Species:
 - a. Southern pine or mixed southern pine; SPIB.
- B. Load-Bearing Partitions: No. 2 grade.
1. Application: Exterior walls.
 2. Species:
 - a. Southern pine or mixed southern pine; SPIB.
 - b. Spruce-pine-fir; NLGA.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Furring.
 4. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of the following species:
1. Mixed southern pine or southern pine; SPIB.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- C. Concealed Boards: 15 percent maximum moisture content and the following species and grades:
 - 1. Mixed southern pine or southern pine: No. 2 grade; SPIB.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.8 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for wood-preserved-treated lumber and where indicated.
- D. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for exterior locations and where indicated.
- E. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
 - 1. Bolt Diameter: 5/8 inch (15.8 mm).
 - 2. Width: 2-1/2 inches (64 mm).
 - 3. Body Thickness: 0.108 inch (2.8 mm) minimum.
 - 4. Base Reinforcement Thickness: 0.239 inch (6.1 mm) minimum.

2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- C. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
- D. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- E. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
 - K. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
 - L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.
 - M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
 - N. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
 - 3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.
- 3.2 WOOD BLOCKING, AND NAILER INSTALLATION
- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
 - B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
 - C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal- (19-by-63-mm actual-) size furring [horizontally] [and] [vertically] at [24 inches (610 mm)] [600 mm] o.c.
- C. Furring to Receive [Gypsum Board] [Plaster Lath]: Install 1-by-2-inch nominal- (19-by-38-mm actual-) size furring vertically at [16 inches (406 mm)] [400 mm] o.c.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal (38-mm actual) thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
 - 1. For exterior walls, provide 2-by-8-inch nominal size wood studs spaced 16 inches (406 mm) o.c. unless otherwise indicated.
 - 2. For interior partitions and walls, provide 2-by-4-inch nominal- (38-by-89-mm actual-)] size wood studs spaced 16 inches (406 mm) o.c. unless otherwise indicated.
 - 3. Provide continuous horizontal blocking at midheight of partitions more than 96 inches (2438 mm) high, using members of 2-inch nominal (38-mm actual) thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal (89-mm actual) depth for openings 48 inches (1200 mm) and less in width, 6-inch nominal (140-mm actual) depth for openings 48 to 72 inches (1200 to 1800 mm) in width, 8-inch nominal (184-mm actual) depth for openings 72 to 120 inches (1800 to 3000 mm) in width, and not less than 10-inch nominal (235-mm actual) depth for openings 10 to 12 feet (3 to 3.6 m) in width.
 - 2. For load-bearing walls, provide double-jamb studs for openings 60 inches (1500 mm) and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

3.5 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for plywood backing panels.
2. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings.

2.4 WALL SHEATHING

- A. Plywood Sheathing: Exterior, Structural I sheathing.
1. Span Rating: Not less than 32/16.
 2. Nominal Thickness: Not less than 15/32 inch.

2.5 ROOF SHEATHING

- A. Plywood Sheathing: Exterior, Structural I sheathing.
1. Span Rating: Not less than 40/20.
 2. Nominal Thickness: Not less than 23/32 inch.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. For roof and wall sheathing, provide fasteners of Type 304 stainless steel.
 2. For roof and wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following and as indicated:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Wall and Roof Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Space panels 1/8 inch (3 mm) apart at edges and ends.
 - c. Where double layer sheathing, stagger panel edges.

END OF SECTION 061600

SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood roof trusses.
 - 2. Wood girder trusses.

1.3 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For metal connector-plate manufacturer, professional engineer and fabricator.
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.
- D. Evaluation Reports: For the following, from ICC-ES:
 - 1. Metal-plate connectors.
 - 2. Metal truss accessories.

1.6 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Engineer and authorities having jurisdiction.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
 - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection under Design Loads:
 - a. Roof Trusses: Vertical deflection of 1/360 of span.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S.
 - 4. Provide dry lumber with 15 percent maximum moisture content at time of dressing.
- B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.
 - 1. Use for interior locations unless otherwise indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 - 2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Allowable design loads, as published by manufacturer, shall comply with or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for exterior locations and where indicated.
- D. Truss Tie-Downs (Hurricane or Seismic Ties): Provide truss tie-down anchors of the size and shape required by the uplift reactions from the truss design.
- E. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches (32 mm) wide by 0.050 inch (1.3 mm) thick. Clip is fastened to truss through slotted holes to allow for truss deflection.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

2.7 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
- I. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated.
 - I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 061000 "Rough Carpentry."
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- L. Replace wood trusses that are damaged or do not comply with requirements.
 - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Engineer.

3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Repair damaged galvanized coatings on exposed surfaces according to ASTM A 780/A 780M and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Engineer shall review roof truss and sheathing installation prior to installation of weather barrier and/or exterior finishes.

END OF SECTION 061753

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Interior trim, including non-fire-rated interior door frames.

B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.

1.3 DEFINITIONS

- A. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

- 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
- 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

- B. Samples: For each exposed product and for each color and texture specified.

C. Samples for Verification:

- 1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.
- 2. For foam-plastic moldings, with half of exposed surface finished; 50 sq. in. (300 sq. cm).

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 2. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or blotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber, mark grade stamp on end or back of each piece.
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: ANSI A135.4.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.
2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
4. Do not use material that is warped or does not comply with requirements for untreated material.
5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
 - a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
7. Application: Where indicated on Drawings.

2.3 INTERIOR TRIM

A. Lumber Trim for Opaque Finish (Painted Finish):

1. Species and Grade: Douglas fir-larch or Douglas fir south; NLGA, WCLIB, or WWPA Prime or D finish.
2. Species and Grade: Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; NHLA B Finish.
3. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
4. Finger Jointing: Allowed.
5. Face Surface: Surfaced (smooth).

B. Moldings for Opaque Finish (Painted Finish): Made to patterns included in MMPA's "WM/ Series Softwood Molding Patterns."

1. Hardwood Moldings: MMPA WM 4, P-grade.
 - a. Species: Aspen, basswood, cottonwood, gum, magnolia, soft maple, tupelo, or yellow poplar.
 - b. Maximum Moisture Content: 9 percent.
2. Finger Jointing: Allowed.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3. Casing Pattern: 11/16-by-2-1/4-inch (17-by-57-mm) flat casing.
- C. PVC-Wrapped Moldings: MMPA WM 2 and made to patterns included in MMPA's "WM/Series Softwood Molding Patterns."
1. Base Pattern: WM 623, 9/16-by-3-1/4-inch (14-by-83-mm) ogee base.
 2. Shoe-Mold Pattern: WM 129, 7/16-by-11/16-inch (11-by-17-mm) quarter-round shoe mold.
 3. Casing Pattern: 11/16-by-2-1/4-inch (17-by-57-mm) flat casing.
 4. Colors, Textures, and Grain Patterns: As selected by Engineer from manufacturer's full range.
- D. Foam-Plastic Moldings: Molded product of shapes indicated, with a tough outer skin on exposed surfaces; factory primed. Exposed surfaces shall not be shaped after molding.
1. Density: Not less than 20 lb/cu. ft. (320 kg/cu. m).
 2. Flame-Spread Index: Not more than 75 when tested according to ASTM E 84.
 3. Thickness: Not more than 1/2 inch (12.7 mm).
 4. Width: Not more than 8 inches (204 mm).
 5. Patterns: As indicated by manufacturer's designations.

2.4 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Low-Emitting Materials: Adhesives shall comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- D. Installation Adhesive for Foam-Plastic Moldings: Product recommended for indicated use by foam-plastic molding manufacturer.
- E. Multipurpose Construction Adhesive: Formulation, complying with ASTM D 3498, that is recommended for indicated use by adhesive manufacturer.

2.5 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
1. Interior standing and running trim, except shoe and crown molds.
 2. Wood-board paneling.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Ease edges of lumber less than 1-inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1-inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 4. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 - 1. Do not use pieces less than 24 inches (610 mm) long, except where necessary.
 - 2. Stagger joints in adjacent and related standing and running trim.
 - 3. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
 - 4. Use scarf joints for end-to-end joints.
 - 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 - 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 - 7. Install trim after gypsum-board joint finishing operations are completed.
 - 8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
 - 9. Fasten to prevent movement or warping.
 - 10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
 - 1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.6 CLEANING

- A. Clean interior finish carpentry on exposed and semi exposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.7 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

END OF SECTION 062023

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Closed-cell foam.
 - 2. Soundproofing blanket.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 CLOSED-CELL FOAM

- A. Closed-cell foam insulation shall be spray polyurethane wall foam insulation applied to a maximum thickness of 3 inches on break-away wall framing. Insulation materials shall meet AC377 thermal barrier standard with the application of DC315. Spray foam materials shall provide a Sound Transmission Coefficient (STC) of 36 or better when tested in accordance with ASTM E90.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.2 SOUNDPROOFING BLANKETS

- A. Soundproofing blankets shall be Thermafiber Versaboard 60 or equivalent of the thicknesses indicated. Thermal resistance rating (R) 4.2 per inch thickness.

2.3 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 - 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
 - 2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- B. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Building wrap.
 - 2. Flexible flashing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.
- B. Shop Drawings: Show details of building wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Water-Vapor Permeance: Not less than 20 perms (1150 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A).
 - 2. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg (0.02 L/s x sq. m at 75 Pa) when tested according to ASTM E 2178.
 - 3. Allowable UV Exposure Time: Not less than three months.
 - 4. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 FLEXIBLE FLASHING

- A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch (0.8 mm)
 - 1. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.
- B. Rubberized-Asphalt Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch (0.8 mm).
 - 1. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.
- C. Primer for Flexible Flashing: Product recommended in writing by flexible flashing manufacturer for substrate.
- D. Nails and Staples: Product recommended in writing by flexible flashing manufacturer and complying with ASTM F 1667.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.
- C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 072500

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes standing-seam metal roof panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Sample Warranties: For special warranties.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For metal panels to include in maintenance manuals.
- 1.6 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
 - B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
 - B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
 - C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
 - D. Retain strippable protective covering on metal panels during installation.
- 1.8 FIELD CONDITIONS
- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.
- 1.9 COORDINATION
- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
 - B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
- C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: UL 90.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

- a. Thickness: 0.040 inch (1.02 mm).
- b. Surface: Embossed finish.
- c. Exterior Finish: Two-coat fluoropolymer.
- d. Color: As selected by Engineer from manufacturer's full range.

2. Clips: Two-piece floating to accommodate thermal movement.

- a. Material: [0.028-inch- (0.71-mm-)] [0.064-inch- (1.63-mm-)] nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
- b. Material: [0.025-inch- (0.64-mm-)] [0.062-inch- (1.59-mm-)] thick, stainless-steel sheet.

3. Joint Type: As standard with manufacturer.
4. Panel Coverage: 16 inches (406 mm).
5. Panel Height: 2.0 inches (51 mm).

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
- B. Felt Underlayment: ASTM D 226/D 22M, Type II (No. 30), asphalt-saturated organic felts.
- C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (914 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.
- E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
- F. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 - 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
1. Apply over the roof area indicated below:
 - a. Roof perimeter for a distance up from eaves of 24 inches (610 mm) beyond interior wall line.
 - b. Valleys, from lowest point to highest point, for a distance on each side of 18 inches (460 mm). Overlap ends of sheets not less than 6 inches (152 mm).
 - c. Hips and ridges for a distance on each side of 12 inches (305 mm).
- B. Felt Underlayment: Apply at locations indicated below, in shingle fashion to shed water, and with lapped joints of not less than 2 inches (50 mm).
1. Apply on roof not covered by self-adhering sheet underlayment. Lap over edges of self-adhering sheet underlayment not less than 3 inches (75 mm), in shingle fashion to shed water.
- C. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- D. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
 4. Stainless-Steel Panels: Use stainless-steel fasteners.
- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
1. Install clips to supports with self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 4. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1-inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.
 - I. Connect downspouts to underground drainage system indicated.
- J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.16

SECTION 074646 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes fiber-cement siding, trim and soffit.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
 - 2. Section 072500 "Weather Barriers" for weather-resistive barriers.

1.3 COORDINATION

- A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Initial Selection: For fiber-cement siding, trim and soffit including related accessories.
- C. Samples for Verification: For each type, color, texture, and pattern required.
 - 1. 12-inch- (300-mm-) long-by-actual-width Sample of siding.
 - 2. 24-inch- (600-mm-) wide-by-36-inch- (900-mm-) high Sample panel of siding assembled on plywood backing.
 - 3. 12-inch- (300-mm-) long-by-actual-width Sample of soffit.
 - 4. 12-inch- (300-mm-) long-by-actual-width Samples of trim and accessories.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of fiber-cement siding, trim and soffit.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
- C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.
- D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish full lengths of fiber-cement siding and soffit including related accessories, in a quantity equal to 2 percent of amount installed.

1.9 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Build mockups for fiber-cement siding, trim and soffit including accessories.
 - a. Size: 48 inches (1200 mm) long by 60 inches (1800 mm) high.
 - b. Include outside corner on one end of mockup.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with labels intact until time of use.
- B. Store materials on elevated platforms, under cover, and in a dry location.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracking and deforming.
 - b. Deterioration of materials beyond normal weathering.
 - 2. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

2.2 FIBER-CEMENT SIDING

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
- B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- C. Nominal Thickness: Not less than 5/16 inch (8 mm).
- D. Horizontal Pattern: Boards 6-1/4 to 6-1/2 inches (159 to 165 mm) wide in plain style.
 - 1. Texture: Wood grain.
- E. Shingle Pattern: 48-inch- (1200-mm-) wide, staggered-edge notched sheets with wood-grain texture.
- F. Factory Priming: Manufacturer's standard acrylic primer.

2.3 FIBER-CEMENT SOFFIT

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
- B. Nominal Thickness: Not less than 5/16 inch (8 mm).
- C. Pattern: 24-inch- (600-mm-) wide sheets with wood-grain texture.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Ventilation: Provide perforated soffit unless otherwise indicated.
- E. Factory Priming: Manufacturer's standard acrylic primer.

2.4 ACCESSORIES

- A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.
 - 1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.
- B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
 - 1. Door and window casings.
 - 2. Fasciae.
 - 3. Moldings and trim.
- C. Flashing: Provide stainless-steel flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.
- D. Fasteners:
 - 1. For fastening to wood, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch (25 mm) into substrate.
 - 2. For fastening fiber cement, use stainless-steel fasteners.
- E. Insect Screening for Soffit Vents: Stainless steel, 18-by-18 (1.4-by-1.4-mm) mesh.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement [siding] [and] [soffit] and related accessories.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Do not install damaged components.
 2. Install fasteners no more than 24 inches (600 mm) o.c.
 3. Lap siding over fasteners so that fasteners are not exposed.
- B. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight installation.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074646

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manufactured through-wall flashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed steep-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 074113.16 "Standing-Seam Metal Roof Panels" for materials and installation of sheet metal flashing and trim integral with roofing.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of roof-penetration flashing.
8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
9. Include details of special conditions.
10. Include details of connections to adjoining work.

C. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested and FM Approvals approved.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-120. Identify materials with name of fabricator and design approved by FM Approvals.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. As-Milled Finish: Standard two-side bright.
 - 2. Alclad Finish: Metallurgically bonded surfacing alloy on both sides, forming aluminum sheet with reflective luster.
 - 3. Factory Prime Coating: Where painting after installation is required, pretreat metal with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil (0.005 mm).
 - 4. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 - 5. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - a. Color: As selected by Engineer from full range of industry colors and color densities.
 - b. Color Range: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

6. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - c. Mica Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - d. Metallic Fluoropolymer: AAMA 2605. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - e. FEVE Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - f. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
7. Color: As selected by Engineer from manufacturer's full range.
8. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; with smooth, flat surface.

1. Finish: 2B (bright, cold rolled).

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.
- B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- K. Do not use graphite pencils to mark metal surfaces.
- 2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS
- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

1. Gutter Profile: Style C according to cited sheet metal standard.
2. Expansion Joints: Lap type.
3. Accessories: Wire-ball downspout strainer.
4. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
 - a. Aluminum: 0.032 inch (0.81 mm) thick.
 - b. Stainless Steel: 0.016 inch (0.40 mm) thick.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Fabricated Hanger Style: Fig 1-35C according to SMACNA's "Architectural Sheet Metal Manual."
2. Fabricate from the following materials:
 - a. Aluminum: 0.024 inch (0.61 mm) thick.
 - b. Stainless Steel: 0.016 inch (0.40 mm) thick.

2.7 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:

1. Aluminum: 0.032 inch (0.81 mm) thick.
2. Stainless Steel: 0.016 inch (0.40 mm) thick.

B. Roof-Penetration Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch (0.48 mm) thick.
2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
3. Copper-Clad Stainless Steel: 0.018 inch (0.46 mm) thick.

2.8 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.016 inch (0.40 mm) thick.
2. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.38 mm) thick.
3. Copper-Clad Stainless Steel: 0.016 inch (0.40 mm) thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend [4 inches (100 mm)] beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Aluminum: 0.032 inch (0.81 mm) thick.
2. Stainless Steel: 0.016 inch (0.40 mm) thick.
3. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.38 mm) thick.
4. Copper-Clad Stainless Steel: 0.016 inch (0.40 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.
- D. Apply slip sheet, wrinkle free, over underlayment, directly on substrate before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Fasten gutter spacers to front and back of gutter.
 - 2. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
 - 3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches (600 mm) apart.
 - 4. Anchor gutter with gutter brackets or straps spaced not more than 24 inches (600 mm) apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.
 - 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
 - 2. Provide elbows at base of downspout to direct water away from building.
 - 3. Connect downspouts to underground drainage system.

3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.7 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.8 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Nonstaining silicone joint sealants.
 - 3. Urethane joint sealants.
 - 4. Immersible joint sealants.
 - 5. Polysulfide joint sealants.
 - 6. Butyl joint sealants.
 - 7. Latex joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
- B. Silicone, S, NS, 50, T, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Uses T and NT.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.4 URETHANE JOINT SEALANTS

- A. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.
- B. Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T and NT.

2.5 IMMERSIBLE JOINT SEALANTS

- A. Polysulfide, Immersible, M, NS, 25, T, NT, I: Immersible, multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, polysulfide joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Uses T, NT, and I.
- B. Urethane, Immersible, M, P, 25, T, NT, I: Immersible, multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T, NT, and I.

2.6 POLYSULFIDE JOINT SEALANTS

- A. Polysulfide, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, polysulfide joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T and NT.

2.7 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.

2.8 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.9 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.10 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
 - 1. Joint Locations:
 - a. Joints in pedestrian plazas.
 - b. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, immersible, S, P, 25, T, NT, I.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Joints in exterior siding, trim and soffit systems.
 - b. Joints between different materials listed above.
 - c. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - d. Control and expansion joints in ceilings and other overhead surfaces.
 - e. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
 - 1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - c. Other joints as indicated on Drawings.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:
 - a. Thresholds.
 - b. Sill plates.
 - c. Other joints as indicated on Drawings.
2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081129 – STAINLESS-STEEL FLOOD DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Reference Standards:
 - 1. ASCE/SEI 24-05, 6.2 Dry Proofing.
 - 2. ASCE 24-14 Flood Resistant Design and Construction.
 - 3. FEMA Technical Bulletin 3-93 Non-Residential Flood Proofing.
 - 4. FEMA Flood Proofing Non-Residential Structures #102
 - 5. FEMA Recommendations on Dry Proofing.
 - 6. NFIP Title 44 US Code of Federal Regulations, Section 60.3.
 - 7. SEI/ASCE 7-10, Minimum Design Loads for Buildings and Other Structures.
 - 8. AISE Manual and Specifications.

1.2 SUMMARY

- A. Section Includes:
 - 1. Stainless steel flood doors and frames.
 - 2. Stainless steel panels.
- B. Related Requirements:
 - 1. Section 087100 "Door Hardware" for door hardware for stainless steel doors.

1.3 COORDINATION

- A. Coordinate anchorage installation for stainless steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.
- C. Samples:
 - 1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 125 mm).
 - 2. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement.
 - 3. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.
- D. Product Schedule: For stainless steel doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of flood/debris impact resistance door for tests performed by a qualified testing agency indicating compliance with performance requirements.
- B. Field quality control reports.

1.7 QUALITY ASSURANCE

- A. The manufacturer of the flood doors shall have provided flood doors on at least five (5) installations similar to the requirements for this project.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver stainless steel doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store stainless steel doors and frames under cover at Project site with head up. Place units on minimum 4-inch- (100-mm-) high wood blocking.
- D. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design is "Flood Secure Door" as supplied/manufactured by Flood Control International, Inc.
- B. Doors and frames shall be as noted above or approved equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Flood door shall provide an effective seal against short term and long-term high-water situations, to the protection level indicated on the drawings, up to full height of door.
- B. The flood door shall incorporate a secure three-point locking system.
- C. The flood door shall utilize an adjustable gasket retainer around the perimeter of the frame. There is raised threshold across the opening.
- D. The flood door shall incorporate a door closer, such that is locks/seals when closed with no secondary operation required to make the door floodproof.
- E. The flood door shall incorporate dog-bolt protection to prevent removal even if hinges are cut.
- F. The door is to be outward opening.
- G. Flood door gaskets shall be easily replaceable.
- H. Double doors shall incorporate a fully removable center astragal/mullion.
- I. Hydrostatic Pressure Resistance – Flood Doors shall conform to the criteria for resisting lateral forces due to hydrostatic pressure from Freestanding Water as set forth by FEMA Technical Bulletin 3-93.
- J. Force Resistance – Flood Doors shall conform to the criteria for resisting lateral forces due to moving flood waters at a minimum velocity of 8 feet per second, unless otherwise noted, as set forth by FEMA Technical Bulletin 3-93.
- K. Debris Impact Force Resistance – Flood Doors shall conform to the criteria for resisting a 1,000-pound object at minimum velocity of 8 feet per second, unless otherwise noted, as prescribed by FEMA Technical Bulletin 3-93.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.3 STAINLESS STEEL DOORS AND FRAMES

- A. Construct stainless steel door and frame assemblies to comply with NAAMM-HMMA 866 for the application indicated, including materials, fabrication methods, hardware reinforcement, tolerances, and clearances, and as specified. Comply with SDI ANSI/A250.4, for Physical Performance Level A.
- B. Doors and Frames:
 - 1. Stainless Steel Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 2-1/8 inches.
 - c. Face Sheets: Type 316 stainless steel sheet, minimum thickness 0.062 inch.
 - d. Edge Construction: Continuously welded with no visible seam.
 - e. Top and Bottom Edges: Closed with continuous stainless-steel channels with minimum thickness of 0.062 inch, welded to face sheets.
 - 1) Provide flush top and bottom closures for exterior doors, with weep holes at bottom edge.
 - f. Core Construction: Polyisocyanurate, polystyrene, or polyurethane laminated to face sheets.
 - 2. Stainless Steel Frames:
 - a. Materials: Type 316 stainless steel sheet.
 - b. Door Frames: Fabricate from stainless steel sheet, minimum thickness 0.1875 inch with security strip to outside perimeter of door.
 - 3. Sills: Stainless Steel not less than 0.25" thickness.
 - 4. Hinges: each leaf to be hung on a minimum of 3 HD stainless steel hinges. Hinges to incorporate "dog bolt" protection.
 - 5. Sill: As frame profile. Total upstand of seal retainer and ground fixing plate 3/4".
 - 6. Gaskets: Adjustable seal holder with shaped skinned EPDM rubber gasket. Gasket position fixed after fitment of door and frame to ensure watertight seal and correct compression when closed. All gaskets shall be field replaceable.
 - 7. Fasteners: All anchor bolts shall be stainless steel Hilti load-rated fixing.
 - 8. Sealants: Sealants shall be a one-part polysulphide gun-applied sealant and shall be compatible with all substrates and field applied in accordance with manufacturer's recommendations.
 - 9. Hardware Reinforcement: Stainless steel sheet.
 - 10. Finish: ASTM A480/A480M No. 4, Directional Satin.

2.4 MATERIALS

- A. Stainless Steel Sheet: ASTM A240/A240M, austenitic stainless steel, Type 316.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Foam-Plastic Insulation: Manufacturer's standard board insulation with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84. Enclose insulation completely within door.
- C. Inserts, Bolts, and Anchor Fasteners:
 - 1. Stainless steel components complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 for bolts and nuts.

2.5 STAINLESS STEEL PANELS

- A. Stainless Steel Panels: Same construction, materials, and finish as specified for adjoining stainless steel doors.

2.6 FRAME ANCHORS

- A. Provide anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
- B. Post installed Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- C. Number and Spacing:
 - 1. Concrete Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c.
 - 2. Compression Type: Not less than two anchors in each jamb.
 - 3. Post installed Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
- D. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
 - 1. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.
- E. Material:
 - 1. Stainless steel sheet. Same type as door face.

2.7 FABRICATION

- A. Stainless Steel Door Fabrication: Provide doors rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
 - 1. Tolerances: Fabricate doors to tolerances indicated in NAAMM-HMMA 866.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. **Stainless Steel Frame Fabrication:** Provide stainless steel frames rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
 - 1. Tolerances: Fabricate frames to tolerances indicated in NAAMM-HMMA 866.
 - 2. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 - 3. Mullions: Provide closed tubular members with no visible face seams or joints. Fasten members at crossings and to jambs by butt welding according to joint designs in NAAMM-HMMA 820.
 - 4. Provide countersunk, flat-, or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

- C. **Hardware Preparation:** Factory prepare stainless steel doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule, and templates.
 - 1. Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.
 - 2. Comply with ANSI/BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

- D. **Hardware:**
 - 1. Three-point locking system to be Surelock McGill "Slimline" system or equal.
 - 2. External access options include: no access/keyed handle.
 - 3. Internal options include: emergency escape bar, lever handle, push pad.
 - 4. For double doors the passive leaf shall be bolted to the removable astragal/mullion.
 - 5. Heavy duty door closer on active leaf.
 - 6. Cylinder/key options shall be selected/coordinated to match owner's standard key requirements.

2.8 FINISHES

- A. **Stainless Steel Finishes:** Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

- B. **Grain Direction:** For finishes exhibiting grain, run grain vertically on door faces and frame jambs.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Do not begin installation until substrates have been property prepared. Surfaces to be clean, solid and free from water and grease prior to fitting.
- C. Prior to installation and with installation spreaders in place, adjust and securely brace stainless steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb, and perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- D. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.2 INSTALLATION

- A. Install stainless steel doors and frames plumb, rigid, properly aligned, and securely fastened in place: comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Stainless Steel Frames:
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Install frames with removable glazing stops located on secure side of opening.
 - 2. Floor Anchors: Secure with post installed expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.
 - 3. In-Place Concrete or Masonry Construction: Secure frames in place with post installed expansion anchors.
 - 4. Installation Tolerances: Adjust stainless steel frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb, and perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- C. Stainless Steel Doors: Fit and adjust stainless steel doors accurately in frames within clearances specified below:

- 1. Non-Fire-Rated Doors: Comply with NAAMM-HMMA 841 and NAAMM-HMMA 866.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.

- B. Inspections:

- 1. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, section 7.2.1.15.

- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 101.

- F. Flood doors shall be operated and field verified including the sealing surfaces to check they maintain the correct level of contact at all points.

- G. A "paper pull-out test" shall be performed on all sealing surfaces to ensure a tight fit.

- H. Verify that the door operates freely without undue force in swinging in both directions.

- I. Verify all anchors are installed correctly.

3.4 ADJUSTING AND CLEANING

- A. Clean grout and other bonding material off stainless steel doors and frames immediately after installation.

- B. Stainless Steel Touchup: Immediately after erection, smooth any scratched or damaged areas of stainless steel; polish to match undamaged finish.

END OF SECTION 081129

SECTION 081500 - FIBERGLASS REINFORCED PLASTIC (FRP) DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. FRP doors and frames.

- B. Related Requirements:

- 1. Section 087100 "Door Hardware" for door hardware for FRP doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

- B. Shop Drawings: Include the following:

- 1. Elevations of each door type.
 - 2. Details of doors, including vertical and horizontal edge details and material thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.

- C. Samples:

- 1. Finishes: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 125 mm).
 - 2. Doors: Show vertical-edge, top, and bottom construction; core construction; glazing; and hinge and other applied hardware reinforcement.
 - 3. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Product Schedule: For FRP doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

- A. Pre-Qualification: Manufacturers desiring to furnish fiberglass doors and frames shall submit to the Engineer complete details of the fiberglass doors and frames to be offered a minimum of fifteen (15) calendar days prior to the date for receiving bids. Included in this submittal shall be a complete description of the entire construction of these units.
- B. Qualification Data: For door inspector.
 - 1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, section 5.2.3.1.
 - 2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, section 7.2.1.15.4.
 - 3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.
- C. Product Test Reports: For each type of fire-rated door and frame assembly for tests performed by a qualified testing agency indicating compliance with performance requirements.
- D. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
- E. Field quality control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
 - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.
- B. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies shall meet the qualifications set forth in NFPA 101, section 7.2.1.15.4 and the following:
 - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic. Provide temporary bracing as required.
- B. Store doors and frames under cover at Project site with head up. Place units on minimum 4-inch-high wood blocking.
- C. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Doors and Frames shall be Model CP3 by Chem-Pruf Door Company or equivalent.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- B. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 4 for enhanced protection, Door 200 and 201 only.

2.3 FIBERGLASS REINFORCED PLASTIC (FRP) DOORS AND FRAMES

- A. Doors and frames shall be made of fiberglass reinforced plastic (FRP) using Class 1 premium resins with no fillers, tailored to resist the specific corrosive environment (stated by the purchaser at the time the order is placed) and have a fiberglass content of 25% by weight. The doors shall be flush construction with no seams or cracks. All mortises shall be molded in at the factory. The doors shall be 1-3/4" thickness have an R-factor of 12.
- B. Door Plates shall be 0.125-inch-thick minimum, molded in one continuous piece, starting with 25 mil gelcoat of the color specified, integrally molded with multiple layers of 1.5 ounces per square foot fiberglass mat. Each layer shall be individually laminated with resin as mentioned above.
- C. Stiles and Rails shall be banded by a matrix of fire-resistant mineral and glass fiber material.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Core material shall be fire resistant mineral core placed within band structure allowing no voids within.
- E. Internal Reinforcement shall be dense matrix of cloth glass fibers and premium resin of sufficient amount to adequately support required hardware and function of same.
- F. Finish of door and frame shall be identical in color and finish with 25 mil resin-rich gelcoat integrally molded in at time of manufacture resulting in a smooth gloss surface that is dense and non-porous. To achieve optimum surface characteristics, the gelcoat shall be cured within a temperature range of 120F to 170F creating an impermeable outer surface, uniform color throughout, and a permanent homogeneous bond with the resin/fiberglass substrate beneath. Only the highest quality gelcoat will be used to ensure enduring color and physical properties. Paint and/or post application of gelcoat results in poor mechanical fusion and will be deemed unacceptable for this application. The finish of the door and frame must be field repairable without compromising the integrity of the original uniform composite structure, function or physical strength.
- G. Window openings shall be provided for at time of manufacture and shall be completely sealed so that the interior of the door is not exposed to the environment.
- H. Hardware Preparation: Factory prepare doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule, and templates.
 - 1. Reinforce doors to receive non-templated mortised and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
 - 3. All related hardware as specified must be furnished and installed by the door and frame manufacturer to ensure sufficient reinforcements, proper sealing, precision tooling and that all hardware complies with the regulations of the manufacturer's testing agencies.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Drill and tap doors and frames to receive non-templated mortised and surface-mounted door hardware.

3.2 INSTALLATION

- A. Verify openings are correctly prepared to receive doors and frames. Verify openings are the correct size and depth.
- B. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with approved Shop Drawings and with manufacturer's written instructions.
- C. Doors: Fit and adjust doors accurately in frames within clearances specified below:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Non-Fire-Rated Doors: Comply with NAAMM-HMMA 841 and NAAMM-HMMA 866.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Engineer.
- B. Inspections:
 1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, section 5.2
 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements according to NFPA 101, section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80.

3.4 ADJUSTING AND CLEANING

- A. Clean grout and other bonding material off doors immediately after installation.
- B. Touchup: Immediately after erection, repair any scratched or damaged areas to door surfaces to match undamaged finish.

END OF SECTION 081500

SECTION 083483 - FLOOR DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes floor doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, materials, individual components and profiles, and finishes.
- B. Product Schedule: For floor doors.

PART 2 - PRODUCTS

2.1 ALUMINUM FLOOR DOORS

- A. Angle Frame Aluminum Floor Door:
 - 1. Frame: Mill finish aluminum, angle profile.
 - 2. Door: Single leaf; 1/4-inch-thick (6.4-mm-thick), diamond-pattern mill-finish aluminum plate.
 - 3. Loading Capacity: 150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live load.
 - 4. Options: Odor gasket, Protective grating panel.
 - 5. Hardware:
 - a. Material and Finish: Type 316 stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and brackets, hinges, pins, and fasteners.
 - b. Hinges: Heavy-duty butt hinges with stainless steel pins.
 - c. Operating Mechanism: Adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with vinyl grip that allows for one-handed closure, and recessed lift handle.
 - d. Latch: Stainless steel slam latch.
 - e. Lock: Latch with removable handle.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Roof Scuttle Aluminum Floor Door:
 - 1. Frame: Mill finish aluminum, angle profile.
 - 2. Door: Double leaf; 1/4-inch-thick (6.4-mm-thick), smooth mill-finish aluminum plate.
 - 3. Loading Capacity: 40-lbf/sq. ft. pedestrian live load.
 - 4. Options: Odor gasket.
 - 5. Hardware:
 - a. Material and Finish: Type 316 stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and brackets, hinges, pins, and fasteners.
 - b. Hinges: Heavy-duty butt hinges with stainless steel pins.
 - c. Operating Mechanism: Adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with vinyl grip that allows for one-handed closure, and recessed lift handle.
 - d. Latch: Stainless steel slam latch.
 - e. Lock: Keyed deadbolt lock.
- C. Safety Accessories: Safety chains, railing as required.

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- E. Frame Anchors: Same material as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

- A. General: Provide floor doors manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure floor doors to types of supports indicated.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. For cylinder locks, furnish two keys per lock and key all locks alike.
 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
- E. Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that comes in contact with concrete.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- E. Prime Painted Steel: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- F. Stainless Steel Finish: Bright, cold-rolled, unpolished ASTM A480/A480M No. 2B finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor doors.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083483

SECTION 085313 - VINYL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes vinyl-framed windows.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.
 - b. Glazing Units: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: WDMA certified with label attached to each window.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
 - 1. Minimum Performance Class: CW.
 - 2. Minimum Performance Grade: 60.
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.30 Btu/sq. ft. x h x deg F (1.71 W/sq. m x K).
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.27.
- E. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 and requirements of authorities having jurisdiction.

2.2 VINYL WINDOWS

- A. Windows shall be Pella 350 Series Single-Hung or equivalent.
- B. Operating Types: Single-Hung.
- C. Frames and Sashes: Impact-resistant, UV-stabilized PVC complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Finish: Integral color, white.
 - 2. Gypsum Board Returns: Provide at interior face of frame.
- D. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3.
 - 1. Kind: Fully tempered.
- E. Insulating-Glass Units: ASTM E2190.
 - 1. Glass: ASTM C1036, Type 1, Class 1, q3.
 - a. Tint: Gray.
 - b. Kind: Fully tempered.
 - 2. Lites: Three.
 - 3. Filling: Fill space between glass lites with argon.
 - 4. Low-E Coating: Sputtered on second or third surface.
- F. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- G. Hardware, General: Provide manufacturer's standard corrosion-resistant hardware sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- H. Hung Window Hardware:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Counterbalancing Mechanism: AAMA 902.
 2. Locks and Latches: Operated from the inside only.
 3. Tilt Hardware: Releasing tilt latch allows sash to pivot about horizontal axis.
- I. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- J. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.3 ACCESSORIES

- A. Dividers (False Muntins): Provide divider grilles in designs indicated for each sash lite.
1. Quantity and Type: One permanently located between insulating-glass lites.
 2. Material: Manufacturer's standard.
 3. Pattern: As indicated on Drawings.
 4. Profile: As selected by Architect from manufacturer's full range.
 5. Color: As selected by Architect from manufacturer's full range.

2.4 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
1. Type and Location: Half, outside for single-hung sashes.
- B. Aluminum Frames: Complying with SMA 1004 or SMA 1201.
1. Finish for Exterior Screens: Baked-on organic coating in color selected by Architect from manufacturer's full range.
- C. Glass-Fiber Mesh Fabric: 18-by-14 (1.1-by-1.4-mm) or 18-by-16 (1.0-by-1.1-mm) mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.
1. Mesh Color: Manufacturer's standard.

2.5 FABRICATION

- A. Fabricate vinyl windows in sizes indicated. Include a complete system for installing and anchoring windows.
- B. Glaze vinyl windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Mullions: Provide mullions and cover plates, compatible with window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units. Provide manufacturer's standard finish to match window units.
- E. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.
- F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- D. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
- E. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085313

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Mechanical door hardware for the following:
 - a. Swinging doors.

B. Related Requirements:

- 1. Section 081129 "Stainless-Steel Flood Doors and Frames".
- 2. Section 081500 "Fiberglass Reinforced Plastic (FRP) Doors and Frames".
- 3. Section 083483 "Floor Doors".

1.3 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

- 1. Cast anchoring inserts into concrete.
- 2. Provide continuous perimeter air tight seal for Floor Door 301.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples for Verification: For each type of exposed product, in each finish specified.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Sample Size: Full-size units or minimum 2-by-4-inch (51-by-102-mm) Samples for sheet and 4-inch (102-mm) long Samples for other products.
 - a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
 2. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- C. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
 3. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - d. Fastenings and other installation information.
 - e. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - f. Mounting locations for door hardware.
 - g. List of related door devices specified in other Sections for each door and frame.
- D. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer and Architectural Hardware Consultant.
 - B. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
 - C. Sample Warranty: For special warranty.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Engineer, and Owner about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
 - a. Exit Devices: Two years from date of Substantial Completion.
 - b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

2.3 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.
 - 1. Door hardware is scheduled in Part 3.

2.4 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

2.5 SELF-CLOSING HINGES AND PIVOTS

- A. Self-Closing Hinges and Pivots: BHMA A156.17.

2.6 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch (13-mm) latch bolt throw.
 - 2. Mortise Locks: Minimum 3/4-inch (19-mm) latch bolt throw.
 - 3. Deadbolts: Minimum 1-inch (25-mm) bolt throw.
- C. Lock Backset: 2-3/4 inches (70 mm) unless otherwise indicated.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Strikes: Provide manufacturer's standard strike for each lock bolt or latch bolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 - E. Bored Locks: BHMA A156.2; Series 4000.
 - F. Mortise Locks: BHMA A156.13; Security Grade 1; stamped steel case with steel or brass parts; Series 1000.
- 2.7 SURFACE BOLTS
- A. Surface Bolts: BHMA A156.16.
- 2.8 MANUAL FLUSH BOLTS
- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.
- 2.9 EXIT DEVICES AND AUXILIARY ITEMS
- A. Exit Devices and Auxiliary Items: BHMA A156.3.
- 2.10 LOCK CYLINDERS
- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- 2.11 KEYING
- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock.
 - 1. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.
 - 2. Keyed Alike: Key all cylinders to same change key.
 - B. Keys: Brass.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2.12 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

2.13 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

2.14 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
- B. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg (75 Pa), as follows:
 - 1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.
 - 2. Gasketing on Single Doors: 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) of door opening.
 - 3. Gasketing on Double Doors: 0.50 cfm per foot (0.000774 cu. m/s per m) of door opening.

2.15 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

2.16 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

2.17 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Engineer.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
 - 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.18 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Doors and Frames: HMMA 831.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- G. Stops: Provide floor stops with holders for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
 - 2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
 - 3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
- B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.8 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

3.9 DOOR HARDWARE SCHEDULE

- A. Manufacturers:
 - 1. Lock-Latch: Sargent
 - 2. Hinges: Hager, McKinney, Stanley
 - 3. Closers: LCN, Sargent
 - 4. Closer/ Holders: LCN, Sargent, Cal-Royal
 - 5. Exit Devices: Von Duprin
 - 6. Push-Pulls: Rockwood
 - 7. Push Plates: Rockwood
 - 8. Flush-Bolts: Glynn-Johnson, Rockwood, Ives
 - 9. Stops: Glynn-Johnson, Rockwood, Ives
 - 10. Kickplates: Rockwood
 - 11. Silencers: Glynn-Johnson, Ives
 - 12. Lock Guards: Glynn-Johnson, Ives
 - 13. Thresholds: Zero, Reese, National Guard
 - 14. Weather-stripping: Zero, Reese, National Guard
- B. Hardware Notes:
 - 1. The following list of hardware items and their manufacturers are represented by specific catalog numbers in the hardware schedule.
 - 2. Hardware finishes shall be US32D or better.
 - 3. Hinges shall be Hager AB800xUS32D or better.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

4. Provide floor or wall stops with holders for all doors, where wall or floor stops are not applicable, provide overhead door stops. Provide Sargent S90 Series xUS32D for the appropriate door.
 5. Provide weather stripping at all doors.
 6. Furnish manufacturer's cut sheets for all hardware.
 7. All Hardware shall be installed in strict accordance with manufacturer's written instructions.
- C. Hardware Set #01 - Interior (Fire) FRP (panic hardware) - Doors 101, 301:
1. Hinges: Top, Intermediate & bottom - match frame finish.
 2. Lock-Latch: Von Duprin 98L-BE.
 3. Closer: LCN 4040 Series (mount on interior side of door).
 4. Door Stop/Holder: Cal-Royal HDFDSH66 bronze heavy-duty construction.
 5. Threshold: National Guard 513 (set in waterproof mastic).
 6. Weather-stripping: National Guard 5050 head/jamb.
 7. Bottom Rail Sweep: National Guard 335N (mortice into bottom rail of door).
- D. Hardware Set #02 – Exterior Flood Doors - Doors 200, 201:
1. Door hardware shall be as required for proper operation of the flood doors.
 2. Provide floor stop/holder if required to hold door in open position.

END OF SECTION 087100

DIVISION 9 - FINISHES

DETAILED SPECIFICATIONS

SECTION 0910 – HIGH-PERFORMANCE COATINGS

PART 1.00 - GENERAL

1.01 Description

The Contractor shall furnish all materials labor, equipment, and incidentals required to provide a protective coating system for the surfaces listed herein and not otherwise excluded.

The work includes painting and finishing of interior and exterior exposed piping, fittings, valves, equipment bases and supports, and all other work obviously required to be painted unless otherwise specified herein, on the drawings, or included in Specification Section 099600.

The omission of minor items in the schedule of work shall not relieve the contractor of his obligation to include such items where they come within the general intent of the specification as stated herein.

1.02 Quality Assurance

Workmanship shall be performed by skilled workmen thoroughly trained in necessary crafts and completely familiar with specific requirements and methods specified herein. All materials shall be produced by a single manufacturer. Total paint system shall be from one manufacturer and no cross coating allowed between primers and finish coats.

1.03 Submittals

Before any paint materials are delivered to the job site, submit to the Engineer a complete listing of all materials proposed to be furnished and installed under this portion of the work. This shall in no way be construed as permitting the substitution of materials for those specified or previously approved by the Engineer.

Accompany the materials list, submit to the Engineer two copies of the full range of colors available in each of the proposed products. Samples on job-type materials will be furnished when requested by the Engineer.

In each case where material proposed is not the material specified or specifically described as an acceptable alternate in this Section of these Specifications, submit for the Engineer's review the current recommended method of application published by the manufacturer of the proposed material.

Submit manufacturer's certification that paints and coatings comply with Federal, State, and Local, whichever is more stringent, requirements for VOC (Volatile Organic Compound).

1.04 Delivery, Handling, and Storage

Deliver all material to site in original, new, unopened containers, labeled and bearing manufacturer's name and stock number, product and brand name, contents by volume for major constituents, instructions for mixing and reducing, and application instruction.

Provide adequate storage facilities designed exclusively for the purpose of paint storage and mixing. Facility area shall be located away from open flames, be well ventilated, and be capable of maintaining ambient storage temperature of no less than 45 degrees F.

Paint, coatings, reducing agents, and other solvents must be stored in original containers until opened; if not resealable, than must be transferred to UL approved safety containers. Provide proper ventilation, personal protection and fire protection for storage and use of same.

Comply with requirements set forth by Occupational Safety and Health Act for storage and use of painting materials and equipment.

1.05 Extra Stock

Upon completion of work, provide owner with at least one gallon of each type and color of product used. Containers shall be tightly sealed and clearly labeled for identification.

PART 2.00 - PRODUCTS

2.01 Acceptable Systems and Manufacturer

Paint products/systems specified are not intended to limit competition, but to establish a standard of quality and performance desired. Equivalent systems by other manufacturers will be considered by the owner.

All materials specified herein are manufactured by the Tnemec Company, Inc., North Kansas City, Missouri. Acceptable manufacturers with equivalent systems are Sherwin-Williams Company High Performance Coatings and Carboline High Performance Coatings.

2.02 Color Selection

Where colors are not indicated, they will be selected by the Owner/Engineer. Intermediate coat color shall be 10% lighter than finish coat color.

PART 3.00 - EXECUTION

3.01 Inspection

Thoroughly examine surface scheduled to be painted prior to commencing work. Report, in writing to the Engineer, any condition that may affect proper application and overall performance of coating system. Do not proceed with work until such conditions have been corrected. Commencing with work indicates acceptance of existing conditions and for responsibility for performance of applied coating.

3.02 Protection

Extreme diligence shall be taken to ensure that vehicles, equipment, hardware, fixtures, materials, etc., are protected against paint spillage, overspray, etc. Such damages shall be corrected at no expense to Owner.

Surfaces not to be coated shall be masked, removed or otherwise covered to protect against cleaning and coating application procedures and weather. Drop cloths shall be used to protect floor, walls, machinery, equipment, and previously coated surfaces.

Exercise care in erecting, bracing, handling, and dismantling staging and scaffolding, to avoid scratching or damaging walls, floors, equipment, etc.

3.03 Surface Preparation

Perform preparation and cleaning procedures in strict accordance with manufacturer's instructions for each substrate condition.

Ferrous metals (structural steel and miscellaneous metals) requiring shop or field priming shall be prepared as listed in the "Coating System Schedule" specified herein and listed for each individual coating system. All metal surfaces shall be cleaned prior to sandblasting to remove oil and grease present by following methods and procedures outlined in SSPC-SPI Solvent Cleaning.

Surface preparation for field touch-up of ferrous metals shop-primed shall be as follows:

Immersion - Remove all oil, grease, dirt, dust and foreign matter from the surface. Weld slag, weld spatter, rough edges and sharp corners of weld seams shall be ground smooth. All rusted, abraded and unpainted areas shall be blast cleaned to a Near-White Finish as outlined in Steel Structures Painting Council's Specification SP-10.

Non-Immersion - Remove all oil, grease, dirt, dust and foreign matter from the surface. Follow cleaning with Steel Structures painting council's Specification SP-3 Power Tool cleaning.

Galvanized metals requiring paint (only as direct by Engineer) shall be cleaned by

removing all oil, grease, dirt, dust and foreign matter by solvent cleaning in accordance with SSPC-SP1 prior to treating with an etching solution, such as Clean'n Etch from Great Lake Laboratories.

PVC piping shall be cleaned and free of all oil, grease, dirt, dust, and foreign matter, and shall be hand sanded.

3.04 Touch-Up of Shop Applied Coatings

All shop applied coatings with manufacturer's standard paint shall be touched-up with compatible barrier coating, Tnemec Series 1 Omnithane, able to receive specified topcoat(s). Notify Engineer in writing of anticipated problems due to incompatible coating systems.

All shop applied coatings with specified primer as listed the "Coating System Schedule" shall be touched up with same primer before any topcoat(2) are applied.

3.05 Application

No paint shall be applied when surrounding air temperature, as measured in the shade, is below 45 degrees F. No paint shall be applied when the temperature of the surface to be painted is below 40 degrees F. Paint shall not be applied to wet or damp surfaces, and shall not be applied in rain, snow, fog or mist, or when the relative humidity exceeds 85%. Paint shall not be applied when the substrate temperature is within 5 degrees of the dewpoint. Paint manufacturer's temperature guidelines must be followed.

No paint shall be applied when it is expected that the relative humidity will exceed 85% or that the air temperature will drop below 45 degrees F within 4 hours after the application of the paint.

Maintain proper ventilation in area of work to alleviate volatile solvents evaporating from coating materials.

All ingredients in any container of the coating materials shall be thoroughly mixed and shall be agitated often enough during application to keep the pigment suspended.

Should thinning be required use only the amounts specified by the coating manufacturer.

Application of coating shall be by brush, roller, mitt or spray and in accordance with manufacturer's recommendations. All material shall be evenly applied to form a smooth, continuous, unbroken coating. Drips, runs, sags, or pinholes shall not be acceptable.

Provide proper application equipment, including ladders, scaffolding, masking materials, and tools to perform work. Ladders and scaffolding shall meet or exceed UL requirements and Metal Ladder Manufacturer's Association.

3.06 System Inspection and Testing

After application of each coating in the specified system and its surface has cured, measure its thickness with a properly calibrated Nordson Microtest Dry Film Thickness Gauge, or equivalent. Follow standard method for measurement of dry paint thickness with magnetic gauges as outlined in Steel Structures Painting Council's SSPC-PA2-73T.

Make as many determinations as needed to ensure the specified thickness values in each typical area. To all surfaces having less dry film thickness than specified, apply additional coat(s) at no extra cost to Owner to bring thickness up to specifications.

Metals in immersion service that receive a protective coating system shall be checked with a non-destructive holiday detector that shall not exceed 67 1/2 volts. All pinholes or defects shall be repaired in accordance with manufacturer's printed recommendations and then retested.

Non-metallic surfaces shall be continuously checked with wet-film thickness gauges during application to ensure proper dry film thickness will be attained. Also square feet coverages need to be monitored to verify proper coverage rates.

Painting contractor shall permit the Engineer and/or paint and coating manufacturer (as requested by owner) to inspect his work for conformance to this specification. Owner reserves the right to reject all work which does not comply with this specification.

3.07 Clean-Up

Upon completion, painting contractor shall clean up and remove from site all surplus materials, tools, appliances, empty cans, cartons, and rubbish resulting from painting work. Site shall be left in neat, orderly condition.

Remove all protective drop cloths and masking from surfaces not being painted. Provide touch-up around same areas as directed by the Engineer.

Remove all misplaced paint splatters or drippings resulting from this work.

3.08 Coating System Schedule

A. Structural Steel and Equipment

1. Exterior Exposure (Non-Immersion)
System No. 74-2 - High Build Urethane
Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

	<u>Dry Film-Mils</u>
<u>1st Coat:</u> 66-Color Hi-Build Epoxoline	4.0 - 5.0
<u>2nd Coat:</u> 66-Color Hi-Build Epoxoline	4.0 - 5.0
<u>3rd Coat:</u> 1074-Endura-Shield II	<u>3.0 - 5.0</u>
	11.0 - 15.0

2. Interior Exposure (Immersion)
System No. 139-2 - High-Build Epoxy
Surface Preparation: SSPC-SP10 Near White Blast Cleaning

	<u>Dry Film-Mils</u>
<u>1st Coat:</u> 46H-413 Hi-Build Tnemec-Tar	8.0
<u>2nd Coat:</u> 46H-413 Hi-Build Tnemec Tar	<u>8.0</u>
	16.0

B. Mill Coated Steel Pipe

1. Interior Exposure (Non-Immersion)
System No. 66-3 - Epoxy-Polyamide
Surface Preparation: Surface shall be clean and dry.

	<u>Dry Film-Mils</u>
<u>1st Coat:</u> 66-1211 Epoxoline Primer	3.0 - 4.0
<u>2nd Coat:</u> 66-Color Hi-Build Epoxoline	<u>4.0 - 5.0</u>
	7.0 - 9.0

2. Exterior Exposure (Non-Immersion)
System No. 66-3 - Epoxy-Polyamide
Surface Preparation: Surface shall be clean and dry.

	<u>Dry Film-Mils</u>
<u>1st Coat:</u> 66-1211 Epoxoline Primer	3.0 - 4.0
<u>2nd Coat:</u> 66-Color Hi-Build Epoxoline	4.0 - 5.0
<u>3rd Coat:</u> 1074-Endura-Shield II	<u>2.0 - 3.0</u>
	9.0 - 12.0

C. Galvanized Steel - Pipe and Fabrications

1. Interior Exposure (Non-Immersion)
System No. 66-1 - Epoxy Polyamide
Surface Preparation: SSPC-SP1 Solvent Cleaning prior to surface etching solution.

	<u>Dry Film-Mils</u>
<u>1st Coat:</u> 66-Color Hi-Build Epoxoline	3.0 - 5.0
<u>2nd Coat*:</u> 1074-Endura Shield II	<u>3.0 - 5.0</u>
	6.0 - 10.0

*Exterior exposure only.

D. PVC Piping

1. Interior Exposure (Non-Immersion)

System No. 66-1 - Epoxy Polyamide

Surface Preparation: Surfaces shall be clean, dry, and hand sanded.

	<u>Dry Film-Mils</u>
<u>1st Coat:</u> 66-Color Hi-Build Epoxoline	3.0 - 5.0

2. Exterior Exposure

System No. 1028-1 - Enduratone

Surface Preparation: Surfaces shall be clean, dry, and hand sanded.

	<u>Dry Film-Mils</u>
<u>1st Coat:</u> 1028-Enduratone	2.0
<u>2nd Coat:</u> 1028-Enduratone	2.0
	4.0

3.09 Pipe Color Code

<u>Pipe System</u>	<u>Color</u>	<u>No.</u>
<u>Water</u>		
Raw Water	Clover	110GN
Settled or Clarified Water	Aqua Sky	10GN
Finished Water	Safety Blue	11SF
<u>Wastewater</u>		
Sewage Plant Effluent	Terra Cotta	07RD
Backwash Waste	Twine	68BR
Sludge	Weathered Bark	84BR
Sanitary Sewer	Deep Space	34GR
<u>Chemical</u>		
Alum or Primary Coagulant	Safety Orange	04SF
Ammonia	White	11WH
Carbon Slurry	Black	35GR
Caustic	Safety Yellow	02SF
	w/Green Band	09SF
Chlorine	Safety Yellow	02SF
Fluoride	Fountainbleu	25BL
	w/Safety Red Band	06SF
Lime Slurry	Irish Spring	37GN
Ozone	Safety Yellow	02SF
	w/Safety Orange Band	04SF
Phosphate Compounds	Irish Spring	37GN
	w/Safety Red Band	06SF

Polymers or Coagulant Aids	Safety Orange	04SF
	w/Safety Green Band	09SF
Potassium Permanganate	Safety Purple	14SF
Soda Ash	Irish Spring	37GN
	w/Safety Orange Band	04SF
Sulfuric Acid	Safety Yellow	02SF
	w/Safety Red Band	06SF
Sulfur Dioxide	Irish Spring	37GN
	w/Safety Yellow Band	02SF
<u>Other</u>		
Compressed Air	Balsam	91GN
Gas	Monterrey Tile	28RD
Other Lines	Light Gray	32GR
Hoists/Trolleys	Safety Yellow	02SF
Fire Protection	Safety Red	06SF

END OF SECTION

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.

B. Related Requirements:

- 1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For embossed, high-strength steel studs and tracks, post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, G60, hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
 - 1. Steel Studs and Tracks:
 - a. Minimum Base-Steel Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
 - 2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.
 - a. Minimum Base-Steel Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide the following:
 - 1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch (38-mm) minimum vertical movement.
- D. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
 - 1. Depth: 1-1/2 inches (38 mm).
 - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
- E. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Configuration: Asymmetrical or Hat Shaped.

2.3 SUSPENSION SYSTEMS

- A. Pliteq "GenieClip" Hangers or equivalent with rubber isolation:
- B. Furring Channels (Furring Members):
 1. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.
 - a. Minimum Base-Steel Thickness: 0.0188 inch.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
 2. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Hangers: 24 inches o.c.
 - 2. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
- D. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
- B. Related Requirements:
 - 1. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or blotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capacity.
 - 1. Thickness: 5/8 inch (15.9 mm).

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Plastic.
 - 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
- C. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type C: Where required for fire-resistance-rated assembly.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners unless otherwise indicated.
 2. LC-Bead: Use at exposed panel edges.
- C. Exterior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.
- D. Aluminum Trim: Install in locations indicated on Drawings.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Concealed areas, and where indicated.
 - 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 099600 "High-Performance Coatings."

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:

- 1. Exterior Substrates:

- a. Concrete, vertical and horizontal surfaces.
 - b. Fiber-cement board.
 - c. Steel.
 - d. Galvanized metal.
 - e. Aluminum (not anodized or otherwise coated).
 - f. Stainless steel.
 - g. Wood.
 - h. Fiberglass.

- 2. Interior Substrates:

- a. Concrete, surfaces.
 - b. Steel.
 - c. Galvanized metal.
 - d. Aluminum (not anodized or otherwise coated).
 - e. Wood.
 - f. Fiberglass.
 - g. Gypsum board.

- B. Related Requirements:

- 1. Section 051200 "Structural Steel Framing" for shop priming of structural steel with primers specified in this Section.
 - 2. See Piping Equipment drawings for coatings on piping and/or equipment.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
 - 3. Fire Barrier Paint system.
- B. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Coatings: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 3. Products shall be of same manufacturer for each coat in a coating system.
- C. Colors: As selected by Architect from manufacturer's full range.

2.2 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Fiber-Cement Board: 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 1. Clean surfaces with pressurized water. Use pressure range of 4000 to 10,000 psi (27 580 to 68 950 kPa) at 6 to 12 inches (150 to 300 mm).
 2. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 1. SSPC-SP 6/NACE No. 3.
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- H. Aluminum Substrates: Remove loose surface oxidation.
- I. Wood Substrates:
 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer that is recommended in writing by topcoat manufacturer for coating system indicated.
 2. Sand surfaces that will be exposed to view and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with filler that is recommended in writing by topcoat manufacturer for coating system indicated. Sand smooth when dried.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 1. Use applicators and techniques suited for coating and substrate indicated.
 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Concrete Substrates, Vertical Surfaces:
 - 1. Epoxy-Modified Latex System MPI EXT 3.1D:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.
- B. Concrete Substrates, Horizontal Surfaces:

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Epoxy Non-Slip Deck Coating System MPI EXT 3.2C:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Epoxy deck coating (slip resistant), MPI #82.

- C. Cement Board Substrates:
 1. Epoxy System MPI EXT 3.3E:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

 2. Epoxy-Modified Latex System MPI EXT 3.3D
 - a. Prime Coat: Epoxy-modified latex, matching topcoat.
 - b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5), MPI #215.

- D. Steel Substrates:
 1. Epoxy System MPI EXT 5.1R:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Epoxy, high build, low gloss, MPI #108.
 - c. Topcoat: Water Based, Emulsion Coating, Semi-gloss, MPI #163.

- E. Galvanized-Metal Substrates:
 1. Pigmented Polyurethane over Epoxy Primer System MPI EXT 5.3L:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, gloss matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.

- F. Aluminum (Not Anodized or Otherwise Coated) Substrates:
 1. Epoxy System MPI EXT 5.4E:
 - a. Prime Coat: Primer, vinyl wash, MPI #80.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

- G. Wood Substrates: Wood trim and Wood board sheathing

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1. Pigmented Polyurethane System MPI EXT 6.3H:
 - a. Prime Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
 - b. Intermediate Coat: Polyurethane, two component, pigmented, gloss, matching topcoat.
 - c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72.

H. Fiberglass Substrates:

1. Epoxy System MPI EXT 6.7F:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Concrete Substrates, Vertical Surfaces:

1. Epoxy-Modified Latex System MPI INT 3.1G:
 - a. Prime Coat: Epoxy-modified latex, matching topcoat.
 - b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
 - c. Topcoat: Epoxy-modified latex, semi-gloss (MPI Gloss Level 5), MPI #215.

B. Concrete Substrates, Horizontal Surfaces.

1. Epoxy System MPI INT 3.2C:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

C. Steel Substrates:

1. Epoxy over Self-Priming Epoxy System MPI INT 5.1V:
 - a. Prime Coat: Epoxy, high build, self-priming, MPI #120.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

D. Galvanized-Metal Substrates:

1. Epoxy over Epoxy Primer System MPI INT 5.3D:
 - a. Prime Coat: Primer, epoxy, anti-corrosive, for metal, MPI #101.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- E. Wood Substrates: Wood trim and wood board paneling.
 - 1. Epoxy System MPI INT 6.3L:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

- F. Wood Substrates Fire Resistant: Wood trim and wood board paneling.
 - 1. Epoxy System MPI INT 6.3L:
 - a. Prime Coat: compatible with intermediate coat.
 - b. Intermediate Coat: Fire Barrier Paint system.
 - c. Topcoat: Epoxy, compatible with intermediate coat, gloss, MPI #77.

- G. Fiberglass Substrates:
 - 1. Epoxy System MPI INT 6.7D:
 - a. Prime Coat: Epoxy, matching topcoat.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Epoxy, gloss, MPI #77.

- H. Gypsum Board Substrates:
 - 1. Epoxy, High-Build System MPI INT 9.2N:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: High-Build Epoxy, matching topcoat.
 - c. Topcoat: High-Build Epoxy, low gloss, MPI #108.

END OF SECTION 099600

DIVISION 13 – SPECIAL CONSTRUCTION

DETAILED SPECIFICATIONS

SECTION 1341 – FACTORY ASSEMBLED VACUUM STATIONS WITH SCADA

PART 1.00 – GENERAL

The following specification is a guideline for pre-fabricated Vacuum Collection Stations. It is organized by major components with sizing indicated.

The vacuum pump skid and SCADA system components described in this specification will be procured by the Town by direct purchase and will be made available to the Contractor at the time of installation. It will be the Contractor's responsibility to direct the delivery of this equipment to the appropriate location and to unload and install in accordance with the drawings and manufacturer's recommendations.

1.01 Description of Work

The extent of work under this section includes furnishing, pre-fabrication and factory testing of a complete and self contained vacuum collection station mounted on a structural steel skid. The vacuum collection station equipment includes the vacuum tank, vacuum pumps, sewage pumps, all associated piping and electrical motor control panel.

1.02 Related Work Specified Elsewhere

Installation of pre-fabricated vacuum station equipment. Connection of vacuum sewers and discharge forcemain. Connection of electrical power and telephone lines to the vacuum collection station.

1.03 Manufacturer's Experience

The manufacturer of pre-fabricated station equipment and controls shall have a minimum of five (5) years of experience in the design, manufacture and start-up of vacuum stations, and have at least five (5) installations in service. Provide verification upon request.

1.04 Submittals

Shop Drawings & Literature: Provide a submittal including complete plan and elevation view drawings of assembled unit (s), vacuum tank and structural steel base. For dual skid units, indicate any field installed connection piping required on site by others. Provide manufacturer's literature on all equipment provided with the station. Indicate materials of construction, physical properties, controls, operational requirements, details and other data.

1.05 Operation and Maintenance Manuals

Submit O & M Manuals for all components indicating recommended spares, start-up data and maintenance procedures. Submit a listing of suppliers who may provide repair parts.

1.06 Warranty

Provide a one-year manufacturer's warranty covering all materials and workmanship of all products supplied. Warranty shall commence from the date of station start-up. (i.e. when controls are turned to auto).

PART 2.00 – PRODUCTS

2.01 Vacuum Pumps

- A. Provide (2) two vacuum pumps. They shall be Busch rotary vane type. Assembly number P14000 as modified for Aqseptence Group, Inc. Pumps shall have a nominal pumping speed of 1180 RPM, and produce 455 ACFM.
- B. The vacuum pump shall be driven directly by a 25 horsepower standard C-face, F2 assembly, TEFC electric motor through a shaft coupling. No belt drives shall be used. At no time does motor horsepower exceed nameplate ratings. Pumps shall be air-cooled with absolutely no water requirements. Pump shall have an end (ultimate) vacuum of 29.3" Hg. (15 Torr) minimum at sea level (29.92" Hg barometer). Pump shall be capable of continuous operation.
- C. Lubrication shall be provided by an integral, fully recirculating oil supply which is filtered by an automotive-type spin-on filter. Once through (non-recirculating) or partial recirculating oil lubrication systems shall not be permitted. Pump shall be capable of operation with standard SAE 30 weight automotive grade oil. Oil separation system shall be integral and shall consist of no less than four stages of internally mounted oil and smoke elimination from the exhaust gas stream. This includes bulk separation, mist elimination, smoke elimination and baffle.
- D. Pump shall have a built-in anti-suck-back valve mounted at the pump inlet.
- E. Pump shall be of three-vane design with vanes having an average of 30,000 hours life between replacement.
- F. Entire pump, motor, and exhaust box shall be shipped as one factory assembled and tested unit mounted on vibration isolators and shall be mounted on the vacuum station skid as shown on the drawings.
- G. Each pump and motor shall be fitted with a name plate indicating model, serial number, horsepower, voltages, amperages, speed, efficiency, insulation type, frame number, locked rotor current, enclosure.
- H. Each pump will be equipped with an internal crank case heater. The heater shall be properly sized to maintain uniform crank case temperatures without damage to the oil. These units are to be self contained including an operating thermostat. Power for these heaters to be supplied by the main vacuum skid control panel.
- I. Sound level shall be approximately 85 db(A).

2.02 Collection Station Piping

- A. This item includes piping, valves, fittings, pipe supports, fixtures, drains and other work involved in providing a complete installation.
- B. Vacuum collection station piping shall include all piping within the collection station skid, connecting piping to vacuum pumps.
- C. Except where noted otherwise, waste water, vacuum and drain lines 4" or larger shall be ductile iron for exposed installations and mechanical joint (ANSI A21.11, AWWA C111) for buried installations; fittings shall be flanged cast iron (ANSI B16.1, 125 lb.) and mechanical joint (ANSI AS1.10, AWWA C110) as appropriate. Vacuum lines as well as other lines under 4" shall be Schedule 80 PVC, 304 Stainless Steel, Galvanized, or Schedule 40 black iron. Vacuum Pump exhaust piping to be stainless steel, galvanized or black iron. These lines are not to be inter-connected. Building sanitary drains shall be PVC DWV pipe and fittings.
- D. One eighth inch (1/8") thick E.P.D.M. gaskets shall be used on all flanges.
- E. All fasteners supplied by AIRVAC for mating flanges, pipe supports and various component mounting shall be Zinc Coated carbon steel.
- F. Piping shall be adequately supported to prevent sagging and vibration and to permit expansion, venting and drainage. Supports shall be situated to prevent the weight of piping and valves from bearing on the pumps.
- G. All shut-off valves fitted within the collection station shall be identical to those specified under Paragraph 2.5 "Division Valves" and shall be flanged.
 - 1. Valves (2" or 3") Butterfly valves used on vacuum pump inlets to be epoxy coated, cast iron, semi-lug body with 316 SS iron disc suitable for continuous contact with domestic sewage.
 - 2. Ball valves used on site tube, equalizing lines, and condensate drains shall be 1" "True Union type with screw thread ends and EPDM seals.
 - 3. Gauge and Instrument Isolation valves shall be 1/2" 316 stainless steel body ball valves with Teflon seats or 1/4" chrome plated brass ball valves with Teflon seats and Viton seals.
- H. Check valves for vacuum pumps shall be flapper swing type and be manufactured by Pratt or approved equal.
- I., Provide an Electric actuated, (120v) resilient seated butterfly valve (Bray) for emergency high-level lockout: Valve to be epoxy coated, cast iron, semi-lug body with 316 SS disc suitable for continuous contact with domestic sewage. The electric actuator (Dresser) shall keep the valve open and with the loss of power to be closed by the spring return feature to isolate the vacuum pumps when the liquid height in the collection tank has reached its alarm condition point.

- J. An automatic operated condensation collection system will be provided as shown on the Station plans, the purpose of which is to prevent exhaust moisture and odors from escaping into the Station ambient air. All valves for the condensation collection system shall be provided. The final 1" piping and supports shall be contractor furnished as shown on plans.

2.03 Structure Steel Skid

- A. The entire vacuum pump assembly shall be rigidly mounted to a raised structural steel platform by means of bolting or welding.
- B. All structural steel shall conform to ASTM A-36/A-36M with minimum tensile strength 58,000 PSI.
- C. The platform shall be so designed to support the assembly with main support members adequately sized to bear loads applied by lifting the unit (s) at four (4) points on its perimeter. Cross members will be located to bear the loads applied by various components. All structural members to be joined by a minimum 1/4" fillet weld.
- D. The entire top surface of the platform will be covered with steel deck plates. Where access to components is required, non-slip type safety floor plate are to be used. Lifting cleats will be attached at four (4) points along the platform perimeter to allow lifting by cable and spreader bars. Each cleat will be adequately sized to bear the load of the entire assembly. They will be fastened by bolts and are to be removed.
 - 1) Painting: The entire platform will be prepared for painting by use of a phosphatizing process. Sandblasting shall not be required. One (1) primer coat of a Rust-oleum Product compatible with 9100 Series Epoxy will be applied immediately after phosphatizing at 3 mils D.F.T. minimum.

2.04 SCADA System

- A. The Owner shall furnish one (1) complete Supervisory Control and Data Acquisition (SCADA) system. It shall be the Owner's responsibility to provide a system consisting of all new equipment to be designed, supplied, fabricated, programmed, installed, tested, started up, and warranted by a single source of responsibility.
- B. The following shall be minimum requirements of the SCADA system software furnished by the Owner:
 - 1) SCADA system software licensing shall be no less than 1,000 tag system with 1,000 tag historian. The SCADA system software shall provide full redundancy for all operations, alarming, and history using this software. The SCADA system shall be expandable to handle unlimited additions with upgrades to the SCADA software. Additions include locally at sites noted under this contract as well as future sites.
 - 2) The SCADA system software shall provide real time data and alarms for all available data points from the Vacuum Control system. Alarm annunciation shall be by email, text message and voice. Any input into the SCADA system shall be configurable by authorized users as an alarm condition.

- 3) The SCADA system software shall allow for remote setpoint changes and pump control, including generator system control, by only operators with the approved security credentials. This shall be accomplished using local SCADA servers and a minimum of two (2) remote access internet clients. The two (2) remote internet access licenses shall include secure remote access using personal mobile devices only for those Operators and devices that are approved to connect on the SCADA network.
 - 4) The SCADA software shall be VTScada, Wonderware Archestra Sys Platform or GE Proficy.
- C. The following shall be minimum requirements of the SCADA system hardware furnished by the Owner:
- 1) One (1) licensed radio Remote Telemetry Unit (RTU) at the Vacuum Pump Station. Within this panel shall be the following components as a minimum:
 - i. Industrial, non-proprietary PLC by Allen Bradley Micrologix 1400 or approved equal
 - ii. Industrial data radio by GE/MDS, model Orbit or approved equal
 - iii. Uninterruptible power supply (UPS)
 - iv. Condensation heater
 - v. 120VAC surge protection device
 - vi. Type 4x stainless steel enclosure
 - vii. yagi antenna and coaxial cable
 - viii. Coaxial surge protection device
- D. SCADA System Supplier (SSS) Qualifications
- 1) The SSS shall be defined as the firm responsible for the design, fabrication and programming of the SCADA system. The SSS may be a sub-contractor of the Contractor. The SSS shall be responsible for the satisfactory design, programming and commissioning of a complete and fully operational (non-proprietary) SCADA system that fully complies with the specifications within this document. Specifically, this shall include supplying all electrical, mechanical and plumbing schematics and wiring inter-connect diagrams, providing instrument installation details, preparing input/output listings, writing software, performing software and hardware integration, debugging, calibrating and tuning the various components and subsystems and providing eight (8) hours of training and one year of warranty services. In addition, the SSS shall also be responsible for obtaining all required FCC radio licenses; and performing propagation and/or topographical studies to determine the optimum communication path for the radio transmission.
 - 2) The SSS shall also have permanent field service staff capable of providing the service and maintenance of the system. Service includes both remote access where permitted by the Owner and onsite support capabilities.
 - 3) The SSS must have a field service location with a full time staff located less than 175 miles from Holden Beach, NC. Field service staff must be formally trained by the System Supplier/Integrator.

- 4) The SSS shall have a minimum of five (5) years of experience in the design, manufacture and start-up of SCADA systems, and have at least five (5) installations in service. ~~Provide verification upon request.~~

Verification shall be provided upon request

2.05 Factory Testing

- A. The assembled station will be vacuum tested to 24" Hg. for a period of not less than two (2) hours. Maximum leak rate to be one (1%) percent per hour. The station will be test run at as near field conditions as can be factory simulated. Vacuum pumps controls will be preset and tested. Sewage pump level controls will be preset and tested.
- B. All alarm functions will be normally open to close on alarm condition and will be pre-tested. Liquid will be admitted to the collection tank to the highest control point (lock-out) and then pumped using both sewage pumps operating alternately.

A factory test report with a chart indicating the vacuum test will be provided with the O & M Manual.

2.06 Final Painting

After all testing is complete, the entire collection station will be tooled, cleaned, pressure washed and/or solvent washed in accordance with SSPC-SPI, SP2 and SP3. Touch-up paint shall be applied as needed prior to final shipping.

PART 3.00 – EXECUTION

3.01 Vacuum Station Startup Services

Vacuum Station equipment manufacturer shall provide at a minimum one (1) week of on-site start up and adjustment of the equipment.

END OF SECTION

DIVISION 13 – SPECIAL CONSTRUCTION

DETAILED SPECIFICATIONS

SECTION 1343 - FACTORY ASSEMBLED CONTROL PANEL – VACUUM SYSTEM

PART 1.00 - GENERAL

The following specification is a general guideline for prewired control panels and electrical components provided on a two skid mounted vacuum collection station, containing two (2) vacuum and two (2) sewage pumps.

This specific component will be procured by the Town by direct purchase and will be made available to the Contractor at the time of installation. It will be the Contractor's responsibility to direct the delivery of this equipment to the appropriate location and to unload and install in accordance with the drawings and manufacturer's recommendations.

1.01 Description of Work

The extent of work under this section includes furnishing, prewiring and factory testing of a complete and self contained control unit for monitoring of vacuum and fluid levels and cycling of pumps on a skid mounted vacuum station. The electrical equipment includes a control panel or MCP, level probes, vacuum switches, and solenoid switches.

1.02 Related Work Specified Elsewhere

Interconnection of sections of the split skid design. Routing of conduit and wires, termination at the MCP terminal strip, and at the field junction box on the vacuum skid or tank skid. Interconnection includes motor leads, switch leads, and probe connections.

1.03 Quality Assurance

Wiring and workmanship for the control components on the Vacuum Collection Skids will comply with the following regulations, standards, and publications:

- N.E.C. - National Electric Code
- U.L. Underwriters Laboratories

1.04 Quality Control

All control panel components shall be of the most current and proven design. Specifications and Drawings call attention to certain features but do not purport to cover all details entering into the design of the control system. The components provided by the System Supplier shall be compatible with the functions required and shall form a complete working system.

All control components shall bear a U.L. Listing label in applicable categories. Some exceptions may be made where components become difficult to use, implement, or obtain in order to be listed.

The control panel shall be to all requirements of U.L. 508 and as such shall be tested, approved, and certified as required. The Control Panel shall be U.L. 508 approved as a unit.

1.05 Manufacturer's Experience

The manufacturer of pre-fabricated control panel shall have a minimum of five (5) years of experience in the design, manufacture and start-up of vacuum stations, and have at least five (5) installations in service. ~~Provide verification upon request.~~

Verification shall be provided upon request.

1.06 Submittals

A. Electrical Drawings

Provide a submittal including complete electrical prints. These include but are not limited to panel layout and material list, power distribution, and I/O layout.

Verification shall be provided upon request.

B. Operation and Maintenance Manuals

Submit O&M Manuals: Manuals to include description of control switches, system operation, theory of operation, warranty information, the above drawings, and manufacturer's published literature on control components.

Part numbers of components used on the drawings to be highlighted.

PART 2.00 - PRODUCTS

2.01 General

Provide NEMA-12 enclosure panel with all relays, starters, disconnects, instruments, switches, indicating lights, terminal boards, and wiring to perform the following functions. Panel to be wall mountable or supported by feet, based upon size required, and painted to color specifications provided.

A. Provide control logic for operation of the two (2) sewage pumps in the automatic and manual modes.

B. Provide control logic for operation of two (2) vacuum pumps in the automatic and manual modes.

- C. Provide control logic to allow system to be operated by the emergency generator supplied and controlled by others.
- D. Provide control logic to assure delay of second (2nd) Sewage and/or 2nd Vacuum pump operation on initial power turn up.
- E. Provide control logic for operation of a High Level cutoff isolation valve.
- F. Provide local alarm, audible and visual, for low vacuum pressure, for high wastewater level in sewage receiver tank, and for high level lockout conditions. Provide for capability to silence the audible alarm and test for Pilot light operation.
- G. Provide trending of Vacuum Tank pressure through Operator Interface.
- H. Provide control logic for automatic cycling of a manufacturer provided condensate collection system.
- I. Provide Phase Fail and Surge Protection as required by the engineer.

2.02 Enclosure

- A. Provide a NEMA 12 rated flange-mounted disconnect enclosure for the electrical controls. The vacuum system manufacturer shall size the enclosure to fit the electrical equipment for this project. Single, Dual or Triple doors are allowed and shall be incorporated as per the project requirements by the vacuum system manufacturer. The vacuum system manufacturer shall mount the enclosure on the vacuum pump skid, provide floor stands for sitting the enclosure in the building or provide wall mounting accessories as so required for the project.
 - 1. The enclosure shall be made from 10-gauge carbon steel.
 - 2. The body seams shall be continuously welded and ground smooth, the enclosure body shall include body stiffeners in larger enclosures for extra rigidity, the body flange trough shall include liquids and contaminants, a heavy-duty lifting eye shall be anchored into the top of the enclosure, and the center post shall be removal for easy panel installation.
 - 3. The doors on the enclosure shall include heavy gauge continuous hinges; they shall include heavy-duty 3-point latching mechanisms operated by patented padlocking handles on all doors. Each of the latching rods shall have rollers for easier door closing. The door shall include a high-impact thermoplastic pocket for data and have an oil-resistant gasket. The master door shall be the far-right side and include a defeater. The defeater must require a screwdriver to be used to allow the door to open. The master door shall include mechanical interlocks to keep the slave door from being

opened first. The doors shall be able to close in any order. Each door shall include a padlocking handle.

4. A universal cutout shall be provided on the right flange for the disconnect operator.
5. The enclosure shall be provided with a 10 gauge back panel which mounts to the back of the enclosure on collar studs.
6. The finish shall be applied by the enclosure manufacturer and shall be "White" on the inside and ANSI 61 "Gray" on the outside. The finish shall be over a phosphatized surface.
7. The enclosure manufacture shall provide the operator adapters for the universal cutouts for the disconnect. The operator adapter shall interlock the master door with the disconnect operating mechanism.
8. Provide an activated door switch. The switch shall turn a light on when the enclosure door is opened.
9. Provide a 20 watt, LED, 1200 Lumens, Kelvin Temp 4000K lighting package. Lithonia or equal
10. Provide an exhaust fan sized appropriately for the enclosure. Include an inlet grill as well. Hoffman, or equal.
11. The enclosure shall meet UL 508A standards.
12. Enclosure package shall be: Hoffman, or equal.

2.03 Voltage Test Station

- A. Provide a safe way for the system operator to verify the presence or absence of voltage. This device shall be mounted on the outside the electrical enclosure.
- B. This device shall be non-flashing with a safe-test port, installed in a UL Type 4 housing with horizontal mount rated IP65. The housing shall include a 304 stainless steel latch and a UV rated polycarbonate cover. Voltage indicator shall be conveniently viewed from the enclosure. Operating range 4-600VAC, 50/60Hz/400Hz or 30-600VDC.
- C. Grace Engineering Products, Inc. or equal

2.04 Programmable Logic Controller (PLC) Based System

A. Conceptual system control scheme is as follows:

1. PLC-CPU shall be Allen Bradley Compact Logix.
2. Documentation shall be in Allen Bradley RSLogix.
3. See Paragraphs, PLC Hardware, for additional requirements.

B. PLC Hardware

1. Provide programmable logic controllers (PLC) and input/output modules in sufficient quantities specified herein and as required to meet functional requirements of the Specification. PLC hardware and power supplies shall be provided in completely wired local control panels as specified herein and as shown. Manufacturer shall include cables, mounting hardware, racks and connectors as required for fully operational PLC systems.
2. PLC system hardware shall be as manufactured by Allen Bradley.
3. I/O modules shall be removable without disturbing field wiring.
4. Provide minimum of 20% spare slot capacity in the card rack for future expansion.
5. For PLC digital output controlling equipment where control voltage/circuit is greater than 30 volt AC, provide 115 volt output cards. Install relays only if the load on the card is greater than its current carrying capacity.

C. PLC-CPU

1. Each process module PLC-CPU shall be Allen Bradley Compact Logix type processor.
2. 25% spare memory shall be available after PLC has been programmed for full operation.

D. Digital Input (DI) Modules

1. Provide Allen Bradley DI modules as required.

E. Digital Output (DO) Modules

1. Provide Allen Bradley DO modules as required.

F. Analog Input (AI) Modules

1. Provide Allen Bradley AI modules as required.

2.05 Disconnects

- A. Provide main disconnect for incoming power with a 25 KIAC rating.
- B. Provide a separate disconnect for each Vacuum and Sewage Pump utilized.
- C. One (1) power feed shall be provided to the enclosure and distributed to the disconnects via a distribution block.
- D. Provide operating handle for disconnect switch mechanism providing indication and control of switch position with enclosure door open or closed, and capable of being locked in the OFF position with three padlocks. Construct and mount starters with disconnect switches in main NEMA Type 12 enclosure.
- E. Site disconnects shall be provided by system manufacturer for the vacuum pumps.

2.06 Vacuum and Sewage Pump Starters

General - except as otherwise indicated, provide motor starters and auxiliary components, which comply with manufacture's standard materials, design and construction in accordance with published product information, and as required for complete installation. Where more than one type of equipment meets indicated requirements, selection is Installers' option.

A. Vacuum Pump and Sewage Pump Starters – Variable Frequency Drive

1. Variable Frequency Drives (VFD)

Variable frequency drives are to be provided for both the vacuum and sewage pumps. VFD's should be a microprocessor based unit with menu oriented keypad programming of setup parameters. NEMA 1 enclosure is permissible if mounted outside the control enclosure, open if mounted inside.

Manufacturer's specifications must be submitted for approval as 'state of the art' in motor control. The most important of these features will be:

Adjustable frequency range, translated to 900-3600 rp.

4-20mA (or 0-10 vDC) input capability

Rated at 150% output for 60 sec.

Remote start/stop.

Programmable accell/decel times.

Wide range of internal fault protection.

Keypad should be provided with the units.
Bypass contactors will not be required.
Allen-Bradley, Model 525 or 755 is typical.

2.07 Flow Meter for Sewage Pump Control

- A. A flow meter of the size required for the pipe in which it is installed shall be provided to control the speed (rpm) of the sewage pump. The flow meter shall be a flanged tube type manufactured to the highest standard available for mag meters. The fabricated tube is stainless steel with steel flanges and is lined with UltraLioner, an NSF61 approved, fusion bonded epoxy. The signal converter is a remote mount type, reporting input and output signals. The converter allows the measurements, functional programming, control of the sensor and data recoding to be communicated through the display and inputs/outputs. The microprocessor-based signal converter has a curve-fitting algorithm to improve accuracy, dual 4-20mA analog outputs, and optional RS485 communication port, an 8 line graphical backlit LCD display with 6 key touch programming, and a rugged enclosure that meets IP67.
- B. McCrometer, Model UM06-06-W-S-R-100-A-1. 100 ft. of strain relief style cable will be provided for use between the meter and converter. 2 year warranty Flow meter is to be purchased through a local NC provider by the Vacuum System supplier and provided with their package of equipment.

2.08 Level Controls

- A. Provide a continuous level measurement device to monitor collection tank levels. RF Admittance/Capacitance, 13-40VDC, 2 wire loop powered, 4-20mA, Hart Output/Digital Protocol. 100 ft. of cable is to be provided. The contractor shall route this cable to the Pump Control panel and away from high voltage cable. This cable shall not be cut or spliced. Any remaining cable shall be coiled up. Capacitance probe shall be Drexelbrook.
- B. Use existing electrode housing and control rods as a back up for the "High-High level lockout condition and Ground probe.
- C. Provide (1) control relay: "ground", and "sewage high-high level alarm" condition. They shall be conductance type, direct acting level control. Provide solid state plug-in relay inside the Pump Control Panel (PCP) enclosure. A set of single pole double throw contacts two normally open and two normally closed shall be included (2 form C). Sensitivity to be at 10K ohm. These relays shall be intrinsically safe. Conductance probe shall be Model 27A1EO, Warrick or equivalent.

2.09 Pressure Transducer

- A. Vacuum Level Transmitter – Supplied by the System Manufacturer and installed by the contractor on the collection tank in the field for vacuum pump operation and alarms. This device will also be used for Future SCADA purposes. Contractor shall be required to provide conduit and wire from the Collection Tank to the Control Panel as indicated on plans. The analog signal to the System Manufacturer's processor is as in 'A' above. SMC brand transmitter is typical.

2.10 Vacuum Chart Recorder

- A. Supply 1 hr., 4 hr., 12 hr. and 24 hr. trending screens on the operator interface screen.
- B. Historically collect data for Vacuum, Force Main Pressure and Sewage Tank level.

2.11 Pilot Devices

Selector switches shall be heavy duty, oil tight/watertight, 30mm units. Switches shall have double-break silver contacts. Devices shall be installed using gaskets to maintain their NEMA 4 rating.

Push buttons shall be heavy duty, oil tight/watertight, 30mm units. Contacts should be double break silver.

Pilot lights and illuminated selector switches should be 30mm, heavy duty, transformer type. Where contacts are used they should be of double break silver type style.

2.12 Relays

Relays shall be heavy duty, general purpose type with 10 amp contacts. Relays shall have blade type terminals which plug-in to a socket.

2.13 Elapsed Time Meters

Provide an hour meter for each pump and accumulating time that all pumps run together for each of sewage and vacuum. The hour meter shall be 6 digit, 2" in diameter, sealed, conforming to MIL-M-3971, and operating at 120VAC.

2.14 Alarm Horn

An alarm horn mounted in a standard 1 7/32 knockout shall be provided. Pitch at 2900HZ and 80-95dB at a fast pulse is required.

2.15 Terminal Blocks

Terminal blocks shall be provided in the control panel for field wiring connections. All terminal blocks should be labeled in accordance with the prints, bearing the wire number connected. IEC style, 600V terminals are required.

2.16 Wiring

All wiring shall be copper. Control wire shall be 16 gauge, 600 volt, type MTW, with the exception of low level DC wires. Power wiring shall be 600 volt, type MTW, THHN, or suitable grade.

All wire on the skids which extends outside the enclosure shall be protected by rigid galvanized conduit.

2.17 Operator Interface

An operator interface shall be provided that gives the operator controlling and monitoring options. A 6-inch display screen shall be included. Graphics are to be displayed in a 18 bit color or 32 level grayscale format. Operator input is to be available through touch screen, keypad or a touch screen/keypad combination. Included shall be a RS232 and USB port and an Ethernet port.

Operator Interface shall be accessible through the panel face without opening the control enclosure door. Allen-Bradley PanelView Plus 7 or equal.

2.18 Alarm System

Alarms shall be by a SCADA system provided by a local supplier. The vacuum system manufacturer shall not supply the SCADA system but shall provide 'dry' (non-powered) contacts for the connection of the SCADA system to extract such information and/or send such alarms as required. An Advantech Ethernet switch is included in the manufacturer's Control Panel for use by the SCADA provider if so desired. No telephone alarm system shall be required but shall be through the SCADA system. Alarms shall be standard as shown .

2.19 Uninterruptible Power System

None required.

2.20 Supplementary Protectors

- A. Provide supplementary protectors for individual circuit protection. Transformer (secondary sides) 24V power supply, input and output modules, ventilation fan, isolation valve, power switch, field potential distributor, enclosure light and other control loads.

- B. Protectors shall be UL/CSA recognized.
- C. Protectors shall be Allen Bradley 1492 series or equal.

2.21 Transformer

- A. Provide a transformer to take the line power and provide control power. Step it down from 480V to 120V. Sized to carry the load as needed.
- B. Non-ventilated automation transformer type, single phase, encapsulated. Group 1, 240 x 480 Primary, 120/240 Secondary, 60hz.
- C. Rated for hazardous locations, UL listed/NEMA type 3R enclosure.
- D. Provide touch proof cover for terminals.
- E. Complies with latest addition of the National Electrical Code
- F. Sola or equal.

2.22 24V Power Supply Module

- A. Provide a 120VAC input – 24VDC output power supply module for the PLC and the vacuum transmitter. Level transmitter, Force Main Pressure, HMI shall have a separate 24VDC power supply.
 - 1. The module shall have auto select input voltage, 24V DC, and have an adjustable voltage feature. The module shall have an indefinite short circuit, overvoltage and overtemperature protection and operate @ -10 C to 60 C without derating. The module shall withstand high inrush loads without shutdown or foldback. The module shall be narrow in width and enclosed with a rugged metal case. The mounting terminations shall be large, rugged, accessible and have multiple connections. The module shall be DIN rail mountable type.
- B. Power supply module shall be by Allen Bradley 1606XLP60EQ, or equal.

2.23 Remote Access Router

- A. Provide wireless access to PLC. The device shall include an integrated WiFi, firewall friendly outbound connection, Ethernet configurable, field interface with USB – female connector, VPN Security. EWON or equivalent.

2.24 Ethernet Switch

- A. Provide an Unmanaged Industrial Ethernet Switch to allow communication to SCADA equipment.
- B. The switch shall have an IP30 rated housing. The switch shall have (8) 10/100Base-TX, RJ-45 ports. It shall meet IEEE 802.3, 802.3u, 802.3x, Din Rail mounted, 12V – 48 VDC power input.
- C. Ethernet switch shall be: ADVANTECH, EKI-2528 or equal.

2.25 Surge Suppression – Incoming Power

- A. Surge suppression shall be provided on main power (480 v) and control power (120 v). Control power surge suppression shall include compliance with UL 1449 Fourth Edition Listed. SCCR rating—200kA.
- B. Control Power – ASCO Power Technologies 400 series, Model 420 SPDee Series or equal.
- C. Main power surge suppression shall include protection against lightning or power surges in the main power supply, typically 460-volt, 3 phase.
- D. Main Power – AB4983-DS, or equal.

2.26 Surge Suppression – Control Power

- A. Provide surge protection on for the control power after the step down transformer.
 - 1. 50kA 8x20us Per Mode, I nominal 20kA, Large-Block, 34mm square, 50kA MOVs, Individually fused & thermally Protected MOVs, Repetitive Impulse: 5000 – 3kA-8x20us; 10kA-8x20us, Response time less than 1 nanosecond, solid state Bi-directional Operation, Pre-wired 3 ft. of #10 AWG conductor, Typical Type 2 Connection: #10AWG to 30A breaker.
 - 2. Surge suppression device shall be UL 1449 3rd Edition listed.
 - 3. Surge Suppression shall be: ASCO, 400 Series Model 420 (SPDee Series)

2.27 Phase Fail

- A. Phase Loss, Under Voltage shall be monitored. Operating voltage shall be 430-480 Adj. with automatic reset.
- B. Diversified Electronics SLA series, Model SLA-440-ASA, or equal.

2.28 Factory Testing

- A. The assembled control panel will be operated as much as feasibly possible prior to shipment to the job site. Vacuum pumps controls will be preset and tested.
- B. All alarm functions will be normally open to close on alarm condition and will be pre-tested.

2.29 Spare Parts

- A. The following is a listing of recommended spares which shall be considered minimum. Any spare part supplied in addition shall be listed with submittals and O & M Manuals:
 - 1. One - Illuminated 3 position selector switch.
 - 2. One - Compact Logix Ethernet Processor.
 - 3. One - Supplementary breaker of each size.

2.30 Control Configuration

Functional Description of Control Switches

A. Control Power:

- 1. DSC0 - DISCONNECT - Provides 480V distribution power.
- 2. DSC1-5 - CONTROL KNOB - Provides 480V lockable disconnect for motor contactors.
- 3. SS1 - CONTROL POWER - Provides 120V control power to the level controls, chart recorder and PLC I/O.
- 4. PL-SS1 - POWER ON - Indicates that control power has been applied to the level controls, chart recorder and PLC I/O.

B. Vacuum Pump Controls

- 1. SS2 - VACUUM PUMP SELECT - determines the mode of operation for all vacuum pumps.
 - a. ALTERNATE - Vacuum Pump #1 and Vacuum Pump #2, and will alternate as being the Duty Pump whenever the system requires more vacuum.
 - b. 1 - Vacuum Pump #1 will be the Lead Pump each time the system calls for more vacuum. Vacuum Pump #2 will be the Standby Pump.

- c. 2 - Vacuum Pump #2 will be the Lead Pump each time the system calls for more vacuum. Vacuum Pump #1 will be the Standby Pump.
- 2. ETM1 - indicates the total elapsed time that Vacuum Pump #1 has been on.
- 3. ETM2 - indicates the total elapsed time that Vacuum Pump #2 has been on.
- 4. ETM3 - indicates the total elapsed time that Vacuum Pump #1 and #2 have been on simultaneously.

C. Sewage Pump Controls:

- 1. SS6 - SEWAGE PUMP SELECT - Determines the mode of operation for both Sewage pumps.
 - a. Duty "1" - Sewage pump #1 will be the Duty Pump each time the system requests to be pumped. Sewage Pump #2 will be the Standby Pump.
 - b. Duty "Alt" - Sewage Pump #1 and Sewage Pump #2 will alternate as being the Duty Pump whenever the system requests to be pumped.
 - c. Duty "2" - Sewage pump #2 will be the Duty Pump whenever the system requests to be pumped. Sewage Pump #1 will be the Standby Pump.
- 2. SS7 - SEWAGE PUMP #1 - determines the operation of Sewage Pump #1.
 - a. H-HAND - Power is applied directly to Sewage Pump #1.
 - b. O-Off - Power is removed from Sewage Pump #1.
 - c. A-Automatic - Sewage Pump #1 is controlled by the circuitry as selected by the Sewage Pump Select Switch, SS6.
- 3. PL-SS7 - Indicates that power has been applied to Sewage Pump #1.
- 4. SS8 - SEWAGE PUMP #2 - Determines the operation of Sewage Pump #2.
 - a. H-Hand - Power is applied directly to Sewage Pump #2.
 - b. O-Off - Power is removed from Sewage Pump #2.

- c. A-Automatic - Sewage Pump #2 is controlled by the circuitry as selected by the Sewage Pump Select Switch, SS6.
5. PL-SS8 - Indicates that power has been applied to Sewage Pump #2.
6. ETM5 - Indicates the total elapsed time that Sewage Pump #1 has been on.
7. ETM6 - Indicates the total elapsed time that Sewage Pump #2 has been on.
8. ETM7 - Indicates the total elapsed time that Sewage Pump #1 and #2 have been on simultaneously.

D. Alarms

1. PL1 - LOW VACUUM ALARM - Indicates that system vacuum has dropped below 13 inches of mercury.
2. PL2 - SEWAGE HIGH LEVEL ALARM - Indicates that the Sewage in the Main Holding Tank has reached a high level condition.
3. PL3 - SEWAGE HIGH LEVEL LOCKOUT ALARM - Indicates that the Sewage in the Main Holding Tank has reached a maximum high level condition, risking ingestion into the vacuum pumps.
4. ALARM HORN - Indicates that a Low Vacuum Alarm, a Sewage High Level Alarm, a Sewage High Level Lockout Alarm or Loss of Air Supply Alarm is present.
5. PB1 - ALARM ACKNOWLEDGE - Silences the Alarm Horn when a Low Vacuum Alarm, a Sewage High Level Alarm, or a Sewage High Level Lockout Alarm is present.
6. PB2 - ALARM TEST - Turns on all Alarm Lights and activates the Alarm Horn to assure proper working condition.
7. SS9 - HORN SILENCE ON/OFF - Enables/disables the Alarm Horn.
8. SS10 - ISOLATION VALVE MODE AUTO/CLOSE - Automatically closes the isolation valve during High Level Lockout Alarm. Allows manual close.
9. PL4 - LOW PRESSURE ALARM - Indicates that the Air Pressure in the air compressor has fallen below an acceptable level.

2.31 System Operation

A. Turning the System On

NOTE: Start with all pump mode switches, SS3-8, in the "Off" position.

1. Place main disconnect, DSC0, in the on position.
2. Place the Control Knob of load switches DISC1-5, in the "On" position.
3. Place the Control Power On Switch, SS1, to the "On" position. Note the presence of Control Power On Light, PL-SS1.

B. Turning the Vacuum Pump Controls On

1. Place the Vacuum Pump Select Switch, SS2, into the desired mode of operation.
2. Place the Vacuum Pump #1 Switch, SS3, into the desired position.
3. Place the Vacuum Pump #2 Switch, SS4, into the desired position.

C. Turning the Sewage Pump Controls On

1. Place the Sewage Pump Select Switch, SS6, into the desired mode of operation.
2. Place the Sewage Pump #1 Switch, SS7, into the desired position.
3. Place the Sewage Pump #2 Switch, SS8, into the desired position.

D. Enabling the Alarm Horn

1. Place the Alarm Horn Switch, SS9, into the desired mode of operation.

E. Acknowledging Alarms

1. **LOW VACUUM ALARM** - The presence of low vacuum will be indicated by the Low Vacuum Alarm Pilot Light, PL1, and the Alarm Horn. The Alarm Horn can be silenced by pushing the Alarm Acknowledge Push-button, PB1. When the alarm is acknowledged, the Alarm Horn will go off, but the Low Vacuum Alarm Pilot Light, PL1, will remain on until the low vacuum condition is corrected.

2. SEWAGE HIGH LEVEL ALARM - The presence of a Sewage high level will be indicated by the Sewage High Level Alarm Light, PL2, and the Alarm Horn. The Alarm Horn can be silenced by pushing the Alarm Acknowledge Push-button, PB1. When the alarm is acknowledged, the Alarm Horn will go off, but the Sewage High Level Alarm Pilot Light, PL2, will remain on until the high Sewage level condition is corrected.
3. SEWAGE HIGH LEVEL LOCKOUT ALARM - The presence of a Sewage high level lockout will be indicated by the Sewage High Level Lockout Alarm Light, PL3, and the Alarm Horn. The Alarm Horn can be silenced by pushing the Alarm Acknowledge Push-button, PB1. When the alarm is acknowledged, the Alarm Horn will go off, but the Sewage High Level Lockout Alarm Pilot Light, PL3, will remain on until the high Sewage level lockout condition is corrected.

F. Testing Alarms

1. Push the Alarm Test Push-button, PB2. All alarm pilot lights will come on and the Alarm Horn will sound.

2.32 Theory of Operation

A. Control Power:

The Disconnect Switch, DSC0, applies 4800V power to the Vacuum Pump and Sewage Pump Disconnects, DSC1 through DSC5, and to the Control Transformer, TRN1. TRN1 steps down the 480V to 120V for control power. The secondary side of the transformer is fused by FU6.

When SS1 is switched on, the Level Controls, the Pressure Switches, the Vacuum Chart Recorder, and the PLC I/O are powered. Each of the I/O modules is protected by a fused source. Presence of control power to the I/O is indicated by the Power On Pilot Light, PL-SS1.

B. Vacuum Pump Controls - Automatic Operation:

In automatic operation, the vacuum pumps are controlled by Vacuum Switch, VS1, and the mode of operation as selected by the Vacuum Pump Select Switch, SS2. VS1 closes at 16 inches of mercury and opens at 20 inches of mercury. When VS1 closes, an input bit to the PLC is activated and enables the logic for Vacuum Pump #1 and Vacuum Pump #2.

With the Vacuum Pump Select Switch, SS2, in the Duty "1" position, power is applied to Vacuum Pump #1. At the same time power is applied to Vacuum Pump Standby Delay On Timer, TMR2. At the end of approximately 2 minutes of delay, as determined by the preset on TMR2, Vacuum Pump #2 comes on. Both vacuum pumps will remain on until VS1 opens at 20 inches of mercury.

With the Vacuum Pump Select Switch, SS2, in the Duty "2" position, power is applied to Vacuum Pump #2. At the same time power is applied to Vacuum Pump Standby Delay On Timer, TMR2. At the end of approximately 2 minutes of delay, as determined by the preset on TMR2, Vacuum Pump #1 comes on. Both vacuum pumps will remain on until VS1 opens at 20 inches of mercury.

With the Vacuum Pump Select Switch, SS2, in the Alternate Position, power is applied to the Vacuum Pump Alternator logic. This software determines which Vacuum pump will be the Duty Pump and the Standby Pump. The end result is the switching of Duty Pump between Vacuum Pump #1 and #2

An auxiliary bit on VFD1 applies power to Vacuum Pump #1 On Pilot Light, PL-SS3, and to Elapsed Time Meter, ETM1. The same method of operation also applies to Vacuum Pump #2, PL-SS4, and Elapsed Time Meter, ETM2. When Vacuum Pump #1 and Vacuum Pump #2 and Vacuum are on simultaneously, VFD1 and 2 closed bits apply power to ETM3, which records the total elapsed time that all vacuum pumps are on together.

All vacuum pumps are disabled from operation, via detection of the presence of a Sewage High Level Lockout Alarm conditions at LC4. In addition, Delay Power On Timer, TMR1, assures that only one Vacuum Pump will operate while powering up.

C. Vacuum Pump - "Off":

In the "Off" position, operation of that associated vacuum pump is disabled.

D. Vacuum Pump - "Hand Operation":

In the "Hand" position, power is applied directly to the associated vacuum pump. However, the presence of a Sewage High Level Lockout Alarm will disable the vacuum pump operation.

E. Sewage Pump Controls - "Automatic" Operation:

In "Automatic" operation, the sewage pumps are controlled by Level Control Relays, LC1 and LC2 and the mode of operation as selected by the Sewage Pump Select Switch, SS6. When the level of sewage in the Main Holding Tank reaches the Duty Pump On Probe, Level Control Relay LC1 is energized.

When the Sewage Pump Select Switch, SS6, is in the Duty "1" position, power is applied directly to Sewage Pump #1 VFD1. Both VFD drives will be programmed to start the sewage pumps on a "ramp-up" curve to achieve a pre-set speed based on time or current limit. The speed of this pump will be controlled by the VFD based on a pre-set flow. A flow meter on the force main will be sampled as feedback. If Sewage Pump #1 cannot handle the incoming flow, the level of sewage will continue to rise until it reaches the Standby Pump On Level. Level Control LC2 will then energize, increasing the target flow rate and applying power directly to Sewage Pump #2 VFD2. It will start similar to #1 pump. The Duty Pump and, if required, the Standby Pump will remain on until the level of sewage in the Main Holding Tank drops below the Pump Off Set Point.

With the Sewage Pump Select Switch, SS6, in the Duty "2" position, Sewage Pump #2 becomes the Duty Pump and will be energized when the level of sewage reaches the Duty Pump On Set Point. Sewage Pump #1 will become the Standby Pump and will be energized if the sewage level in the Main Holding Tank continues to rise and reaches the Standby Pump Level. The Duty Pump and, if required, the Standby Pump will remain on until the sewage level in the Main Holding Tank drops below the Pump Off Set Point.

With Sewage Pump Select Switch, SS6, in the "Alternate" position, power is applied to the Sewage Pump Alternator logic. This software alternator determines which sewage pump will be the Duty Pump and the Standby Pump. The end result is the switching of Duty Pump duty between Sewage Pump #1 and Sewage Pump #2.

When power is applied to Sewage Pump #1 drive, VFD1, an auxiliary feedback applies power to the Sewage Pump #1 On Pilot, PL-SS7, and to Elapsed Time Meter, ETM5. The same method of operation applies to Sewage Pump #2 On Pilot Light, PL-SS8, and Elapsed Time Meter, ETM6. When Sewage Pump #1 and Sewage Pump #2 are on simultaneously, the VFD1 Run bit, and the auxiliary input from VFD2 apply power to ETM7, which records the total elapsed time that both sewage pumps are on together.

Both sewage pumps are disabled from operation, in the "Automatic" mode with the presence of a Sewage High Level Lockout Alarm. In addition, Delay Power On Timer, TMR1, assures that only one Sewage Pump will operate while powering up. In addition, the auxiliary generator input will allow only one sewage pump to operate while on standby power.

F. Sewage Pump - "Off":

In the "Off" position, operation of that associated Sewage pump is disabled.

G. Sewage Pump - "Hand Operation":

In the "Hand" position, power is applied directly to the associated Sewage pump. The presence of a Emergency Power Shutdown condition will disable the operation of the backup Sewage pump.

H. Alarms - Low Vacuum

The Low Vacuum Alarm bit, VS2, closes at 13 inches of mercury or the Low Vacuum Request Timer, TMR4, times out indicating a low vacuum condition. The activation of VS2 or TMR4 energizes the Low Vacuum Alarm bit and also applies power to the Low Vacuum Alarm Pilot Light, PL1.

The energizing of the Low Vacuum Alarm bit applies power to the Alarm Horn. When the Alarm Horn is acknowledged by pressing the Alarm Acknowledge Push-button, PB1, power is applied to the Low Vacuum Latch bit, which then latches in and holds the Alarm Horn off until the Low Vacuum Alarm condition is corrected.

I. Alarm - Sewage High Level:

When the Sewage level in the Main Holding Tank reaches High Level, internal bit LC3 is energized. Power is supplied to the Sewage High Level Alarm bit, and the Sewage High Level Alarm Pilot Light, PL2.

The energizing of the Sewage High Level Alarm bit applies power to the Alarm Horn. When the Alarm Horn is acknowledged by pressing the Alarm Acknowledge Push-button, PB1, power is applied to the Sewage High Level Latch bit, which then latches in and holds the Alarm Horn off until the Sewage High Level condition is corrected.

J. Alarms - Sewage High Level Lockout

When the Sewage level in the Main Holding Tank reaches the High Level Lockout Level, internal bit LC4 is energized and applies power to the High Level Lockout Delay On Timer, TMR5. High Level Lockout Alarm Pilot Light, PL3, is also powered. After "X" seconds of delay, as determined by the setting on TMR5, power is applied to the High Level Lockout Control bit. When it is energized, Vacuum Pumps #1 and #2 are disabled in both "Auto" and "Hand" operation and Sewage Pumps #1 and #2 are disabled in "Auto" operation only.

The energizing of the High Level Lockout Control bit applies power to the Alarm Horn. When the Alarm Horn is acknowledged by pressing the Alarm Acknowledge Push-button, PB1, power is applied to the Sewage High Level Lockout Latch bit, which then latches in and holds the Alarm Horn off until the Sewage High Level Lockout condition is corrected.

K. Alarms - Test:

When Alarm Test Push-button, PB2, is pressed, power is disabled to each Alarm Condition Control bit and applied to each associated Alarm Pilot Light. In addition, power is applied to the Alarm Horn.

END OF SECTION

DIVISION 15 - MECHANICAL

DETAILED SPECIFICATIONS

SECTION 1510 - PIPE: DUCTILE IRON

PART 1.00 - GENERAL

1.01 Description

This Section provides a description of the required ductile iron pipe to be furnished and installed on this project at locations as shown on the drawings, listed in the specifications or as directed by the Engineer.

PART 2.00 - PRODUCTS

2.01 General

Ductile iron pipe shall be manufactured in strict conformance with ANSI/AWWA C150/A 21.50 and ANSI/AWWA C151/A 21.51, and shall be Class 50, or greater.

Ductile iron pipe used in open trench construction shall be furnished with "push-on" joints according to ANSI/AWWA C 111/A 21.11, unless otherwise shown on the drawings or herein specified.

Ductile iron pipe used within encasements and in aerial lines, shall be furnished with "mechanical" joints according to ANSI/AWWA C151/A 21.51.

2.02 Linings

All ductile iron pipe and fittings shall be cement mortar lined in accordance with ANSI Standard A 21.4.

PART 3.00 - EXECUTION

3.01 Installation

Install as indicated on the drawings and per manufacturer's recommendations.

END OF SECTION

DIVISION 15 - MECHANICAL

DETAILED SPECIFICATIONS

SECTION 1514 - PIPE: PVC-SEWER (SDR 35)

PART 1.00 - GENERAL

1.01 Description

This Section provides a description of the allowable Polyvinyl Chloride (PVC) sewer - SDR 35 pipe for usage on this sanitary sewer work.

PART 2.00 - PRODUCTS

2.01 Polyvinyl Chloride (PVC)

Rigid PVC pipe as described in this specification is designed to carry untreated sanitary sewage by gravity.

The pipe shall meet the requirements of ASTM D 3034 Standard Specifications Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings with SDR 35.

A. Pipe Standards

<u>Size</u>	<u>O.D.</u>	<u>Min. Wall</u>
4"	4.215"	0.120"
6"	6.275"	0.180"
8"	8.400"	0.240"
10"	10.500"	0.300"
12"	12.500"	0.360"

B. Gaskets

Elastomeric ring gaskets shall conform to ASTM F 477.

The PVC pipe shall be manufactured from material meeting the requirements of Cell Class 12454-B, (with a minimum tensile modulus of 500,000 psi) as defined by ASTM D 1784.

The PVC pipe shall be furnished with integral bell and spigot joints.

PART 3.00 - EXECUTION

3.01 Installation

Shall be in accordance with Section 1503 and ASTM Standard C 2321, as directed by the Engineer and as herein required.

3.02 Stone Bedding

Stone bedding shall be placed beneath all PVC (SDR 35) gravity sewer of 8" diameter or larger. Bedding shall be a minimum of four (4") inches deep beneath the pipe, and shall be along the sides of the pipe at least up to the top of the pipe. Bedding width shall be at least the width of the pipe O.D. plus 24 inches. Stone bedding shall not be a separate pay item, but will be included in the unit price bid for Sanitary Sewer Pipe.

END OF SECTION

DIVISION 15 - MECHANICAL

DETAILED SPECIFICATIONS

SECTION 1520 - PIPE: PVC (SCHEDULE 40)

PART 1.00 - GENERAL

1.01 Description

This Section provides a description of the allowable Polyvinyl Chloride (PVC) - Schedule 40 pipe to be used in the media filter bed or as shown on the drawing or included elsewhere in these specifications.

PART 2.00 - PRODUCTS

2.01 Polyvinyl Chloride (PVC) Pipe - Schedule 40

PVC (Schedule 40) pipe and fittings shall conform to ASTM D-1785 (latest revision), including, but not limited to physical dimensions, tolerances, and markings. The pipe shall be clearly marked at intervals of 5 feet or less, to indicate (1) manufacturer's name, (2) nominal size, (3) the applicable ASTM, and (4) the pipe schedule.

As designated on the drawings, Schedule 40 fittings shall conform to ASTM D-2466.

PART 3.00 - EXECUTION

3.01 Installation

Shall be in accordance with manufacturer's recommendations and as shown on the drawings or as directed by the Engineer.

END OF SECTION

DIVISION 15 - MECHANICAL

DETAILED SPECIFICATIONS

SECTION 1521 - PIPE: PVC (SCHEDULE 80)

PART 1.00 - GENERAL

1.01 Description

The rigid PVC (Schedule 80) pressure pipe described in this specification is to be used for vacuum system piping or as shown on the drawing or included elsewhere in these specifications.

PART 2.00 - PRODUCTS

2.01 Polyvinyl Chloride (Schedule 80) Pipe

This pipe shall be PVC Schedule 80 and shall conform completely to ASTM D-1785 (latest revision), including, but not limited to physical dimensions, tolerances, and markings.

Rigid PVC (polyvinyl chloride) used in this extrusion of Schedule 80 pipe shall be of Type 1, Grade 1 compound as stated in ASTM D-1784. Raw materials used in extrusion shall contain the specified amounts of color pigment, stabilizers, and other additives approved by the National Sanitation Foundation. As designated on the drawings, Schedule 80 fittings shall conform to ASTM D-2467 for socket fittings and to ASTM D-2464 for threaded fittings.

PART 3.00 - EXECUTION

3.01 Installation

Shall be in accordance with manufacturer's recommendations and as shown on the drawings or as directed by the Engineer.

END OF SECTION

DIVISION 15 - MECHANICAL

DETAILED SPECIFICATIONS

SECTION 1530 - VALVES (GENERAL)

PART 1.00 - GENERAL

1.01 Description

The work covered in this Section includes the furnishing and installation of all valves shown on the drawings, required in these specifications, or as directed by the Engineer.

1.02 Quality Assurance

All materials and installations shall comply with pertinent Federal, State and local codes and regulations; with applicable AWWA standards; and with herein referenced standards.

Installations shall be performed only by persons completely trained and experienced in the installation of the required materials, and under the supervision of a person knowledgeable in this work, who is thoroughly familiar with the project design and the approved shop drawings.

1.03 Submittals

Submit shop drawings, in five copies for review and approval by the Engineer, for all valves and other miscellaneous items covered by these specifications.

PART 2.00 - PRODUCTS

Product requirements for valves needed on this project are included elsewhere in Division 15 of these specifications.

PART 3.00 - EXECUTION

3.01 General

All valves shall be installed in accordance with the manufacturer's recommendations, as directed by the Engineer and as herein specified.

Valves shall be installed at locations as shown on the drawings or as directed by the

Engineer.

Installed valves shall be properly aligned, plumbed, and braced when required.

Buried valves shall be properly bedded to prevent settlement. Valves in pits shall be properly supported.

3.02 Buried Valves

Valve boxes, as per Section 1552 of these specifications, shall be installed for each buried valve. Boxes shall be centered over valve operating nut and shall be adjusted to finished ground elevation, unless otherwise directed by the Engineer.

Valves and boxes shall be installed as shown on drawings and backfilled with acceptable material. Backfill shall be compacted as required by the pipeline installation requirements and as directed by the Engineer.

Valves buried greater than 48" in depth shall be equipped with a solid steel extension stem. Stem shall be extended to within 12" of final grade.

3.03 Non-buried Valves

Paint all exposed ferrous metals in accordance with Section 0910 "High Performance Coatings."

3.04 Testing

Valves shall be tested as an integral part of pipeline installation.

END OF SECTION

DIVISION 15 - MECHANICAL

DETAILED SPECIFICATIONS

SECTION 1533 - BUTTERFLY VALVES (RESILIENT SEATED)

PART 1.00 - GENERAL

1.01 Description

This Section provides a description of the required butterfly valves to be used and installed on the ground level vacuum line.

PART 2.00 - PRODUCTS

2.01 General

All butterfly valves shall be of the tight-closing, rubber seat type with rubber seats that are securely fastened to the valve disc or valve body. No metal-to-metal seating surfaces shall be permitted. Valves shall be bubble-tight at rated pressures with flow in either direction and shall be satisfactory for applications involving throttling service and/or frequent operation and for applications involving valve operation after long periods of inactivity. Valve discs shall rotate 90 from the full open position to the tight shut position.

All valves shall be as manufactured by Bray Controls, Series 31H for 3-inch valve and Series 31 for 8-inch valve.

2.02 Materials

- A. Valve Bodies shall be high-strength cast iron.
- B. Valve Discs shall be Nylon 11 coated ductile iron.
- C. Valve Shafts shall be turned, ground and polished. Valve shafts shall be constructed of Type 416 stainless steel.
- D. Valve Seats shall be EPDM rubber and must be replaceable.
- E. Valve Operators shall be standard 10 position notch plate lever operators.
- F. Finish - All exterior ferrous surfaces of the valve including exterior of the operator and accessories shall be of polyester.

PART 3.00 - EXECUTION

3.01 Installation

Shall be in accordance with Section 1530, the manufacturer's instructions, and as directed by the Engineer.

END OF SECTION

DIVISION 15 - MECHANICAL

DETAILED SPECIFICATIONS

SECTION 1534 - CHECK VALVES

PART 1.00 - GENERAL

1.01 Description

This Section provides a description of check valves to be used and installed at locations as shown on the drawings or as directed by the Engineer. All valves described in this Section may not necessarily be required for this particular project.

PART 2.00 - PRODUCTS

2.01 Iron Bodied, Swing Check Valves

Check valves shall be of the iron body, bronze mounted, full opening swing type.

Valves in sizes 2 in. through 12 in. shall be rated for 175 psi water working pressure and 350 psi hydrostatic test for structural soundness.

Valves in sizes 16 in. through 24 in. shall be rated for 150 psi water working pressure and 300 psi hydrostatic test for structural soundness.

Check valves shall be furnished with 125# ANSI flanged ends. Clappers shall be all bronze (B-62) for sizes through 4" and cast iron bronze faced (90-0-6-4) for 5" and larger.

All check valves shall be equipped with outside lever and weight.

Check valves to be as manufactured by American, Mueller, Kennedy, Clow, or equal.

2.02 Iron Bodied, Rubber Flapper Swing Check Valves

Check valves shall be of the iron body and cover, full opening swing type.

Valves in sizes 2 in. through 12 in. shall be rated for 175 psi water working pressure and 350 psi hydrostatic test for structural soundness.

Valves in sizes 16 in. through 24 in. shall be rated for 150 psi water working pressure and 300 psi hydrostatic test for structural soundness.

Check valves shall be furnished with 125# ANSI flanged ends.

The flapper shall be Buna-N (70 Duro) having an "O" ring seating edge and be internally reinforced with steel. Flapper shall be captured between the body and the body cover in a manner to permit the flapper to flex from closed to full open position during flow through the valve. Flapper shall be easily removed without need to remove the valve from the line.

Valve shall be suitable for buried service with stainless steel cover bolts.

Check valves to be APCO Series 100 Rubber Flapper Swing Check Valve as manufactured by Valve & Primer Corporation or equal.

PART 3.00 - EXECUTION

3.01 Installation

Shall be in accordance with Section 1530 of these specifications.

END OF SECTION

DIVISION 15 - MECHANICAL

DETAILED SPECIFICATIONS

SECTION 1535 - PLUG VALVES

PART 1.00 - GENERAL

1.01 Description

This Section provides a description of plug valves to be furnished and installed on this project at locations as shown on the drawings or as directed by the Engineer.

PART 2.00 - PRODUCTS

2.01 Description

All plug valves shall be of the tight closing, resilient faced plug type and shall be of eccentric seating construction such that the opening movement of the closing member (plug) results in the closing member rising off the body seat contact. Port areas shall be equal to 100% of the nominal size pipe area.

Pressure ratings shall be 175 psi (1210 kPa) on valve sizes through 12" (300mm) and 150 psi (1035 kPa) for 14" (350mm) and larger and shall be satisfactory for applications involving throttling service and/or frequent operation and for applications involving open/close valve operation. Every valve shall be given a certified hydrostatic shell test and seat test, with test reports being available upon request.

All Eccentric Seating Plug Valves shall be as supplied by Henry Pratt, DeZurik, or equal.

A. Valve Bodies

Bodies and covers shall be Cast Iron ASTM A126 Class B or ASTM A536 Grade 65-45-12. Ports shall be rectangular and 100% Port. The valve port area shall meet or exceed standard pipe area per ASME/ANSI B36.10M. Round ports are not acceptable.

B. Valve Plug

Plugs shall be solid one-piece, constructed of Cast Iron ASTM A126 Class B or Ductile Iron ASTM A536 Grade 65-45-12. The plug shall have a cylindrical seating surface eccentrically offset from the center of the shaft. Plug shall not contact the seat until at least 90% closed. Spherical shaped plugs are not acceptable.

The plug shaft shall be integral. The plug shall have a synthetic rubber bonded to all surfaces except shaft and thrust bearing surfaces. The rubber compound shall be approximately 70 durometer hardness.

The bond must withstand 75 lbs. pull under test procedure ASTM D-429, Method B, to conform to the eccentric seating surface of the body.

C. Valve Body Seats

Seats shall be 1/8" thick welded overlay of not less than 95% pure nickel. Seat shall be at least 1/2" wide, 1/8" thick through entire width and raised. The raised surface shall be completely covered with nickel to ensure that the resilient plug face contacts only the nickel seat. Coated non-metallic materials shall not be acceptable.

D. Trunnion Bearings

Bearings shall be sleeve type and made of sintered, oil impregnated permanently lubricated type 316 stainless steel for sizes 4-18" (100-450mm) and ASTM A743 Grade CF8M for sizes 20-36" (500-900mm). In valves larger than 36" (900mm), the upper and lower plug journals shall be fitted with ASTM A240 type 316 stainless sleeves with body bearings of ASTM B30, Alloy C95400 aluminum bronze.

E. Packing

Adjustable packing shall be Acrylonitrile-Butadiene (NBR) multiple V-ring type, with a packing gland follower. Packing gland shall permit inspection, adjustment or complete replacement of packing without disturbing any part of the valve or actuator assembly, except the gland follower. Non-adjustable packing or packing requiring actuator removal to replace the packing, is not acceptable.

F. Thrust Bearings

Shall be provided at the top and bottom faced surfaces of the plug. Thrust bearings shall be corrosion resistant and constructed of phenolic-backed or fiberglass-backed woven teflon fiber.

G. End Connections

End connections shall meet or exceed the latest revisions of AWWA C517 and other applicable standards. End Connections shall be Flanged drilled per ASME B16.1 and/or Mechanical Joint per AWWA C111.

H. Operators

All valves larger than 6" shall be installed with worm gear actuators. All gearing shall be enclosed in a cast iron housing, with outboard seals to protect the bearings and other internal components. The actuator shaft and gear quadrant shall be supported on permanently lubricated bronze bearings.

Buried actuators shall be 90% grease filled. Input shaft and fasteners shall be stainless steel. Actuator mounting brackets shall be totally enclosed.

1. Buried Valves

- a. All buried plug valves shall be provided with a 2" square nut for operation with a standard valve wrench.

2. Non-Buried Valves

- a. All non-buried plug valves shall have handwheel operators unless noted otherwise.
- b. Plug valves mounted above 6 feet from the operating floor shall be equipped with chainwheel operators.

PART 3.00 - EXECUTION

3.01 Installation

Shall be in accordance with Section 1530 of these specifications.

END OF SECTION

**SECTION 15500 –
MECHANICAL GENERAL REQUIREMENTS**

PART 1-GENERAL

1.01 GENERAL CONDITIONS:

The stipulations and conditions stated in this section, together with all provisions of the "Instructions to Bidders", "General Conditions", "Supplemental General Conditions", and "Special Conditions", hereinbefore set forth, shall apply to all mechanical contract executed for construction, of this project, or any part thereof.

The Mechanical work shall be part of the General Construction Contract.

1.02 GENERAL REQUIREMENTS:

The General Requirements hereinafter listed apply to the Mechanical Work Division. If there is any conflict between the General Requirements and the General Conditions, the General Conditions shall take precedence.

1.03 ALTERNATES:

Carefully examine all alternates at the back of this specification to determine if any work described under the Mechanical Section will be affected thereby.

1.04 INTENT:

The intent of Mechanical drawings and specifications are to describe the installation of a complete, fully adjusted, and operational Mechanical System. Therefore, any items shown on drawings and not specifically called for in the specifications, or any items specified and not specifically indicated or detailed on the drawings, or any items neither specified or shown, but which are reasonably incidental to and commonly required to make a complete job, will be furnished and installed by the Mechanical Contractor at his own expense.

1.05 DEFINITIONS:

The contractor shall provide all supervision, labor, material equipment, machinery, plant, and any and all other items necessary to complete the mechanical systems. All items of equipment are specified in the singular; however, the contractor shall provide the number of items of equipment as indicated on the drawings, and as required for complete systems.

Where the word "provide" is used, it shall mean "furnish and install complete and ready to use."

1.06 REQUIRED WORK DESCRIBED IN OTHER SECTIONS:

Mechanical, General Requirements	15500
Mechanical Supports & Anchors	15501
Mechanical Identification	15502
Ductless Split System Heat Pump	15552
Unitary Air Cooled Condenser	15775
Power Ventilators	15870

1.07 VISIT TO THE SITE

The Mechanical Contractor shall visit the site before submitting his bid so as to be thoroughly familiar with the job conditions and/or peculiarities. No extra payment will be allowed for anything which could have been anticipated from a visit to the site.

1.08 REGULATORY REQUIREMENTS

All work under this section shall be accomplished in strict accordance with State codes. Where these plans and specifications conflict with such codes, the codes shall govern. Mechanical Contractor shall notify the architect or engineer of such conflicts in writing prior to receipt of bids.

1.09 PERMITS AND FEES:

The Mechanical Contractor shall make all necessary arrangements, obtain all necessary approval, obtain all permits and pay fees required for the installation of any of the work covered under the Mechanical Work Division of the specifications. Any fees required by any utility companies or municipal authorities for the final connections for these services shall be paid by the contractor under whose work such services appear. Before the job is certified as substantially complete, a certificate of approval from all authorities involved must be obtained and turned over to the Architect/Engineer.

1.10 DRAWINGS AND SPECIFICATIONS:

The Mechanical Drawings and Specifications are intended to cover all the work enumerated under the respective headings. The drawings are diagrammatic only. No contractor shall take advantage of conflict or error between drawings and specifications, or between general drawings and mechanical, plumbing and/or electrical drawings, but shall request a

clarification of such from the Architect/Engineer, should this condition exist. If there is insufficient time to issue an addendum for this clarification, the contractor shall figure on the most expensive of the items in conflict.

The Mechanical Contractor shall refer to the architectural and structural drawings and specifications for the general construction of the building, for floors and ceiling heights, for locations of walls, partitions, beams, etc., and shall be guided accordingly for setting of all sleeves, inserts and equipment. No contractor shall under any circumstances scale drawings for the location of equipment. Each contractor shall verify the locations of all utility services.

The Mechanical Contractor shall keep at least one set of corrected shop and design drawings at the site. Drawings are to be current, denoting approved modifications and actual installed departure. Submit drawings to Architect/Engineer before final payment is made.

1.11 SUPERVISION:

The Mechanical Contractor performing the work specified shall be required to employ a qualified superintendent or foreman to continuously supervise the installation of their work, with authorization to act as agent for his respective contractors. He shall be capable of checking layouts, coordinating and supervising the work, establishing grades and levels, and locating chases, openings, hangers, inserts, sleeves, etc.

PART 2 PRODUCTS

2.01 STANDARD PRODUCTS:

Unless otherwise indicated in writing by the Architect/Engineer, the materials to be provided under this specification shall be standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design. All items of the same type or rating shall be identical.

2.02 SUBMITTALS:

The Mechanical Contractor shall submit for approval, detailed shop drawings on all major equipment and where requested. No materials or equipment may be delivered to the job site or installed until the contractor has in his possession the approved shop drawing for the particular material or equipment. The contractor shall furnish the number of copies required by the General or Special Conditions of the contract, but no case less than six (6) copies.

Submitted material shall be properly labeled indicating specific service for which material or equipment to be used, section and article number of specifications governing, Contractor's name, and name of job.

Approval of equipment will not relieve the Contractor of compliance with the specifications even if such approval is made in writing, unless the attention of the Engineer is called to the non-complying features by letter accompanying the submittal data. Approval of submittal data by the Engineer shall not be construed as a complete check of approval of detailed dimensions, weights, gauges, and similar details with the proposed articles. The conformance with the necessary coordination between the various other contractors and suppliers shall be solely the responsibility of the Contractor and with no additional expense to the owner.

Required Shop Drawings are as follows:

1. Condensor
2. Mini splits
3. Power ventilators

2.03 SUBSTITUTIONS:

Manufacturer's lists are to establish a standard of quality and not intended to limit the selection to these manufacturers. All materials and equipment which are essential and have not been specified or shown shall be new and of the highest grade and quality. Free from defect or other imperfections. It should be understood that where the words "furnished and installed" are used, it is intended that the Contractor shall purchase and install all materials required.

All materials and equipment proposed as substitutes for these specified shall require a ten (10) day prior approval from the Engineer prior to the bid date. No substitutions will be allowed after the ten (10) day period before the bid date.

2.04 PRODUCT HANDLING:

Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and, protected in accordance with the manufacturer's recommendations and as approved by the Architect/Engineer. Equipment installed with a factory finish shall be fully protected during construction and shall be maintained free of dust, dirt, and foreign matter. Dents and other surface damage shall be repaired or replaced to the satisfaction of the Architect/Engineer at no additional cost to the owner.

Each contractor shall clean up and remove from the job site all waste materials, packaging, crating, and refuse resulting from his work on a daily basis.

2.05 MATERIALS AND WORKMANSHIP:

The Mechanical Contractor shall perform a first class job, both in material and workmanship. None other will be accepted. Deviations from either will be corrected by the Contractor at Mechanical Contractor's expense.

The Material used throughout the work, except when otherwise noted, shall be new and of the best of its kind. No substitutes shall be used unless approved by the Architect/Engineer. All work shall be executed with a maximum speed consistent with safety and good workmanship.

Any mechanical equipment furnished by the Mechanical Contractor that is larger than those indicated on the drawings and described in these specifications or have different electrical characteristics, the increase in cost to the Electrical Contractor for larger wires, conduit, circuit breakers, switches, etc. or for changes in work already installed shall be borne by the Mechanical Contractor.

PART 3 EXECUTION

3.01 SCAFFOLDING, RIGGING, AND HOISTING:

The Mechanical contractor shall furnish all necessary scaffolding, staging, rigging and hoisting required for the completion of his work. All such scaffolding, etc., shall be removed from the premises when its use is no longer required on the job.

3.02 QUIET OPERATION AND VIBRATION:

All work shall operate under all conditions of load without any sound or vibration, which is objectionable in the opinion of the Engineer. Sound and vibration conditions considered objectionable shall be corrected at mechanical contractors expense.

3.03 CUTTING AND PATCHING:

The Mechanical Contractor shall provide all cutting and patching necessary to install the work specified in this section. The patching shall match adjacent surfaces.

No structural member shall be cut without the approval of the engineer, and all such cutting shall be done in a manner directed by him.

3.04 EQUIPMENT SPACE AND ARRANGEMENT:

The Mechanical Equipment shall fit into the space allotted and shall allow adequate clearance for entry, installation, replacement, servicing, and maintenance. The Contractor shall coordinate the work to ensure that equipment may be moved into place without altering building components or other installations. Access space shall not be less than the equipment manufacturer's requirements.

The Mechanical Drawings indicate the extent and general arrangement of equipment, piping, and ductwork. If any departures are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as practicable and within 30 days after award of the contract. No departure shall be made without written approval of the Architect/Engineer.

3.05 DAMAGE TO WORK ALREADY IN PLACE:

The Mechanical Contractor shall assume full responsibility for any damage done by him, his agents or employees, to any work already in place. Any such damage done shall be repaired at the contractor's expense by mechanics skilled at their respective trades, to the approval of the Architect/Engineer.

3.06 JURISDICTION OF WORK:

It may become necessary for the Mechanical Contractor to furnish labor or materials, which is not generally accepted as part of this trade. In cases of this type, he shall contract the work, or shall furnish materials and employ workmen of the trade involved in order not to cause any delay or stoppage of work caused by infringement of trade agreements as to jurisdiction, alleged or actual.

3.07 COORDINATION WITH OTHER TRADES:

Mechanical work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance to coordinate architectural, structural, mechanical, plumbing and electrical features of construction. The Contractor shall verify at the site all locations, grades, elevations, and utility service connections indicated. Any conflicts due to lack of proper coordination shall be brought to the attention of the Architect/Engineer for resolution. The Contractor shall make required changes or relocations at no additional cost to the owner.

Installation, inspection, and testing of Mechanical work above ceilings shall be completed and approved by the Architect/Engineer prior to installation of the specified finished ceilings. However, ceiling suspension system may be installed as required for coordination with Mechanical work.

The Mechanical Contractor shall consult with the other trades at the start of the work and periodically thereafter, as required to properly coordinate the various items of work, and to avoid interferences. Should any interferences of any nature develop as the work progresses, such interferences shall be resolved and eliminated as directed. The cost of any work directed shall be borne by the subcontractor or contractors directed to do this work.

3.08 DIVISION OF WORK:

This paragraph is intended to show exactly the point of division of work between the Electrical Work Division and the Mechanical Work Division.

All power requiring equipment covered in the Mechanical Division of the specifications shall be furnished, mounted, aligned and fused by the Mechanical Contractor. All disconnect switches for this equipment shall be furnished by the Mechanical Contractor.

The Electrical Contractor shall provide the conduit, wire and final connections to the line side of the disconnect.

Throughout this paragraph the term wire, conduit and final connections shall include all pull boxes, junction boxes, splices, outlet boxes, mounting devices and other accessories required for a complete installation.

Electrical Equipment and wiring that is provided by the Mechanical Contractor shall be in accordance with the Electrical Specifications.

Under Division 16, power wiring shall be provided to a termination point consisting of a junction box, trough, starter, or disconnect switch. Under Division 16, line side terminations shall be provided. Wiring from the termination point to the mechanical equipment, including final connections, shall be provided under Division 15.

3.09 EQUIPMENT INSTALLATION:

Final connections to equipment, including pipe, duct, and temperature controls, shall be provided under applicable sections of this Division, unless otherwise specified or indicated.

Manufacturer's Instructions: Equipment shall be installed as recommended by the manufacturer to conform to the requirements of the particular application, in accordance with these drawings and specifications.

3.10 OPERATION AND MAINTENANCE MANUALS:

- A. One complete manual as outlined herein shall be submitted for approval before conducting instruction sessions in operation, before systems or equipment tests are performed, and before final or beneficial occupancy.
- B. Manuals shall have rigid covers and index tabs for each major piece of equipment, auxiliaries, and systems. The following shall be inscribed on the cover: the words "OPERATION AND MAINTENANCE MANUAL," the name and location of the building, the name of the section, such as "Plumbing," or "Heating," and the name of the Contractor. Two copies of each approved manual shall be submitted to the Owner and one copy shall be submitted to the Architect-Engineer.
- C. Each piece of equipment shall be listed and identified with the same name, mark, number, or other identification as noted or scheduled in the contract documents.
- D. Manuals shall include the following:
 - a. Complete operating installations, covering start-up and shutdown for all components installed.
 - b. Legible copies of all shop drawings. Any comments incorporated in "as-noted" approvals of shop drawings shall be recorded on the drawings included in the manuals.
 - c. All equipment maintenance and service manuals.
 - d. A complete parts list for each piece of equipment.
 - e. All descriptive literature for the equipment.
 - f. Operating characteristics, performance data, ratings, and curves for each piece of equipment such as condensers, fans, and air handling units.
 - g. Final testing and balancing reports.
 - h. All other information pertinent to the maintenance and servicing of equipment and systems provided in the project.

- k. Name, address, and telephone number for service on each manufacturer's equipment.

3.11 OPERATING INSTRUCTIONS:

- A. After all equipment and services are in operation, and the operation and maintenance manuals are available, an instruction and training session shall be conducted for the owner's operating personnel.
- B. Instruction sessions shall be conducted during the owner's normal working periods, and at times and locations satisfactory to-the Owner.

3.12 EQUIPMENT START-UP:

No equipment shall be placed in operation until it has been inspected by a qualified representative of the manufacturer and certified to be ready for operation. The manufacturer's representative shall supervise the start-up operation and shall be responsible for all adjustments required to meet design conditions. Such services shall be at no additional cost to the Owner.

3.13 GUARANTEE:

The Mechanical Contractor shall present to the Owner a written guarantee covering his work, including all equipment, material and workmanship. This guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.

Any defective work, equipment, material and/or workmanship that develops within the guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Contractor without cost to the Owner.

3.14 FINAL INSPECTION:

When the entire contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make the inspection. At the time of inspection, the Mechanical Contractor shall demonstrate to the Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the contract.

3.15 FINAL PAYMENTS:

All final payments are contingent upon all necessary certificates and/or approvals cited above, together with the written guarantee being presented to the Owner.

*****END OF SECTION*****

**SECTION 15501 –
MECHANICAL SUPPORTS AND ANCHORS**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Pipe hangers, supports, and associated anchors.
- B. Sleeves and seals.

1.02 SUBMITTALS

- A. Submit shop drawings and product data under provisions 15500.
- B. Indicate hanger and support framing and attachment methods.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 o 1-1/2 Inch stainless steel, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 and over: stainless steel, adjustable, clevis.
- C. Shield for Insulated Piping: 18 gage stainless steel shield over insulation in 180 degree segments, minimum 16 inches long at pipe support.

2.02 HANGER RODS

- A. Stainless Steel Hanger Rods: Threaded both ends, or continuous threaded.

2.03 INSERTS

- A. Inserts: Malleable iron case of galvanized] steel shell and expander plug for threaded connection; size inserts to suit threaded hanger rods.

2.04 FABRICATION

- A. Design hangers without disengagement of supported pipe.

2.05 FINISH

- A. Prime and finish coat exposed steel hangers and supports.

PART 3 EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

<u>PIPE SIZE</u>	<u>MAX. HANGER SPACING</u>	<u>HANGER DIAMETER</u>
1/2 to 2 1/2 inch	10' – 0"	3/8"

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support vertical piping at every floor.

F. Support riser piping independently of connected horizontal piping.

3.02 INSERTS

A. Drill hole in concrete of sufficient size that the expansion case can be inserted.

B. Provide wall penetration per attached UL system detail.

*****END OF SECTION*****

**SECTION 15502
MECHANICAL IDENTIFICATION**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Identification of mechanical products installed under Division 15.

1.02 REFERENCES

- A. ANSI/ASME A13.1 - Scheme for the Identification of Piping Systems.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Seton Name Plate Corp.
- B. W. H. Brady Co.
- C. Substitutions: Under provisions of Section 15500.

2.02 MATERIALS

- A. Color: Unless specified otherwise, conform with ANSI/ASME A13.1.
- B. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- C. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Plastic Nameplates: Install with corrosive-resistant mechanical fasteners.
- B. Plastic Tags: Install with corrosive-resistant chain.
- C. Plastic Tape Pipe Markers: Install complete around pipe in accordance with manufacturer's instructions.
- D. Equipment: Identify chiller, pumps, air cooled condenser, tanks and water treatment devices with plastic nameplates.
- E. Controls: Identify control panels and major control components outside panels with plastic nameplates.
- F. Valves: Identify valves in main and branch piping with tags.
- G. Piping: Identify piping, concealed or exposed, with plastic tape pipe markers. Identify service, flow direction, - and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

*****END OF SECTION*****

**SECTION 15508 –
PIPE INSULATION**

PART 1 GENERAL

WORK INCLUDED

- A. Piping insulation.
- B. Jackets and accessories.

PART 2 PRODUCTS

ACCEPTABLE MANUFACTURERS

- A. Owens-Corning Fiberglass, Inc.
- B. Knauf, Inc.
- C. Certainteed, Inc.
- D. Substitutions: Under provisions of Section 15500.

2.01 INSULATION

- A. Type A: Pre-molded Glass fiber insulation; ANSI/ASTM C547; 'k' value of 0.24 at 75 degrees F; noncombustible.
- B. Type B: Cellular foam; flexible, plastic; 'k' value of 0.28 at 75 degrees F.

2.02 JACKETS

- A. Vapor barrier jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints.
- B. PVC Jackets: One piece, premolded type.
- C. Aluminum Jackets: ASTM B209; 0.020 inch thick; smooth finish.

2.03 ACCESSORIES

- A. Insulation Bands: 3/4 inch wide; inch 0.007 inch thick aluminum.
- B. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
- C. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool.

- D. Finishing Cement: ASTM C449.
- E. Fibrous Glass Cloth: Untreated; 9 oz/sq yd weight.
- F. Adhesives: Compatible with insulation.

PART 3 EXECUTION

3.01 PREPARATION

- A. Install materials after piping has been tested and approved.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Continue insulation through penetrations.
- C. In exposed piping, locate insulation and cover seams in least visible locations.
- D. Do not insulate unions at equipment, but bevel and seal ends of insulation at such locations.
- E. Neatly finish insulation at supports, protrusions, and interruptions.
- F. Jackets:
 - 1. Standard jackets with vapor barrier, factory-applied. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe, and finish with glass cloth and adhesive. PVC jackets may be used.
 - 2. Exterior refrigerant piping shall be Type B with PVC sleeve jacket.
 - 2. Interior above ground drain lines shall be included as above with PVC jackets.
- G. Provide speed channel line set cover over all refrigerant piping.

*****END OF SECTION*****

SECTION 15510 – HYDRONIC PIPING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Pipe and pipe fittings.
- B. Valves.
- C. Flexible connections.
- D. Chilled water system.

1.02 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ASME B31.9.

1.03 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Welding Materials and Procedures: Conform to ANSI/ASME SEC 9.
- C. Welders Certification: In accordance with ANSI/ASME SEC 9.

1.04 SUBMITTALS

- A. Submit product data that includes data on pipe materials, pipe fittings, valves, and accessories.

PART 2 PRODUCTS

2.01 EQUIPMENT DRAINS AND OVERFLOWS

- A. Schedule 80 PVC (polyvinyl chloride) pipe ASTM D1785
 - 1. Fittings: ANSI/ASME B16.23, cast brass or ANSI/ASME B16.29, wrought copper.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe,
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. After completion, fill, clean, and treat systems.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- B. Install piping to conserve building space, and not interfere with use of space and other work.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

- E. Provide clearance for installation of insulation, and access to valves and fittings.
- F. Provide access where valves and fittings are not exposed.
- G. Slope piping and arrange system to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Prepare pipe, fittings, supports, and accessories for finish painting.

3.03 APPLICATION

- A. Install condensate piping to drain to exterior
- B. Provide splash block at exterior for draining.
- C. Insulate condensate drain

*****END OF SECTION*****

**SECTION 15530
REFRIGERANT PIPING**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Refrigerant Piping System.

PART 2 PRODUCTS

2.01 REFRIGERANT PIPING, ABOVE GRADE

- A. Copper tubing: ASTM B88, Type L, hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: ASW A5.8, Bcup silver bronze or flared.

2.02 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe size 2 inches and under: 150 psig malleable iron unions for threaded ferrous piping; bronze union for copper pipe, soldered joints.

2.03 ACCEPTABLE MANUFACTURERS VALVES

- A. ITT Grinnell, Inc.
- B. Carnes, Inc.
- C. Nibco, Inc.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel -plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with unions.

3.02 INSTALLATION

- A. Route piping in orderly manner and maintain gradient.
- B. Install piping to conserve building space and not interfere with use of space.

- C. Install piping to allow for expansions and contraction without stressing pipe, joints or connected equipment.
- D. Where pipe support members are welded to structural building frame, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- E. Prepare pipe, fittings, supports and accessories not prefinished, ready for finish painting.

3.03 SERVICE CONNECTIONS

- A. Connect to new condensing units and new furnace DX coils.
- B. Provide suction and liquid lines from heat condensing units to air handling units in Pump Station room.

*****END OF SECTION*****

SECTION 15535
REFRIGERATION SPECIALTIES

PART I GENERAL

1.01 WORK INCLUDED

- A. Liquid indicators
- B. Refrigerant driers
- C. Filter driers
- D. Solenoid valves
- E. Expansion valves
- F. Refrigerant charging valves
- G. Flexible connections

1.02 REFERENCES

- A. Safety Code for Mechanical Refrigerant, ANSI B9.1
- B. Refrigerant Piping, ANSI B31.5
- C. National Plumbing Code, ASME A40.8
- D. Refrigerant Liquid Receivers, ARI 495
- E. Liquid Line Driers, ARI 710
- F. Thermostatic Refrigerant Expansion valves, ARI 750
- G. Seamless Copper Tube, ASTM 88

1.03 REGULATORY REQUIREMENTS

- A. Comply with applicable regulations and mechanical refrigeration codes.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 15500.
- B. Submit manufacturer's installation instructions under provisions of Section 15500.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Sporlan
- B. Henry Valve Co.
- C. Parker Hannifin Corp.

2.02 LIQUID INDICATORS

- A. Double port type with copper or brass body, and flared or solder ends.
- B. Provide removable seal caps on each port for inspection of refrigerant condition.
- C. Provide full size liquid indicators in main liquid line leaving condenser.

2.03 FILTER DRIERS

- A. Angle type, with brass shell and using combined straining and drying material.
- B. Employ replaceable desiccant material
- C. Acceptable in lieu of separate strainers and driers
- D. Provide three valve by pass assembly

2.04 SOLENOID VALVES

- A. Copper or brass body with flared or threaded ends.
- B. Use replaceable coil assembly
- C. Provide a manually operated stem to permit operation in case of coil failure.
- D. Provide solenoid valves in liquid line of systems operating with single pump out or pump down compressor control, in liquid line of single evaporator systems, and in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into the suction line when system shuts down.

2.05 EXPANSION VALVES

- A. Angle type or straight through design suitable for the refrigerant utilized in the system.
- B. Brass body, internal or external equalizer, and adjustable superheat setting, complete with capillary tube and remote sensing bulb.
- C. Size expansion valves to avoid being undersized at full load and excessively oversized at partial load.
- D. Evaluate refrigerant pressure drop through system to determine the available pressure drop across each valve.
- E. Select valves for maximum load at design operating pressure and minimum 43 degrees F.(6 degrees C) of superheat.

2.06 CHARGING VALVES

- A. General purpose type with brass body, flared or solder ends, and removable valve core.
- B. Provide valve inlet with quick coupling connection for ease of charging.
- C. Provide refrigerant charging connections in liquid line between receiver shut-off valve and expansion valve.

2.07 FLEXIBLE CONNECTORS

- A. Close pitch corrugated bronze hose with single layer of exterior braiding.
- B. At least 9 inches long with bronze fittings.
- C. Utilize only at or near compressors where it is not physically possible to absorb vibration within piping configuration.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.

3.02 FILTER DRIERS

- A. Install with bypass assembly to permit isolation for servicing.

3.03 EXPANSION VALVES

- A. Locate expansion valve sensing bulb immediately after evaporator outlet on suction line.

*****END OF SECTION*****

**SECTION 15552
DUCTLESS SPLIT SYSTEM CONDENSING UNTIS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Split unit.
- B. Unit controls.

1.02 SUBMITTALS

- A. Submit shop drawings and product data for manufactured products and assemblies required for this project.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Daikin Manufacturing Company
- B. Mitsubishi Manufacturing Company
- C. Sanyo Manufacturing Company

2.02 EQUIPMENT (Indoor Unit-Typical of two)

- A. General:

Indoor, direct-expansion, wall-mounted fan coil. Unit shall be complete with cooling/heating coil, fan, fan motor, piping connectors, electrical controls, microprocessor control system, and integral temperature sensing. Unit shall be furnished with integral wall-mounting bracket, mounting hardware, and thermistor interconnection cable.

- B. Unit Cabinet:

Cabinet discharge and inlet grilles shall be attractively styled, high-impact polystyrene. Cabinet shall be fully insulated for improved thermal and acoustic performance.

C. Fans:

1. Fan shall be tangential direct-drive blower type with air intake at the upper front face of the unit and discharge at the bottom front. Automatic, motor-driven vertical air sweep shall be provided standard.
2. Air sweep operation shall be user selectable. Horizontal direction may be manually adjusted (using remote controller) and vertical air sweep may be manually set.

D. Coil:

Coil shall be copper tube with aluminum fins and galvanized steel tube sheets. Fins shall be bonded to the tubes by mechanical expansion. A drip pan under the coil shall have a drain connection for hose attachment to remove condensate. Condensate pan shall have internal trap and auxiliary drip pan under coil header.

E. Motors:

Motors shall be open drip-proof, permanently lubricated ball bearing with inherent overload protection. Fan motors shall be 3-speed.

F. Controls:

Controls shall consist of a microprocessor-based control system which shall control space temperature, determine optimum fan speed, and run self diagnostics. The temperature control range shall be from 64 F to 84 F. The unit shall have the following functions as a minimum:

1. An automatic restart after power failure at the same operating conditions as at failure.
2. A timer function to provide a minimum 24-hour timer cycle for system Auto Start/Stop.
3. Temperature-sensing controls shall sense return-air temperature. Indoor-air high discharge temperature shutdown shall be provided.
4. Indoor coil freeze protection.
5. Wireless infrared remote control to enter set points and operating conditions.
6. Auto Stop features shall have integral setback control.
7. Automatic airt sweep control to provide on or off activation of airt sweep louvers.
8. Dehumidification mode shall provide increased latent removal capability by modulating system operation and set point temperature.
9. Fan-only operation to provide room air circulation when no cooling is required.

10. Diagnostics shall provide continuous checks of unit operation and warn of possible malfunctions. Error messages shall be displayed at the unit and at the remote controller.
11. An indoor to outdoor thermistor connection cable shall be provided with the fan coil unit.
12. Fan speed control shall be user-selectable: high, medium, low, or microprocessor automatic operation during all operating modes.
13. A time delay shall prevent compressor restart in less than 3 minutes.
14. Automatic heating-to-cooling changeover to provide automatic heating and cooling operation. Control shall include deadband to prevent rapid mode cycling.
15. Demand defrost shall be provided and shall minimize defrost cycles by internally adjusting defrost timing based on frost accumulation.
16. Indoor coil high temperature protection shall be provided to detect excessive indoor discharge temperature when unit is in heat pump mode.
17. Provide wireless thermostat in clear lockable plastic perforated cover.

G. Filters:

Unit shall have filter track with factory-supplied cleanable filters.

H. Electrical Requirements:

Unit shall operate on 208v, single phase, 60 Hz power supply as specified on the equipment schedule. Power and control connections shall have terminal block connections.

I. Operating Characteristics:

1. The unit shall be matched with an outdoor unit. The combination of the outdoor unit and the indoor-fan coil unit shall have a total net cooling capacity of 34,000 Btuh or greater at conditions and entering-air temperature at the evaporator coil of 80 degrees F dry bulb and 67 degrees F wet bulb. Outdoor ambient temperature of air entering the condenser of 95 degrees F.
2. The system shall have a minimum listed SEER (seasonal energy efficiency ratio) of 12 at ARI conditions.
4. The heating capacity shall be 34,000 Btuh or greater.

J. Refrigerant Lines:

All units shall have rotatable refrigerant lines for penetration through the wall using flare connections. All units shall have flare connections.

- K. Provide field installed condensate pump to completely remove condensate from the drain pan. The pump shall consist of two parts: an internal reservoir/sensor assembly, and a remote sound shielded pump assembly. The lift capability shall be 1 to 10 feet. A level sensor on the condensate pan shall stop cooling operation if the level in the condensate pan is unacceptable.

2.03 EQUIPMENT (Outdoor Unit - Typical of two)

- A. General:

Factory assembled, single piece, air-cooled outdoor unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, compressor, full charge of R-410A refrigerant, and special features required prior to field start-up. Unit shall operate two indoor units

- B. Unit Cabinet:

1. Unit cabinet shall be constructed of galvanized-steel, bonderized and coated with a baked-enamel finish.
2. Unit access panels shall be removable with minimal screws and shall provide full access to the compressor, fan, and control components.
3. Outdoor compartment shall be isolated and have an acoustic lining to assure quiet operation.

- C. Fans:

1. Outdoor fans shall be direct-drive propeller type, and shall discharge air horizontally. Fans shall blow air through the outdoor coil (38HDC only).
2. Outdoor fan motors shall be totally-enclosed, single-phase motors with class B insulation and permanently-lubricated sleeve bearings. Motor shall be protected by internal thermal overload protection.
3. Shaft shall have inherent corrosion resistance.
4. Fan blades shall be corrosion resistant and shall be statically and dynamically balanced.
5. Outdoor fan openings shall be equipped with PVC coated protection grille over fan and coil.

D. Compressor:

1. Compressor shall be fully hermetic reciprocating or scroll type.
2. Compressor shall be equipped with oil system, operating oil charge, and motor. Internal overloads shall protect the compressor from overtemperature and overcurrent. Scroll compressors shall also have high discharge gas temperature protection if required.
3. Motor shall be NEMA rated class F, suitable for operation in a refrigerant atmosphere.
4. Reciprocating compressors shall be equipped with crankcase heaters to minimize liquid refrigerant accumulation in compressor during shutdown and to prevent refrigerant dilution of oil.
6. Compressor assembly shall be installed on rubber vibration isolators and shall have internal spring isolation.
7. Compressor shall be single-phase or 3-phase as specified on the contract drawings.

E. Outdoor Coil:

Coil shall be constructed of aluminum fins mechanically bonded to internally enhanced, seamless copper tubes which are cleaned, dehydrated, and sealed.

F. Refrigeration Components:

Refrigerant circuit components shall include brass external liquid line service valve with service gage port connections, suction line service valve with service gage connection port, service gage port connections on compressor suction and discharge lines with Schrader-type fittings with brass caps, accumulator, pressure relief, and a full charge of refrigerant.

G. Controls and Safeties:

Operating controls and safeties shall be factory selected, assembled, and tested. The minimum control functions shall include the following:

1. Controls:
 - a. Time delay restart to prevent compressor reverse rotation on single-phase scroll compressors.
 - b. Automatic restart on power failure.
 - c. Safety lockout if any outdoor unit safety is open.
 - d. A time delay control sequence provided through the fan coil board, thermostat, or controller.
 - e. High-pressure and liquid line low-pressure switches.
 - f. Automatic outdoor-fan motor protection.

- g. Start capacitor and relay (single-phase units without scroll compressors).
- 2. Safeties:
 - a. System diagnostics.
 - b. Compressor motor current and temperature overload protection.
 - c. High pressure relief.
 - d. Outdoor fan failure protection.

H. Electrical Requirements:

- 1. All other units shall operate on single-phase, 60 cycle power at 208v.
- 2. Unit electrical power shall be a single point connection.
- 3. Unit control voltage to the indoor-fan coil shall be 24 v.
- 4. All power and control wiring must be installed per NEC and all local building codes.
- 5. High- and low-voltage terminal block connections.

I. Special Features – Provide the Following:

- *1. Low-Ambient Kit:
Control shall regulate fan-motor cycles in response to saturated condensing pressure of the unit. The control shall be capable of maintaining a condensing temperature of 100 F \pm 10 F with outdoor temperatures to -20 F. Installation of kit shall not require changing the outdoor-fan motor.
- *2. Liquid Solenoid Valve:
This electronically operated shutoff valve shall close and open in response to compressor operation. The valve should be used with all long-lines applications (over 100 ft).
- *3. Winter Start Control:
Field supplied and installed winter start control shall be provided for cooling operation under low-load conditions and at low-ambient temperatures by bypassing the low-pressure switch for a 3-minute delay period. Winter start control shall be provided for this unit. Unit shall be shipped with a clamp-on compressor oil sump heater.

**SECTION 15775
UNITARY AIR COOLED CONDENSER**

PART 1 — GENERAL

1.01 SYSTEM DESCRIPTION

Outdoor ground-mounted, electrically controlled, air-cooled unitary condenser unit utilizing dual (2) scroll-type compressors for refrigerant compression and an integral fan .

1.02 QUALITY ASSURANCE

Unit performance shall be certified in accordance with ARI Standards 240 and 270, latest versions.

The refrigerant coil shall be designed and tested in accordance with ASHRAE 15 Safety Code for Mechanical Refrigeration.

Unit shall be constructed in accordance with ETL and ETLC regulations and shall carry the ETL and ETLC labels of approval.

Coils shall be qualified to UL 1995 burst test at 2,200 psi and shall be leak tested to 150 psig and pressure tested to 400 psig.

Unit shall be manufactured in a facility registered to the ISO 9002 manufacturing quality standard.

1.03 SUBMITTALS

Submit shop drawings and product data under provisions of section 0120.

Submit manufacturer's installation instructions.

1.04 WARRANTY

Provide five-year warranty.

Warranty: Include coverage for refrigerant compressors.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S

1. Trane WSCO92H4R0A
2. York
3. Carrier

Substitutions: Under provisions of Section 15500.

2.02 AIR HANDLING SECTION

Indoor mounted, draw-thru, packaged air-handling unit that can be used integrally with the heat pump. Unit shall consist of forward-curved belt-driven centrifugal fan(s), motor and drive assembly, prewired fan motor contactor, factory-installed refrigerant metering devices, cooling coil, 2-in. disposable air filters, and condensate drain pans for horizontal configurations.

Base Unit:

Cabinet shall be constructed of mill-galvanized steel.

Fan shall have variable speed motor with VFD to modulate fan speed when cooling load is minimal.

Cabinet panels shall be fully insulated with 1/2-in. fire-retardant material. Insulation shall contain an EPA-registered immobilized antimicrobial agent to effectively resist the growth of bacteria and fungi as proven by tests in accordance with ASTM standards G21 and 22.

Unit shall contain copper condensate drain pans for horizontal applications. Drain pans shall have connections on right and left sides of unit to facilitate field connection. Drain pans shall have the ability to be sloped toward the right or left side of the unit to prevent standing water from accumulating in pans. Provide emergency condensate drain.

Unit shall have factory-supplied 2-in. throwaway-type filters installed upstream from the cooling coil. Filter access shall be from either the right or left side of the unit. Filter access will be done without the use of tools.

Coils:

Coils shall consist of 3 rows, or 4 rows of copper tubes with sine-wave aluminum fins bonded to the tubes by mechanical expansion. Suction and liquid line connections or supply and discharge connections shall be made on the same side of the coil.

Direct-expansion coils shall feature factory-installed thermostatic expansion valves (TXVs) for refrigerant control. The TXVs shall be capable of external adjustment. Direct-expansion heat pump coils shall have a factory-installed bypass line and check valve assembly around the TXVs to allow liquid flow from the coil to the outdoor unit during the heating mode. Coil tubing shall be internally rifled to maximize heat transfer.

Coils shall have baked on phenolic coating for corrosion protection.

Operating Characteristics:

SEE SCHEDULES ON DRAWINGS.

Motor:

Fan motor of the size and electrical characteristics specified on the equipment schedule shall be factory supplied and installed. Motors shall have internal thermal overload protection

Controls shall be set up so that during the occupied mode, unit fans shall run continuously with outside air damper open to its minimum position. During unoccupied mode, unit fan shall cycle to meet demand with outside air damper closed.

CONTROLS – SEE CONTROLS AND INSTRUMENTATION

2.03 ECONOMIZER

Economizer for ventilation or “free” cooling shall be factory provided for field installation on either return air opening of air handler. For free cooling applications, economizer shall be compatible with separate thermostat; economizer dampers shall open when outdoor air enthalpy is suitable for free cooling. Economizer shall include enthalpy control and damper actuator. Economizer dampers shall be remotely controlled through the smart stat controller.

2.04 EQUIPMENT

A. General:

Outdoor-mounted, air-cooled single package system condensing unit shall be suitable for on-the-ground or rooftop installation on a full level pad or on raised pads at each support point. The unit shall consist of a semi-hermetic refrigerant compressor/motor assembly, a fin-tube coil, propeller-type fans, fan motors, refrigerant controls, and a control box. All components shall be factory assembled as a single unit. A holding charge of R-410A shall be included.

B. Unit Cabinet:

1. Cabinet shall be constructed of galvanized steel, bonderized, and finished with baked enamel.
2. Fan venturi housings and guards shall be assembled on the unit.
3. A removable panel or hinged door shall be provided for access to the compressor and control compartments.
4. A refrigerant accumulator with a fusible plug relief shall be installed in the cabinet.

C. Fans:

1. Multi speed indoor fan system shall meet the minimum requirements of CA Title 24. This system shall incorporate multispeed fan controls to change the speed of the fan to 67% of full airflow based off of compressor stages.
2. Fans shall be arranged for vertical up-blast discharge.
3. Variable frequency drives shall be factory installed and tested to provide supply fan motor speed modulation. VFD on supply be used in lieu of inlet guide vanes or discharge dampers. VFD's shall be allowed to bypass if required. Bypass controls shall provide full nominal airflow in the event of drive failure.

D. Compressor/Motor Assembly:

1. Semi-hermetic, dual (2) scroll-type variable speed compressor shall be complete with a motor and oil pump all on a single polished crankshaft.
2. Motor stator winding shall be NEMA Class F rated, suitable for operation in a refrigerant atmosphere.
3. Oil pump shall be automatically reversible.
4. Casing shall include suction and discharge shutoff valves, capacity control device, oil level control orifice, oil-pressure regulating valve, and a crankcase oil heater.
5. Suction and discharge valves shall be Swedish steel, reed-type flapper valves.
6. Pistons and connecting rods shall be high-density aluminum alloy castings. Pistons shall be equipped with automotive-type compression and oil scraper rings.
7. Pump-end bearing shall be cast aluminum. Motor-end bearing shall be steel-backed, tin-base babbitt type.
8. Compressor assembly shall be installed on spring vibration isolators.

E. Coil:

Coil shall have copper tubes, aluminum plate fins, and galvanized steel tube sheets. The fins shall be bonded to tubes by mechanical expansion. Coil shall be circuited for subcooling during cooling mode operation. Provide phenolic corrosion resistant coating on coil. Provide as baked phenolic and epoxy modified baked phenolic coating to protect against corrosive chemicals and elements with minimal reduction in heat transfer.

F. Controls and Safeties: Operating controls and safeties shall be factory, assembled, and tested. Minimum control functions shall be as listed below:

1. Controls:

- a. Capacity control valves on the compressor shall be self-contained, electrically-actuated, and suction cutoff.
- b. Head pressure control shall be achieved by fan cycling: One fan shall be cycled in response to liquid pressure, and one fan shall be non-cycling. Both fans shall be activated in the heating mode.
- c. Defrost control shall consist of a time and temperature activated system that initiates de-frost periodically in response to a temperature signal.

2. Safeties:

- a. Low oil pressure switch cutout.
- b. High discharge pressure cutout.
- c. Loss-of-charge cutout.
- d. Compressor motor current and temperature overload cutouts.
- e. Liquid line solenoid valve.
- f. Filter drier in the heating mode.
- g. Device to hold the compressor off-line until reset manually when any of the following listed cutouts are tripped: High discharge pressure, high temperature, and loss-of-charge.
- h. Compressor short-cycle protection control to prevent compressor restart after timed period has expired.

G. Electrical Requirements:

1. Factory supplied and installed transformer shall provide 24 v control voltage.
2. All power and control circuit wiring shall comply with local and national codes.

- H. Provide unit with condenser coil guards.
- I. Low Ambient Control
 - 1. Provide unit with controls capable of maintaining correct condensing pressure at outdoor temperatures down to negative 20 degrees Fahrenheit.
- J. Unit Controls (R 410A)
 - 1. Unit shall be completely factory wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect. Controls shall be provided for all 23 volt control functions. The resident algorithms shall make all heating, cooling, or ventilation decisions in response to electronic signal from sensors measuring indoor and outdoor temperatures. The control algorithm shall maintain accurate temperature control, minimize drift from set setpoint, and provide overall building comfort. A centralized control shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.

2.05 COATINGS

- A. Coat enclosure with “Adsil” or equal corrosion resistant treatment. Coating shall be inorganic, cross-link cured, glasslike surface treatments that chemically bond to non-ferrous metal surfaces to ensure maximum corrosion protection. Provide coating on the outside and inside enclosure, coils, fans, and exposed surfaces. Coil coatings shall include tinting.
- B. Coating shall be factory applied prior to on site shipment.
- C. Coating shall use Adsil Microguard Siloxane Technology or equal.
- D. Provide extended warranty for 2 years.

PART 3 EXECUTION

3.01 INSTALLATION

Install in accordance with manufactures instructions.

Install units on vibration isolators.

UNITARY AIR COOLED CONDENSER

15775-7

Install in ducts and casings in accordance with SMACNA, HVAC Duct Construction Standard, Metal and Flexible.

Support coil sections independent of piping on steel channel or double angle frames and secure to casings.

Protect coils to prevent damage to fins and flanges. Comb out bent fins.

Make connections to coils with unions and flanges.

Provide electrical connections for controls and power into AHU unit conduit entry.

Supply initial charge of refrigerant and oil for each refrigerant circuit. Replace losses of refrigerant and oil.

Provide drain pan and drain connection for cooling coils. Fabricate drain pan for 20 gage-galvanized steel. Extend 3 inches from face of coil leaving airside. Pipe drain pans individually with type "K" hard copper to floor drain with water seal trap. Secure drain to floor as necessary. Auxiliary condensate systems shall be provided in accordance with North Carolina Mechanical Code, Section 307.2.3. Auxiliary condensate drain pans shall be insulated and have a minimum of 2% slope in two planes to the condensate drain connection.

Provide for wooden platform mounting per plans.

Provide complete coil guards on unit.

MANUFACTURER'S FIELD SERVICES.

Manufacturers shall furnish a factory trained service engineer with out additional charge to start the units. Representatives shall provide leak testing, evacuation, dehydration, and charging of the units as required.

A start-up log shall be furnished by the manufacturer to document the AHU start-up to date and shall be signed by the owner or his authorized representative prior to commissioning the air-handling unit.

Supply initial charge of refrigerant and oil.

****END OF SECTION****

**SECTION 15870
POWER VENTILATORS**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Ceiling exhaust fans.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Penn, Inc.
- B. Acme, Inc.
- C. Greenheck, Inc.
- D. Substitutions: Under provisions of Section 15500.

2.02 PROPELLER FAN (Provided by Holden Beach installed by Contractor)

- A. Propeller: Fabricated steel, fabricated aluminum, or cast aluminum blades and hubs. Propellers shall be securely attached to fan shaft. Statically and dynamically balance propellers.
- B. Motors: Permanently lubricated, heavy duty type.
- C. Fan Shafts: Ground and polished steel. Mount in permanently lubricated sealed ball bearing pillow blocks.
- D. Provide with motor guard, wall housing, motor operated backdraft damper, and actuator.
- E. Provide one point wiring connection.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions .
- B. Interconnect to existing ductwork .
- C. Interconnect all power and controls.

*****END OF SECTION*****

**SECTION 15952
CONTROLS AND INSTRUMENTATION**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Electric Control System
- B. Control Devices, Components, Wiring, and Materials
- C. Instructions to Owners

1.02 SUBMITTALS

- A. Submit shop drawings and product data showing system drawings, wiring diagrams, and written detailed operational description. All products to include UL listing.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. KMC – Flex-Stat BACnet-14.
- B. Carrier Inc.
- C. Trane, Inc.
- D. Substitutions: under provision of section 15500.

2.02 CONTROL SYSTEMS

- A. Provide electric control products in sizes and capacities indicated, consisting of switches, relays, and other components as required for a complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer. Provide electric control systems with following functional and construction features as indicated.
- B. Provide materials and field work necessary to connect control components, factory supplied, as part of equipment controlled.

2.03 UNITARY AIR COOLED CONDENSER SYSTEM FLEX-STAT

- A. Factory wired low voltage wall mounted controller capable to receive 4-20 ma inputs and multi-stage outputs for tow stage control of condenser. Controller shall be capable of maintaining temperature, humidity and CO2 in the conditioned space.
- B. Provide with integral CO2 sensor for demand controlled ventilation.
- C. Provide humidity sensor option integral to the Flex-Stat to enable condenser cooling and Reheat coil for dehumidification.
- D. Locate Flex-Stats in rooms as shown.
- E. Provide vandal resistant locking cover.
- F. Provide Flex-Stats controller for manual operation of economizer dampers to 100%.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Check and verify location of Flex-Stats and other exposed control sensors with plans and room details before installation. Locate BAC net controller 48 inches above floor to top per ADA.
- B. Install systems and materials in accordance with manufacturer's instruction, rough-in drawings, and detail drawings.
- C. Number-code and color-code all connectors.
- D. Provide for a complete service of control systems, including call-backs, for one year running concurrent with connection period.
- E. All electrical work shall be in accordance with the latest Edition of the National Electric Code.
- F. All 120-volt control wiring shall be a minimum of #14 THHN.
- G. All control wiring shall be enclosed in PVC SCH 80 conduit inside and conduit outside.

3.02 ADJUSTING AND CLEANING

- A. Start-up: Start-up, test, and adjust electric control systems in presence of manufacturer's authorized representative. Demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- B. Clean factory finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch up paint.
- C. After completion of installation, adjust thermostats, control valves, motors, and similar equipment provided as worked in this section.
- D. Provide for interconnection of the BAC net controller to the internet via modem.
- D. At completion of installation, provide instruction for operating personnel.

*****END OF SECTION*****

DIVISION 31 - EARTHWORK

DETAILED SPECIFICATIONS

SECTION 31 62 16 – VINYL SHEET PILING

PART 1.00 - GENERAL

1.01 Description

The work covered in this Section includes the furnishing and installation of vinyl sheet piling where shown on the drawings, required in these specifications, or as directed by the Engineer.

1.02 References

The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM)
 - a. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
 - b. D638, Standard Test Method for Tensile Properties of Plastics
 - c. D648, Standard Test Method for Deflection temperature of Plastics Under Flexural Load in the Edgewise Position
 - d. D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
2. International Organization for Standardization (ISO)
 - a. 178, Plastics, Determination of Flexural Properties
 - b. 179-1, Plastics, Determination of Charpy Impact Properties
 - c. 306, Plastics, Thermoplastic Materials, Determination of Vicat Softening Temperature (VST)
 - d. 527-2, Plastics, Determination of Tensile Properties

- e. 868, Plastics and Ebonite, Determination of Indentation Hardness by Means of a Durometer (Shore Hardness)
- f. 1183-3, Plastics, Methods for Determining the Density of Non-Cellular Plastics

1.03 Quality Assurance

Installations shall be performed only by persons completely trained and experienced in the installation of the required materials, and under the supervision of a person knowledgeable in this work, who is thoroughly familiar with the project design and the approved shop drawings.

Installer Qualifications: Sheet piling installer shall have, as a minimum, three (3) successful past installations of sheet piling of comparable overall heights and sections and comparable penetration into soils similar to those found on the Project.

1.04 Submittals

Submit shop drawings, in five copies for review and approval by the Engineer, for all vinyl sheet piling section and accessories covered by these specifications.

- A. Provide qualifications of proposed sheet pile installer.
- B. Contractor shall provide information from the manufacturer that indicates the sheet piling meets or exceeds the Specifications listed in this section.

1.05 Handling and Storage

- A. Do not subject piles to damage by impact bending stresses in transporting to and storing piles onsite.
- B. Vinyl sheet pile sections shall be supported on top of wooden supports spaced in 3 foot intervals to prevent sagging and deformation during storage.
- C. Soft webbing slings shall be used to prevent pile damage during lifting and handling.

PART 2.00 - PRODUCTS

2.01 General

- A. All vinyl sheet piling shall be new and unspliced material throughout, unless otherwise reviewed and accepted by Engineer.
- B. Vinyl sheet piles and special fabricated shapes shall be of a design that ensures continuous interlock throughout the entire length when in place.

2.02 Materials

- A. Vinyl sheet piling shall be corrugated box sections with the following dimensions:

- 1. Width: 23.9 inches
- 2. Depth: 9.1 inches
- 3. Thickness: 0.35 inches

- B. Vinyl Box Section, minimum physical properties:

Section Modulus	20.6 in ³ /ft
Moment of Inertia	93.4 in ⁴ /ft
Allowable Moment	5.5 ft-lb/ft
Ultimate Moment	11 ft-lb/ft
Ultimate Stiffness	35.2 ibf-in ² x 10 ⁶ /ft

- C. Vinyl sheet piling shall meet or exceed the following material standards and values:

Density, ISO 1183-3	86-92 lb/ft ³
Flexural Strength, ASTM D790, ISO 178	9572.49 psi
Shore Durometer, ISO 868	75 Shore D
Modulus of Elasticity, ASTM D638, ISO 178/527-2	379998.9 psi
Tensile Strength, ASTM D638	6381.66 psi
Izod Impact Strength, ASTM D256	4.28 ft-lb/in ²
Charpy Impact Strength	14.27 ft-lb/in ²
Vicat Softening Temp., ASTM D648, ISO 306	170°F

- D. Whalers

The sheet pile wall shall be restrained against overturning through the addition of whalers installed on the outside of the wall. The whalers shall be constructed from 4x6 pressure-treated lumber, minimum.

E. Earth Anchors

Earth anchors consisting of a threaded rod and spade shaped bearing plate shall be driven into the undisturbed soil behind the wall from location of the whaler. Tensioning of the rod after driving turns the bearing plate to develop the bearing capacity of the anchor. Bearing plates shall be designed to resist a force of 25 tons.

Anchors shall be approximately 13 feet in length, installed at a 30 degree angle and located at the end of each wall segment and placed at a minimum of every 8 feet along each wall segment. A minimum 0.75 inch treaded rod shall extend from the whaler to the anchor. Each rod shall include an anchor plate, nut and beveled washer at the whaler. The minimum yield strength of the threaded anchor rods shall be 36 ksi.

PART 3.00 - EXECUTION

3.01 Preparation

- A. Any fill along the alignment of the sheet pile must be in place to sub-grade elevations and compacted prior to driving the sheet pile.

3.02 Installation

A. General:

1. Vinyl sheet piling shall be driven to the depths shown on the Drawings.

B. Sheet Piling Driving:

1. Driving guides shall be used to keep the piles aligned correctly and minimize the danger of breaking the interlock between the sheets.
2. Vinyl sheet piling shall be driven to form a tight bulkhead.
3. A steel pile head shall be used to protect the pile top and to distribute the pressing/driving load. Any piling which is damaged in driving or which has broken interlocks between sections shall be pulled and replaced at Contractor's expense.

- C. Care shall be taken during driving to keep from causing deformations of the top of the piles, splitting of section, or breaking of the interlock between sections. Care shall also be taken during driving to prevent and correct any tendency of vinyl sheet piles to twist or get out of plumb.

- D. Vinyl box piles shall be driven with the female interlock leading.
- E. Establish the locations of the earth anchors and install through drilled holes in the sheet pile wall.
- F. Pre-drill timber walers at the locations of the anchor rods and secure to wall. Tighten each rod, ensuring that each anchor bearing plate has turned to achieve the fully bearing capacity of the plate. Cut excess rod 1-inch from nut.

END OF SECTION

SECTION 316219 - TIMBER PILES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes square timber piles.

1.2 UNIT PRICES

- A. Contract Sum: Base Contract Sum shall include number and dimensions of piles indicated from tip to cutoff, plus not less than 24 inches of overlength for cutting piles at cutoff elevations.
- B. Work of this Section is affected as follows:
 - 1. Additional payment for pile lengths in excess of that indicated, and credit for pile lengths less than that indicated, is calculated at unit prices stated in the Contract, based on net addition or deduction to total pile length as determined by Engineer and measured to nearest 12 inches.
 - a. Additional payment for splices required to extend pile lengths in excess of that indicated is calculated at unit prices stated in the Contract.
 - 2. Additional payment for number of piles in excess of that indicated, and credit for number of piles less than that indicated, is calculated at unit prices stated in the Contract.
 - 3. Unit prices include labor, materials, tools, equipment, and incidentals for furnishing, driving, cutting off, capping, and disposing of cutoffs.
 - 4. Test piles that become part of permanent foundation system are considered as an integral part of the Work.
 - 5. No payment is made for rejected piles, including piles driven out of tolerance, defective piles, or piles damaged during handling or driving.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For timber piles. Show fabrication and installation details for piles, including details of driving shoes, tips or boots, and pile butt protection.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

1.5 INFORMATIONAL SUBMITTALS

- A. Timber pile treatment data.
- B. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.
- C. Pile-driving records.
- D. Field quality-control reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store piles at Project site to prevent breaks, cuts, abrasions, or other physical damage and as required by AWWA M4. Do not drill holes or drive spikes or nails into pile below cutoff elevation.

PART 2 - PRODUCTS

2.1 TIMBER PILES

- A. Square Timber Piles: unused, one piece from butt to tip; of the following species and size basis:
 - 1. Species: Southern yellow pine.
 - 2. Size Basis: 8"x8" minimum.
- B. Pressure-treat timber piles according to AWWA U1 as follows:
 - 1. Service Condition: Land or fresh-water use.
 - 2. Treatment: AWWA C3, CCA 0.80 lbs./cf minimum retention rate.

2.2 PILE ACCESSORIES

- A. Driving Shoes: Fabricate from ASTM A1011/A1011M, hot-rolled carbon-steel strip to suit pile-tip.

2.3 FABRICATION

- A. Pile Tips: Cut and shape pile tips to accept driving shoes. Fit and fasten driving shoes to pile tips according to manufacturer's written instructions.
- B. Pile Butt: Trim pile butt and cut perpendicular to longitudinal axis of pile. Chamfer and shape butt to fit tightly to driving cap of hammer.
- C. Field-Applied Wood Preservative: Treat field cuts, holes, and other penetrations according to AWWA M4.

Town of Holden Beach
Vacuum Sewer Station #2 Modifications

- D. Pile-Length Markings: Mark each pile with horizontal lines at 12-inch (305-mm) intervals; label the distance from pile tip at 60-inch (1524-mm) intervals. Maintain markings on piles until driven.

PART 3 - EXECUTION

3.1 DRIVING PILES

- A. General: Continuously drive piles to elevations or penetration resistance indicated. Establish and maintain axial alignment of leads and piles before and during driving.
- B. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.
- C. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:
 - 1. Location: 2 inches from location indicated after initial driving, and 3 inches after pile driving is completed.
 - 2. Plumb: Maintain 1 inch (25 mm) in 48 inches (1219 mm) from vertical, or a maximum of 3 inches, measured when pile is aboveground in leads.
- D. Withdraw damaged or defective piles and piles that exceed driving tolerances, and install new piles within driving tolerances. Fill holes left by withdrawn piles as directed by Engineer.
- E. Cut off butts of driven piles square with pile axis and at elevations indicated.
 - 1. Cover cut-off piling surfaces with minimum three coats of preservative treatment according to AWPA M4.
- F. Pile-Driving Records: Maintain accurate driving records for each pile, compiled and attested to by a qualified professional engineer.

3.2 FIELD QUALITY CONTROL

- A. Inspections: Contractor shall engage a qualified special inspector to perform the following special inspections:
 - 1. Pile foundations.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

END OF SECTION 316219

SECTION 16100
GENERAL ELECTRICAL REQUIREMENTS

NOTE: The Town of Holden Beach is planning to building a new vacuum lift station # 2 at Holden beach, North Carolina.

The electrical work associated with this project shall include new power distribution equipment, motor control center, automatic transfer switch, standby generator, and miscellaneous electrical equipment. This electrical work shall be part of the general contract.

shall

The Electrical Contractor ~~must~~ shall organize his work and secure materials in a manner that will expedite the project, thus completing the project on schedule. Conditions of the Contract, Form of Construction Contract, Notice to Bidders, Supplementary General Conditions, General Specifications and all of which are a part of these specifications.

The Contractor shall refer to the Notice to Bidders and General Conditions of the Contract, Form of Construction Contract, Instructions to Bidders, Supplementary General Conditions, General Specifications and all Division 16 Electrical Specifications, all of which are a part of these specifications.

Refer to civil drawings for exact dimensions and layout. The electrical work shall be part of the general contract.

PART I GENERAL

1.01 These specifications and the accompanying plans are intended to describe the installation of a complete electrical system in this facility complex. The work to be done under these specifications shall include the furnishing of all labor, equipment and materials required to provide a complete and working electrical system as shown on the plans and as outlined in these specifications.

PART 2 GENERAL

2.01 The contract shall include all labor, materials, permits, etc. necessary for the completion of the work. All materials, shall be new except as specifically noted, and shall have Underwriter's Laboratory approval or other third party agency approval or U.L. re-examination listing, and shall be installed in accordance with the best practice by experienced mechanics.

2.02 The electrical plans are diagrammatic only and are not intended to show all details of the

work. The location of all conduit work is approximate and the Electrical Contractor shall make any necessary changes in the location to avoid piers, beams, footings, plumbing, duct and other obstructions at no additional cost to the Owner.

- 2.03 The spirit as well as the letter of the plans and specifications shall be followed and all work shall be executed according to the true intent and meaning of plans and specifications, both of which are intended to include everything requisite for a complete electrical system.
- 2.04 The Electrical Contractor shall comply with all state and Underwriter's requirements, ordinances or rules governing work of the character including the current edition of the National Electrical Code and OSHA.
- 2.05 Should any error or omission exist in either or both of these plans and specifications, or conflict one with the other, the Contractor shall not avail himself of such unintentional error, omission or conflict, but shall have same explained and adjusted before signing the contract or proceeding with the work, otherwise, he shall at his expense supply the proper materials and labor to make good any damage to or defect in his work caused by such error, omission, or conflict.

PART 3 SAMPLES

- 3.01 All materials, equipment and accessories entering into the work area are subject to the approval or disapproval of the Engineer. No samples are required to be submitted with bid documents. Name of equipment suppliers shall be provided on the Bid Form where required.
- 3.02 The samples required by the Engineer shall be submitted after the award of the contract and acceptance of the Contractor's bond. All samples shall be delivered to a location designated by the Engineer.
- 3.03 No inspection or test shall be made except upon formal notice to the Engineer from the Contractor by letter or telegram. Contractor shall furnish all labor and appliances for tests and shall meet all expenses of said test.
- 3.04 In all cases where devices or part of the equipment is herein referred to in the singular number, it is intended that such referred shall apply to as many devices as are required to complete the installation.

PART 4 SPECIAL CONDITIONS

- 4.01 Everything necessary for the completion and successful operation of the work, whether or not here definitely specified or indicated on the drawings, shall be furnished and installed as well and faithfully as if so indicated and specified.
- 4.02 Contractor shall store all materials in trailers each night. No materials shall be left in the

facility.

4.03 System voltage shall be the following:

A. Holden Beach Lift Station # 2 – 277/480 VAC Three phase 4 wire, 60 Hertz.

PART 5 PAINTING

5.01 All factory finished metal surfaces damaged during installation shall be restored to their original condition.

PART 6 SUPERVISION AND SUPERINTENDENCE

6.01 This Contractor shall during the progress of the work, maintain a competent Superintendent who shall not be changed except if he proves unsatisfactory to the Contractor or the Engineer.

6.02 ~~Efficient supervision shall be given to the work.~~ Superintendent shall supervise the work efficiently.

PART 7 WORKMANSHIP

7.01 Only the finest quality workmanship shall be acceptable and any shoddy work shall be removed without delay and such materials shall not be re-used without the consent of the Engineer.

7.02 The Electrical Contractor's Foreman shall be thoroughly experienced in the installation of electric wiring as covered by the plans and specifications and he shall remain on the job continually while the work is in progress. His qualifications, and ability shall be acceptable to the Engineer.

PART 8 INSPECTION AND TESTS

8.01 The system shall be installed in strict accordance with the regulations of the local and State Codes and Ordinances.

8.02 The final inspection and tests shall be made only after the Engineer shall be satisfied that the work described in these specifications has been completely installed in accordance with the spirit and intent of these specifications. The acceptance of the work shall not in any way prejudice the rights to demand the replacement of defective materials or workmanship. The Electrical Contractor shall furnish instruments, special apparatus, and expert service to make all necessary tests to show that the system is absolutely clear of improper grounds and short circuits and to demonstrate that the entire equipment as to capacity, quality, and completeness is properly installed to meet all requirements of these specifications and defects shall be remedied without delay. Contractor shall inform all local inspectors of work phases

accomplished and shall acquire all phasing permits and final approval from all local authorities.

PART 9 VISIT TO SITE

9.01 All bidders shall visit the site and thoroughly familiarize themselves with the existing conditions before submitting their bids. No allowances will be made for a lack of knowledge of existing conditions.

PART 10 GUARANTEES

10.01 The Contractor shall deliver the system to the Owner in first class operating condition in every respect and shall guarantee as specified in Instructions to Bidders and General Conditions of the Contract for one full year after final payment.

PART 11 LIQUIDATED DAMAGES

11.01 Refer to General Conditions.

PART 12 COORDINATION

12.01 The electrical work is part of the General Contract. The electrical contractor shall be responsible for any delays in construction caused by the Electrical Contractor.

PART 13 FEE AND PERMITS

13.01 Contractor shall acquire and pay for all fees and permits required by authorities.

PART 14 CONTRACTOR DEFINED

14.01 The words "Contractor", "contractor" and "Electrical Contractor" as used in this section are synonymous.

PART 15 ACCEPTANCE

15.01 The entire system will be accepted as unit. There will be no partial acceptance.

PART 16 DAMAGES

16.01 This contractor shall be responsible for damage to the work of others or the property and any damage by this contractor shall be repaired or replaced by this contractor at no cost to the Owner. This Contractor shall provide barricades where his work may endanger the public safety.

PART 17 RECORD DRAWINGS

17.01 The contractor shall furnish to the Engineer drawings of any arrangements installed differently from those shown on the Engineer's contract drawings.

PART 18 SUBSTITUTE MATERIALS

18.01 A 10 day prior approval before the bid date shall be required for any substitutions than the materials listed in the specifications.

PART 19 SPECIAL REQUIREMENTS

19.01 Adherence to special requirements for seismic protection per latest issue of the N.C. Building code shall include:

- A. Electrical equipment and raceways will not become mobile and be displaced from its location. Must be anchored and secured to wall and floor to meet standard perpendicular forces.

*****END OF SECTION*****

**SECTION 16111
CONDUIT**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Electrical Metallic Tubing and Fittings
- B. Non Metallic Conduit and Fittings
- C. Rigid Metal Conduit and Fittings

1.02 REFERENCES

- A. ANSI C80.3 Electrical Metallic Tubing, zinc coated
- B. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and cable assemblies.
- B. FS WW-C-581 - Specifications for PVC Conduit

PART 2 PRODUCTS

2.01 PLASTIC CONDUITS AND FITTINGS:

- A. Conduit Nema TC2: 40 PVC or 80 PVC manufactured in accordance with Underwriter's Laboratory Standard and UL listed.
- B. Fitting and conduit bodies TC3.
- C. Acceptable Manufacturers:
 - 1. Allied
 - 2. Carbon
 - 3. FRE Conduit

2.02 CONDUIT SUPPORTS

- A. Conduit Clamps, Straps, and Supports: malleable iron for riser assemblies.

PART 3 EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORTS

- A. Size conduit for conductor type installed. 3/4" (20mm) minimum size.
- B. Arrange conduit to present a neat appearance.
- C. Route exposed conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
- D. Maintain minimum 6" clearance between conduit and piping. Maintain 12" (300mm) clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- E. Paralleled conduit shall be run straight and true with offsets uniform and symmetrical. Conduit terminals, boxes and cabinets shall be rigidly secured with double locknuts, one inside and one outside and bushings. Insulated bushings of the plastic type shall be used on all conduits 3/4" trade size and larger. Lacquer coating of conduits shall be removed where ground clamps are to be installed.
- F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
- H. Exposed conduit shall be securely fastened in place in accordance with the latest issue of the NEC. Horizontal and vertical conduit runs may be supported by one-hole malleable straps, clampbacks or other approved device with suitable bolts, expansion shields where needed or beam clamps for mounting to building structure or special brackets. Adjustable hangers may be used to suspend conduits when separately located. The required strength of the supporting equipment shall be based on the combined weight of conduits, hangers and cables.

3.02 CONDUIT INSTALLATIONS ABOVE GRADE

- A. Cut conduit square using a saw or pipe cutter; de-burr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.

- D. Install no more than the equivalent of four 90 degree bends between boxes.
- E. Use conduit bodies to make sharp changes in direction.
- F. Use hydraulic one shot conduit bender or factory elbows for bends in conduit larger than 2" (50 mm) size.
- G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
- J. Where conduit penetrates fire-rated walls and floors, provide mechanical fire-stop fittings with UL listing fire rating equal to wall or floor rating.
- K. PVC conduit installed on exterior above grade or in unheated areas shall utilize expansion fittings at a minimum of every 5 foot.
- L. Nema 4-X boxes shall use Nema 4-X rated hubs for termination

3.03 SCHEDULE OF CONDUIT INSTALLATION

- A. Interior or Exterior installation Above Grade: Schedule 80 PVC.
- B. Underground Conduit: Schedule 40 PVC.

*****END OF SECTION*****

**SECTION 16123
WIRE AND CABLE**

PART I GENERAL

1.01 WORK INCLUDED

- A. Building Wire
- B. Cable
- C. Wiring connections and terminations

1.02 REFERENCES

- A. NEMA WC-5 thermoplastic insulated wire and cable for the transmissions and distribution of Electrical Energy

1.03 SUBMITTALS

- A. None

PART 2 PRODUCTS

2.01 BUILDING WIRE

- A. Thermoplastic insulated Building Wire - NEMA WC 5
- B. Feeders and Branch circuits larger than 8 AWG: copper stranded conductor, 600 volt insulation, THHN/THWN.
- C. Branch circuit 10 AWG and Smaller copper solid conductor, 600 volt insulation, THHN/THWN.
- D. Control Circuits Discrete: Copper, stranded conductor 600 volts insulation, 14 AWG THWN.
- E. Control Circuits Analog: 4-20 ma conductors shall be #16 AWG twisted pair shielded cables with tape shield, drain wires, and outer thermoplastic jacket.

2.02 CONDUCTORS

- A. All conductors shall be tinned soft or annealed copper wire of the quality manufacturers in accordance with ASTM Specifications. Cutting away of strands to permit inserting into lugs will not be tolerated.
- B. All wiring shall be color coded by pigmentation. Not tape color coding is acceptable.
- C. Conductor sizes shall be American Wire gauge sizes as indicated and stranded construction. All wires to be factory marked with stamping every two feet indicating size, type, voltage, rating and manufacturer's name. Wire shall be factory color coded, except for feeder wire. Color coding shall be as follows:

277/480 vac, 3 phase, 4 wire: Phase A (1) Brown, Phase B (2) Orange, Phase C (3) Yellow, Neutral (N) Gray, and ground (G) Green

120/230 VAC 1 phase 3 wire: Phase A (1) Black, Phase B (2) Red, Neutral (N) White, and Ground (G) Green.

The system grounding conductor shall be colored green. Note the green coding required by NEC of conductors intended solely for the grounding purposed. In multi-conductors, the group shall be color coded. All color coding shall be by pigmentation. Surface colored wires will not be accepted.

- D. Low Voltage Conductors: Twisted pair shielded 16 AWG with inner jacket, flame retardant, aluminum tape, outer thermoplastic jacket wet or dry and drain wires.

2.03 ACCEPTABLE MANUFACTURERS

- A. Phelps Dodge
- B. Houston
- C. Southwire

PART 3 GENERAL

3.01 GENERAL WIRING:

- A. Use no wire smaller than 12 AWG for power and lighting circuits.
- B. Place an equal number of conductors for each phase of a circuit in same raceway or cable.
- C. Splice only in junction or outlet boxes.
- D. Neatly train and lace wiring inside boxes, equipment and panelboards.

- E. Each feeder conductor in pull box or panel containing more than one home run shall be identified by non-magnetic metal tag. Tags shall be one inch in diameter and have stamped numbers and letters 1/2" high. Tape with printed numbers, etc., type identifiers shall be acceptable for branch circuits wiring. Engraved plastic laminated plates for panelboards, switchgear, transformers, etc., will be required. Embossed plastic adhesive tape will not be acceptable for temporary use during construction. Thoroughly wipe wire and cable with alcohol to clean surface before applying tape type identifiers.

3.02 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricants for pulling 4 AWG and larger wires.
- B. Install wire in raceway after all Mechanical work likely to injure conductors has been completed.
- C. As far as practicable, all feeder cables shall be continuous from origin to panel termination without running splices in intermediate pull boxes or splicing chambers. Sufficient slack shall be left at the termination to make proper connections. Unless otherwise noted, each conduit raceway shall contain only those conductors constituting a single feeder circuit. All cable terminals, taps and splices shall be made secure. Where conductors are to be connected to metallic surfaces, the coated surfaces for the metal shall be polished before installing the connector. Marlin twine shall be used to bind cable groups together.
- D. Completely and thoroughly swab raceway system before installing conductors.

3.03 CABLE INSTALLATION

- A. Use suitable cable fittings and connectors.

3.04 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes, outlets, or handholes if necessary, avoid splicing if possible.
- B. Power and Lighting circuits #10 AWG and smaller shall have solid copper conductors. Conductor sized #8 AWG and larger shall have Class B stranded conductors #10, #12, AWG, Copper and smaller shall be spliced by twisting securely and by means of mechanical connector plugs gum rubber tape, friction tape or

approved plastic tape. The contractor shall use Ideal "Wire nuts" for lighting fixture lead splices to branch circuit conductors. As an option, the contractor may use ideal "wire nuts" or T & B "Piggy" connectors for branch circuits splices (#10 and #12) in junction boxes and lighting fixtures. Solderless mechanical connectors for splices and taps provided with U.L. approved insulating covers may be used instead of mechanical connectors plus tape.

- C. Use mechanical or compression connectors for copper wire splices and taps #8 AWG and larger. All joint splices and taps and other sections of wiring requiring taping shall be taped with at least two layers of approved gum rubber tape which shall be laid on with half lap followed by at least one layer of friction or plastic tape laid on with half lap. The intent of this specifications is that the taping shall be neatly done and form a permanently secured insulation equal to 150 percent of the insulation value of the conductor.
- D. Thoroughly clean wires before installing lugs and connectors.
- E. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- F. Terminate spare conductors with electrical tape.
- G. When the conductor length from the panel to first outlet on a 120 V circuit exceeds 50 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG.

3.05 FIELD QUALITY CONTROL

- A. Field inspection and testing shall be performed.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Torque test conductor connections and terminations to manufacturer's recommended value.
- D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.
- E. Branch circuit voltage drop shall not exceed (3%) three percent. The maximum total voltage drop on both feeders and branch circuits shall not exceed (5%) five percent.

F. FEEDER INSULATION RESISTANCE TESTING

1. All current carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500 volt megger. The procedures listed below shall be followed:
 - a. Minimum readings shall be one million (1,000,000) or more ohms for #6 wire and smaller, 250,000 ohms or more for #4 wire or larger, between conductors and between conductor and the grounding conductor.
 - b. After all fixtures, devices and equipment are installed and all connections completed to each panel, the contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel and until the low readings are found. The reconnect and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
 - c. The contractor shall send a letter to the engineer certifying that the above has been done and tabulating the megger readings for each panel. This shall be done at least four (4) days prior to final inspection.
 - d. At final inspection, the contractor shall furnish a megger and show the engineers that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and a voltmeter and take current and voltage readings as directed by the representatives.

3.06 WIRE AND CABLE INSTALLATION SCHEDULE

- A. Exposed Interior Locations: Building wire in raceways.
- B. Concealed Interior Locations: Building wire in raceways.
- C. Exterior Locations: Building wire in raceways.

*****END OF SECTION*****

**SECTION 16130
BOXES**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Wall and ceiling outlet boxes
- B. Pulling and junction boxes

1.02 RELATED WORK

- A. Section 16141 General Purpose Wiring Devices

1.03 REFERENCES

- A. ANSI/NFHA OS 1 Metal outlet boxes, device boxes, covers and box supports
- B. UL Standard 886
- C. FED. SPEC. W-C-583B

PART 2 PRODUCTS

2.01 OUTLET BOXES

- A. Sheet metal outlet boxes: ANSI/ NEMA OS 1; galvanized steel with 1/2 inch (13mm) male fixture studs where required. Boxes shall be at least 2-1/2" deep and of sufficient size to accommodate devices noted. Boxes for fixtures shall have mounting lugs or ears for covers. Wall switch outlet boxes shall be set as indicated above finished floor. Where located near doors, they shall be installed on the lock side of the door.
- B. Cast metal boxes: cast ferroalloy, deep type, threaded hubs (surface mounted installation).
- C. ACCEPTABLE MANUFACTURERS
 - 1. RACO
 - 2. STEEL CITY
 - 3. APPLETON

2.02 OUTLET BOXES - SHEET METAL

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1. galvanized steel with 1/2 inch (13 mm) male fixture studs where required. Boxes shall be at least 2-1/2" deep and of sufficient size to accommodate devices noted. Boxes for fixtures shall have mounting lugs or ears for covers. Wall switch outlet boxes shall be set as indicated above finished floor. Where located near doors, they shall be installed on the *lock* side of the door.

- B. ACCEPTABLE MANUFACTURERS
 - 1. RACO
 - 2. STEEL CITY
 - 3. APPLETON

2.03 PULL AND JUNCTION BOXES:

- A. Sheet metal junction boxes: ANSI/NEKA OS I
 - 1. Pull and junction boxes shall be fabricated from galvanized sheet steel not less than 16 gauges thick with covers held in place by corrosion resisting machine screws. Boxes shall be furnished and installed where indicated on the plans and where necessary to facilitate cable pulling and splicing. Box size shall be as required by NEC for the number of conduits and conductors entering and leaving it. Where feeder splices are to be made, box shall be large enough to provide ample work space. Boxes shall be installed in locations approved by the Engineer. Exposed junction boxes 4-11/16" x 4" x 4" shall be covered with Bowers #649 and #469 "blank Box covers" respectively.

2.04 CABLE BOXES:

- A. The electrical contractor shall furnish and install junction boxes, pull boxes, cable support boxes, and wiring troughs as shown on the drawings, herein specified or otherwise required. All boxes shall be of the code gauge galvanized steel with screw covers fastened with corrosion resistant machine screws and they may be painted or treated to resist corrosion in addition. Boxes shall be supported independently of conduits entering them. Brackets, rod hangers, bolts or other suitable supporting methods may be used.

2.05 JUNCTION BOXES – STRUCTURES

- A. Junction boxes in structures as designed for interconnection to pump power or control cable shall be stainless steel construction rated NEMA 4-x as designated on the drawings. All power and control cables shall be continuous. No splices.
- B. Junction boxes shall be utilized 304 (19-8) stainless steel screws for all mounting.
- C. Hubs for all conduit entry shall similarly be rated for NEMA 4-x.

2.06 ACCEPTABLE MANUFACTURERS

- 1. Carlon
- 2. Crouse Hinds
- 3. Or equal

PART 3 EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on drawings and as required for splices, taps, wire pulling, equipment connections and code compliance.
- B. Electrical box locations shown on contract drawings are approximate unless dimensioned. Verify locations of outlets in work areas prior to rough-in. owner reserves the right to make minor changes in the location of any switch or box without additional cost prior to installation.
- C. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of required access doors.
- D. Locate and install to present a neat appearance.
- E. Before any outlet box or switch for use by other trades is set, the exact location required shall be obtained from the contractor installing the equipment. If not adhered to, the Electrical contractor shall be responsible for changes at no cost to the owner or other trades.

3.02 OUTLET BOX INSTALLATION

- A. Provide surface mounted cast metal outlet boxes for devices as per drawings
- B. Provide recessed sheet metal outlet boxes with masonry plaster ring.
- C. Provide knockout closures for unused openings.
- D. Support boxes independently of conduit.
- E. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage.
- F. Coordinate mounting heights and locations of outlets mounted in enclosures or cabinets.
- G. Position outlets to locate luminaries as shown on Room Floor Plans.
- H. Provide surface mounted boxes when designated; secure boxes to wall and accurately position.
- I. Provide cast outlet boxes in interior or exterior locations exposed to the weather and wet locations. All surface outlet boxes interior shall also be cast metal.
- J. Align wall mounted outlet boxes for switches, timers and similar devices.
- K. Provide stainless steel bolts and screws in corrosion resistant applications.

3.03 PULL AND JUNCTION BOX INSTALLATION

- A. Install pull boxes and junction boxes above in unobtrusive locations.
- B. Support pull and junction boxes independent of conduit.
- C. Provide stainless steel bolts and screws in corrosion resistant applications.
- D. Junction boxes exterior or interior shall be stainless steel NEMA 4-X.

*****END OF SECTION*****

**SECTION 16141
GENERAL PURPOSE WIRING DEVICES**

1.0 GENERAL

1.01 WORK INCLUDED

- A. Wall Switches. (General Purpose)
- B. Receptacles (General Purpose)
- C. Device Plates and Box Covers.

1.02 REFERENCES

- A. FS W-C 596 - Electrical Power Connector, Plug, Receptacle and Cable Outlet.
- B. FS W-S-896 - Switch, Toggle.
- C. NEMA WD 1 - General Purpose Wiring Devices.

1.03 SUBMITTALS

- A. Provide product data showing configuration, finishes, dimensions and manufacturer's instructions.

PART 2 PRODUCTS

2.01 WALL SWITCHES

- A. Wall Switches for General Purpose lighting circuits NEMA WD; 1, AC general use snap switch with toggle handle, rated 20 amperes and 120-277 volts AC. Handle: Ivory plastic.
- B. Toggle switches shall be of the grounding type with hex head grounding screw, rated 20A 120/277volt AC only. All switches shall have quiet operating mechanisms without the use of Mercury switches. All switches shall be listed by an "approved" third party agency, approved for the voltage and amperage indicated.

**2.02 ACCEPTABLE MANUFACTURERS - WALL SWITCHES
(INDUSTRIAL SPECIFICATION GRADE)**

- A. Toggle Switches.
 - 1. Hubbell 1221-1 single pole 20 ampere.

2. Bryant 4901-1 ampere.
3. Slater Medalist 720-AG-IV 20 ampere
4. Or Equal

2.03 RECEPTACLES (Industrial Specification Grade)

- A. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20 R Ivory Plastic Face.
 1. Duplex receptacles shall be of the grounding type, arranged for back and side wiring, with separate single or double grounding terminals. Receptacles shall be straight blade, rated 20A., 125 volt and the face configuration shall conform to the NEMA Standard No. WDI.101968, and shall be "approved" third-party listed. Self grounding or automatic type grounding receptacles are not acceptable in lieu of receptacles with separate grounding screw lugs and a direct, green insulated conductor connection to the equipment grounding system.
 2. Receptacles shall be specification grade, mounted vertically. Receptacles mounted over Counter, back-splashes, etc., shall be mounted horizontally.
 3. Special wiring devices shall be shown on the drawings with complete description thereof.

2.04 GFCI RECEPTACLES

- A. Exterior receptacles shall be ground fault interrupting and be made in conformance with NEMA WD-1-1.10. Models shall be UL listed "Hospital Grade" and Certified IT "corrosion resistant" enduring the 500 hour ASTM B-117-73 salt spray (fog) test. Receptacles shall be NEMA 5-20R configuration rated for 20 amperes and 125 volts AC and be ivory in color.

2.05 ACCEPTABLE MANUFACTURERS RECEPTACLES (GFCI)

- A. Leviton 6398-HGI
- B. Hubbell GF-8300I
- C. Or Equal

2.06 WALL PLATES

- A. Interior Cover Plate Flush: Smooth Stainless Steel

2.07 ACCEPTABLE MANUFACTURERS - WALL PLATES

- A. Hubbell S-8 (General Purpose) (Receptacles Flush)
- B. Crouse-Hinds S1 (Switches 1 gang)
- C. Crouse-Hinds S2 (Switches 2 gang)

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install interior wall switches 48 inches (1.2m) above floor, "OFF" position down.
- B. Install interior convenience receptacles 18 inches (450mm) above floor grounding pole on bottom unless noted otherwise.
- C. Install galvanized steel plates on junction boxes.
- D. Install devices and wall plates flush and level.
- E. Install switches in such a manner that the one nearest the door controls the light or row nearest the door to the further switch and further light or row.

*****END OF SECTION*****

**SECTION 16147
PLATE COVERS**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Plate Covers.

1.02 RELATED WORK

- A. Section 16141 – General Purpose Wiring Devices

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Hubbell
- B. Bryant
- C. Leviton

2.02 MATERIALS

- A. Stainless Steel: Type 302 or 304, No. 4 finish, 0.040 inch (1mm) thick, accurately die cut, protected with release paper. Screws shall be slotted head oval screws to match the material of the plate.
- B. Cast Metal: Die cast profile, ribbed for strength, flash removed, primed with gray enamel, furnished complete with four mounting screws for exposed work.
- C. Gaskets: Resilient rubber or closed cell foam urethane.
- D. Steel: Hot dip galvanized, 1.25 oz./sq. ft. (381 g/sq.m) min.

2.03 PLATES

- A. Flush Mounting Plates: Beveled type with smooth rolled outer edge, stainless steel.
- B. Surface Box Plates: Beveled type with smooth rolled outer edge, stainless steel.
- C. Where two-gang boxes are required for single gang devices, provide special plates with device opening in one-gang and second gang blank.

- D. Weatherproof plates: Exterior mounted switch and receptacle plates and those noted as weatherproof shall be weatherproof cast metal cover plates, standard size, single or ganged as indicated on the drawings and shall be "approved" third party listed as "raintight while in use".

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install coverplates on wiring devices.
- B. All exterior plates and interior as designated shall be raintight while in use designated to fit the cast metal boxes.

*****END OF SECTION*****

**SECTION 16190
SUPPORTING DEVICES**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Conduit and equipment supports
- B. Fastening hardware

1.02 RELATED WORK

- A. Section 16111 - Conduit

1.03 QUALITY ASSURANCE

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry. Conduit shall be supported in a method and at a spacing as approved by the NEC, except as designated otherwise.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Support Channel: stainless steel.
- B. Hardware: Corrosion resistant stainless steel bolts.
- C. Aluminum mounting plates.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors and preset inserts.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
- C. Do not fasten supports to piping; ductwork, mechanical equipment or conduit.

- D. Do not use powder actuated anchors.
- E. Do not drill structural steel members.
- F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagonal bolts with spring lock washers under all nuts.
- G. Support lighting fixtures directly from ceiling structural support system. Support fixtures from its four corners directly to building structure.
- H. Conduit shall be supported by approved pipe straps or clamps:
- I. Conduit installed on the interior of exterior building walls shall be spaced off the wall surface a minimum of 1/4 inch using "clamp-backs" or strut.

*****END OF SECTION*****

**SECTION 16195
ELECTRICAL IDENTIFICATION**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Nameplates and tape labels.
- B. Wire and cable markers.
- C. Conduit color coding.

1.02 RELATED WORK

- A. Section 16120 - Wire & Cable.

1.03 SUBMITTALS

- A. Include schedule for nameplates and tape labels.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Nameplates: Engraved three-layer laminated plastic, blue surface with white core for 120/230 volt equipment. Black surface with white core for 277/480 volt equipment. Include equipment name, amperage, voltage, and phase.
- B. Wire and Cable Markers: Metal tags, split sleeve or tubing type.
- C. Self sticking vinyl cloth wire markers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Degrease and clean surfaces to receive nameplates and tape labels.
- B. Install nameplates and tape labels parallel to equipment lines.
- C. Secure nameplates to equipment fronts using screws or rivets. Secure nameplate to inside face of recessed panelboard doors in finished locations. Adhesive to secure plates will not be allowed.

- D. Embossed tape will not be permitted for any application.
- E. Clean wire and cable with alcohol to receive self sticking wire markers.

3.02 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams for control wiring.

3.03 NAMEPLATE ENGRAVING SCHEDULE

- A. Provide nameplates to identify all electrical distribution and control equipment, and loads served. Letter height: 1/4 inch (6 mm) for distribution and control equipment identification. Provide with equipment, voltage, amperage, and phase.

3.04 CONDUIT RUNS AND CONDUIT IDENTIFICATION

- A. All empty conduit runs and conduit with conductors identified for future use shall indicate where they terminate. Identification shall be by tags with string or wire attached to conduit or outlet. List amperage, voltage, and phase (i.e. 200 amperage 277/480 VAC, 3 phase)

3.05 OUTLET, JUNCTION, AND PULL BOXES

- A. All outlet boxes, junction boxes, and pull boxes shall have their covers and exterior visible surfaces painted with colors to match the surface color scheme outlined above. This would include covers on boxes above left out and other type accessible ceilings.

*****END OF SECTION*****

SECTION 16450 GROUNDING

PART 1 GENERAL

- A. Power system grounding.

1.02 RELATED WORK

- A. Section 16111 - Conduit.
- B. Section 16120 - Wires and Cables.

1.03 REFERENCES

- A. None

1.04 REGULATORY REQUIREMENTS

- A. All grounding shall be in accordance with the requirements of the latest edition of the National Electric Code. The Contractor shall furnish and install complete and effective grounding for the entire electrical system. Use proper grounding locknuts, bonding type bushings where required, or their suitable devices required.

1.05 TESTS

- A. Measure ground grid resistance with earth test megger and install up additional ground rods and conductors as required until resistance to ground is 25 ohms or less.

PART 2 PRODUCTS

2.01 GROUND BUS

- A. 2 X 1/4 inch (50 X 6 mm) copper minimum, mounted on insulating standoffs, complete with lugs for connecting grounding cables.
- B. Green equipment grounding conductors carried throughout all conduit runs. Ground conductor shall run from panel ground to equipment.
- C. The raceway shall not be relied on for ground continuity.

PART 3 EXECUTION

3.01 POWER SYSTEM GROUNDING

- A. **Circuit Grounding:** Install grounding bushings, grounding studs, and grounding jumpers at pullboxes and panelboxes.
- B. **Equipment Grounding Conductors:** Provide green insulation, size correlated with overcurrent device protecting the wire, attach to grounding bushings on conduit, to lugs on boxes, and other enclosures. Connection to neutral only at service neutral bar. Maintain grounding and neutral separation throughout system from this point.
- C. **Furnish and install double locknuts and insulating bushings, on all conduits entering outer boxes, panelboards, junction boxes, etc., made up tight to insure a continuous ground of minimum resistance from main distribution point on the raceway system. One locknut shall be used on boxes with treated hubs.**
- D. **All non-current carrying equipment shall be bonded together and grounded. All metal outlet and pull boxes shall have jumper and ground screw. All receptacles and switches shall use jumper and ground screw.**

The main electrical service shall be grounded by three (3) means:

To the cold water main, if metallic and in direct contact with the earth for at least 10 feet as per NEC 250-81.

To the steel frame of the building, provided the building is effectively grounded.

To ground rod(s). Ground rods shall be 10 feet long and $\frac{3}{4}$ inches in diameter and shall be copper clad steel construction. All ground connections shall be accessible.

The ground resistance of any "made" electrode shall be measured by an earth megger device and it shall be 25 ohms or less as per NEC 250-84.

Boxes with concentric, eccentric, or oversized knockouts shall be provided with bonding bushings and jumpers. The jumper shall be sized per NEC table 250-94 and lugged to the box.

*****END OF SECTION*****

**SECTION 16471
CIRCUIT BREAKERS & PANELBOARDS**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Distribution Panelboards
- B. Branch Circuit Panelboards
- C. Circuit Breakers

1.02 REGULATORY REQUIREMENTS

- A. Construct panelboards to UL standards and provide UL labels.
- B. Width of gutters shall be in accordance with the 2011 National Electric Code, Article 373-6 based on deflection of conductors.
- C. Panelboards identified for use as service equipment shall be so labeled.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Square D
- B. Cutler Hammer
- C. General Electric (Type A series with screw cover)

2.02 SUBMITTALS

- A. Submit shop drawings and product data.

2.03 ENCLOSURES

- A. **PANELS:** Surface mounted complete with panel trim having concealed hinges and trim mounting screws. Provide locking door with flush catch. Panels shall be made of painted steel. Panelboards shall be rated Nema 1. Front shall be of painted steel . Fronts shall be furnished with approved adjustable trip clamps as a means of securing the front to the box.
- B. **TUBE:** Painted Steel
- C. **KEYS:** Provide two keys for each panel. Make keys interchangeable for panels of same voltage.
- D. **DIRECTORY:** Provide directory holder with glass or plastic plate and metal frame mounted on inside of each door. Circuit directory shall be typewritten.
- E. Provide tin plated copper buses in all panelboards throughout.

2.04 277/480 VOLT PANELBOARDS

- A. Panelboards: 3 phase, 4 wire, solid neutral design with sequence style bussing and full capacity neutral, composed of an assembly of bolt-on (as specified) type molded case thermal magnetic circuit breakers. Provide minimum interrupting rating as designated in interrupting schedules. No series rating is allowed.

2.05 120/230 VOLT PANELBOARDS

- A. Panelboards: 1 phase 3 wire, solid neutral design with sequence style bussing and full capacity neutral, composed of an assembly of bolt-on (as specified) type molded case thermal magnetic circuit breakers. Provide minimum interrupting rating as designated in interrupting schedules. No series rating is allowed.

2.06 CIRCUIT BREAKERS

- A. Circuit breakers shall be bolt-on type of the indicating variety, providing "ON", "OFF", and "TRIP" positions of the operating handle. When the breaker is tripped automatically, the handle shall assume a middle position between "ON" and "OFF". All multi-pole breakers shall be so designated that an overload on the one pole automatically causes all poles to be open and it shall be common trip. Field installed handle ties shall not be accepted. The circuit breaker shall be quick-make and quick - break on manual as well as automatic operation and have inverse time characteristics secured through the use of bimetallic tripping element supplemented by a magnetic trip.
- B. No half size or tandem circuit breakers will be allowed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide mounting brackets, busbar drillings, and filler pieces for unused spaces.
- B. Prepare and affix typewritten directory to inside cover of panelboards indicating both new and relocated loads controlled by each circuit.
- C. An engraved nameplate shall be provided for each panel.

*****END OF SECTION*****

**SECTION 16483
MOTOR STARTERS**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Motor Starters for ventilation equipment.

1.02 RELATED WORK

- A. Section 16195 - Electrical Identification
- B. Section 16471 – Panelboards and Circuit Breakers

1.03 REGULATORY REQUIREMENTS

- A. Provide motor protection switches of the appropriate NEMA size. For units not using NEMA ratings, use equivalent NEMA size.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Square D
- B. Cutler Hammer
- C. Allen Bradley

2.02 COMBINATION MOTOR PROTECTION SWITCHES

- A. Provide molded case automatic air circuit breakers with rotary operating handle and lock-off facility.
- B. Restrict opening of switch enclosure by the use of a defeater screw unless switch is in the OFF position.
- C. Provide full voltage magnetic starters of NEMA size and voltage rating indicated on drawings.
- D. Provide contractors with three ambient compensated type thermal overload relays.
- E. Provide elapsed time meter mounted in cover.
- F. 120 volt holding coil.

- G. Provide pilot light in cover, red transformer type.
- H. Provide remote control devices for starter operation as indicated.
- I. Provide phase monitor relays to deenergize control for undervoltage, loss of phase, and phase reversal.
- J. Provide variable time delay relays on all starters for staggered starting.
- K. Include control circuit interlocked with safety switches.
- L. Provide two sets of normally open auxiliary contacts in addition to standard auxiliary holding contacts supplied with each contactor.
- M. Provide hand off auto selector switches mounted through starter/disconnect cover.
- N. Provide control transformer 480/120 volts of sufficient capacity to handle operating coil and associated controls for motor starter.
- O. Provide starters in NEMA type 1 painted steel enclosures

2.03 REDUCED VOLTAGE SOLID STATE SOFT START STARTERS:

Starters shall be soft start reduced voltage starter, heavy duty Nema rated for motor full load current. Provide ramp up and ramp down features use multipurpose control consisting of six (SCR) silicon control rectifiers connected in inverse parallel to provide three phase full wave control of voltage and current delivered to the three phase 480 VAC motor. The control shall use (MOV) metal oxide varistors to provide surge protection. Dip switch and potentiometers shall be used for setup with LED indicators and status contacts. Also include bar graph representation of the motor current from 0-400% FLA.

Starters shall be three (3) pole having three (3) manually resettable overload relays providing complete single phasing and overload protection with a reset pushbutton in the front door. Provide door mounted control components and indicating lights as specified, and as shown on the drawings, or as required for the equipment to be controlled. All starters shall be equipped with a minimum of two (2) auxiliary contacts. It shall be CONTRACTOR's responsibility to provide approved sized overload relay heaters in all starters.

Include reduced voltage pump option for deceleration ramp of closed loop feedback of the motor back EMF.

PART3 EXECUTION

3.01 INSTALLATION

- A. In finished areas, mount magnetic motor starters level and install suitable identification plates.
- B. Install heaters correlated with full load current on motors provided.
- C. Set overload devices to suit motors provided.
- D. Provide overcurrent protection with circuit breakers to suit actual motor full load current inrush.
- E. Provide flexible metallic conduit for terminations to motors (2 foot maximum).
- F. Use type "E" conduit fittings on single phase motor terminations.
- G. Install starter stations integral to control panels per plans.

*****END OF SECTION*****

**SECTION 16491
DRY TYPE TRANSFORMERS**

PART 1 GENERAL

- A. This section includes supply and installation of dry type transformers, supports, and accessories.

1.01 RELATED WORK

- A. Section 16111 – Conduit
- B. Section 16123 – Wires and Cables

1.02 SUBMITTALS

- A. Submit shop drawings and product data.

1.03 REGULATORY REQUIREMENTS

- A. NEMA ST20 Standard for a 220 degrees C UL components recognized insulation system.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Square D
- B. Cutler Hammer
- C. General Electric

2.02 TRANSFORMERS

- A. Three phase transformers shall be 25 KVA 480 VAC primary and secondary voltage 120/230 VAC as designated single phase 3 wire.
- B. Transformer shall have a minimum of four 2 ½% full capacity primary taps.
- C. Transformer shall be 150° C temperature rise about 40° C ambient. All insulating materials shall be in accordance with NEMA and UL standards listed above.
- D. Transformer shall be NEMA 1 painted steel and be ventilated.

- E. All cores to be constructed of high grade, non-aging silicone steel with high magnetic permeability, and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below the saturation point. The core laminations shall be lapped together with structural steel angles. The completed core and coil shall then be bolted to the base of the enclosure but isolated therefrom by means of rubber, vibration-absorbing mounts. There shall be no metal to metal contact between the core and coil of the enclosure. The vibration isolating system shall be designed to provide a permanent fastening of the core and coil to the enclosure. Sound isolating systems requiring the complete removal of all fastening devices will not be acceptable.
- H. The maximum temperature of the top of the enclosure shall not exceed 50° C rise above a 40° C ambient.
- I. The core of the transformer shall be visibly grounded to the enclosure by means of a flexible grounding conductor sized in accordance with applicable NEMA, IEEE, and ANSI standards.
- J. Sound levels shall be guaranteed by the manufacturer not to exceed 50 DB.
- K. The transformer shall be listed by Underwriter's Laboratory for the specified temperature rise.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide for transformers to be wall mounted.
- B. Provide for interconnecting of secondary neutral and equipment ground back to the main system grounding via grounding electrode conductor. Assure transformer grounding continuity to the main electrical system ground.

*****END OF SECTION*****

SECTION 16501

LAMPS

1.01 WORK INCLUDED

- A. Provide and install items as indicated.

1.02 RELATED WORK

- A. Section 16502 - Ballasts & Accessories
- B. Section 16510 - Lighting Fixture

1.03 SUBMITTALS

- A. Submit manufacturer's installation instructions and complete schedule including manufacturer's data and cuts.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. General Electric
- B. Phillips
- C. Sylvania

2.02 LED LAMPS

- A. LED Lamps: 3000 K, (85) CRI color rendering index, 180 degree beam spread, +/- 75 K color variation, 45 lumens per watt efficacy.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install lamps in accordance with manufacturer's instructions.

*****END OF SECTION*****

**SECTION 16502
BALLAST AND ACCESSORIES**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide and install required ballasts.

1.02 RELATED WORK

- A. Section 16510 - Lighting Fixtures
- B. Section 16501 - Lamps

1.02 REGULATORY REQUIREMENTS

- A. Provide ballasts that meet standards of an electrical testing laboratory and ANSI C82.11.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. General Electric
- B. Advance
- C. Universal

2.02 LED LAMPS - LED DRIVERS

- A.
 - 1. Input voltage 120 VAC
 - 2. Minimum power Factor - .98
 - 3. frequency 60 Hz
 - 4. 1 Channel
 - 5. output volts 6-20 VDC
 - 6. Minimum operating temperature – 20C
 - 7. THD – Less than 10%

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide ballasts of compatible design to lamps specified.
- B. Ballast shall be mounted in fixtures to reduce - noise transmission.

*****END OF SECTION*****

**SECTION 16510
LIGHTING FIXTURES**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. This section includes supply and installations of luminaries, supports and accessories and supply of surface mounted boxes, pendant stems and canopies required for a complete installation.

1.02 RELATED WORK

- A. Section 16123 - Wires and Cables
- B. Section 16190 - Supporting Devices
- C. Section 16501 – Lamps
- D. Section 16502 - Ballasts and Accessories

1.03 SUBMITTALS AND SAMPLES

- A. Submit shop drawings and product data.
- B. Submit shop drawings for luminaries indicating physical characteristics.
- C. Provide complete photometric data and heat dissipation reports from independent testing laboratory.

1.04 INTERFACE

- A. Confirm compatibility and interface of other materials with luminaire and ceiling system report discrepancies to the Engineer and defer ordering until clarified.

1.05 LUMINAIRE DESIGNATIONS

- A. Luminaries: LED type

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. See lighting fixture schedule.

2.02 LED LUMINAIRE

- A. Prime coat and finish in high reflectance baked enamel, two coats minimum of exposed and reflective surfaces, giving reflectance of 85 percent.
- B. Reflective -plates may be 22 gauge (0.80 mm) metal for modular fluorescent fixture and 20 gauge (0.90 mm) steel housing.
- C. Provide 20 gauge (0.90 mm) steel housing.
- D. Provide hinged ' frames with catches, removable for cleaning without tools. Support surface mounted fixtures from building structure.
- E. Provide gasketing, stops and barriers to form light traps and prevent light leaks.
- F. Design luminarie to dissipate ballast and lamp heat.
- G. Ballasts shall be LED drivers and meet the following criteria:
 - a. Driver to be UL Listed as Section 16502.
- H. Provide LED energy saving lamps as indicated.
- I. Use formed or ribbed backplates, endplates, reinforcing channels.
- J. Surface mounted fixture shall be UL rated for low density ceilings.
- K. Paint finishes shall be baked on enamel painted finish or standard color to be designated by owner.
- L. Provide luminaire disconnecting means as required by 2011 NEC 410.73 (G) 2008 410.130 (G).

PART 3 EXECUTION

A. INSTALLATION

3.01 SUPPORTS

- A. Refer to Section 16190.
- B. Provide concealed EMT raceway and boxes mounted in concealed ceilings.
- C. Where a recessed fluorescent, high intensity, or downlight fixture replaces a section or part of a ceiling tile, fixture is to be supported at the two (2) opposite ends to the steel

frame of the building. Supports shall be provided with the same type of wire as used to support the lay-in ceiling track. Attach one end of the wire to one corner of the luminaire and the other end to the building's structural system. The lay-in luminaire shall then be screwed to the main runners of the lay-in ceiling track at all four (4) corners using sheet metal screws. For fire rated suspended ceiling, luminaire shall be supported to the Building Structure as per the Ceiling Design Criteria, luminaire shall then be screwed to the main runners of the suspended ceiling, track at all four (4) corners using sheet metal screws. It is the electrical designer's responsibility to make sure this work is coordinated with the work of the ceiling contractor through the ceiling specifications. Also, see the ASTM Section "E-580-02" items 3.3, 4.3, 5.5, and 5.6 and the NEC 410-16C.

- D. Mount perimeter and post lighting fixtures at mounting heights indicated.

*****END OF SECTION*****

**SECTION 16617
AUTOMATIC TRANSFER SWITCH
STANDBY POWER**

PART I GENERAL

1.01 WORK INCLUDED

- A. Holden Beach Lift Station # 2 Automatic Transfer Switch

1.02 REFERENCES

- A. UL 1008

1.03 SUBMITTALS

- A. Provide shop submittals including catalog and fabrication information. Provide for automatic starting of existing Mobile Generator

PART 2 PRODUCTS

2.01 AUTOMATIC TRANSFER SWITCH

- A. Furnish and install where shown on the accompanying plans the complete load transfer switch and accessories. The bidder is cautioned to make sure that all equipment necessary for the satisfactory operation of the generator and switch are included in the bid. The function of this switch is to AUTOMATICALLY switch load to the generator and back to commercial power. Transfer switch shall be furnished in the engine generator package. The transfer switch shall bring wiring to terminal block switch control to start generator and transfer load and to retransfer load and deenergize generator.
- B. The load transfer switch shall be manufactured by Russelectric, Zenith, Detroit, Cummins or Asco.
- C. The transfer switch shall have a rating of 400 amperes at a normal and alternate source of 277/480 volts, 3 phase, 60 Hertz, 4 wire.

- D.** The transfer switch shall be capable of switching all classes of load and shall be rated for continuous duty when installed in a non-ventilated enclosure constructed in accordance with Underwriter's Laboratories, Inc. Standard UL-1008.
- E.** The transfer switch shall be 4 pole double throw, actuated by a single electric operator momentarily energized and connected to the transfer mechanism by a simple overcenter type linkage with a total transfer time not to exceed one-half second. The transfer switch shall be capable of transferring successfully in either direction with 70% of rated voltage applied to the switch terminals. The neutral switching contact shall be on the same shaft as the main contacts. The transfer switch shall have a push button for manual transfer of a portable standby generator. The switch shall be used for automatic operation of the existing mobile generator.
- F.** The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in position in both the normal and emergency position without the use of hooks, latches, magnets or springs and shall be silver-tungsten alloy protected by arcing contacts with magnetic blowouts on each pole. Interlocked molded case circuit breakers or contactors are not acceptable.
- G.** The transfer switch shall be equipped with a manual mechanical operator that is designed to prevent injury to the operating personnel if the electrical operator should suddenly become energized during manual transfer. The manual operator shall provide the same contact - to- contact transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly.
- H.** Sequence of Operation: Engine starting contacts shall be provided to start the generating plant if any phase of the normal source drops below 80% of rated voltage after a non-adjustable time delay period of 3 seconds to allow for momentary dips. The transfer switch shall transfer to emergency as soon as the voltage and frequency have reached 90% of rated voltage and adjustable time delay period of 0-30 minutes shall delay transfer to normal power until it has had time to stabilize. If the emergency power source shall fail during the time delay period, the time delay shall be bypassed and the switch shall return immediately to the normal source. After the switch has retransferred to normal, the engine generator shall be allowed to operate at no load for an adjustable period of time (0-5 minutes) to allow it to cool before shutdown. A manual switch shall be mounted on the cabinet door to indicate the switch position. Two auxiliary contacts rated 25 amperes, 120 volts, shall be mounted on the main shaft; one closed on normal, the other closed on emergency. Provide pilot light to indicate switch position on the door.

- I. For proper system coordination, the manufacturer of the transfer switch shall verify that his switch is listed by Underwriter's Laboratories, Inc. at the time of the bid opening, under UL-1008 with a withstand and closing rating at least equal to the interrupting rating of the circuit breaker and/or fuse specified by the Engineer to protect the circuit.
- J. When conducting temperature rise tests to Paragraph 17 of UL-1008, the manufacturer shall include post endurance temperature rise tests to verify the ability of the transfer switch to carry full rated current after completing the overload endurance tests.
- K. In addition to the above, the transfer switch must have a short circuit withstand capability in excess of the UL minimum requirement for 400 ampere switch of 42,000 RMS amperes symmetrical at 480 volts, when coordinated with circuit breakers.
- L. To establish conformance with the above, the manufacturer must produce certified test reports from an independent testing laboratory (factory tests not acceptable) to verify that identical samples have been subjected to three phase short circuit currents at 480 VAC for a minimum of 3 cycles duration without contact damage or contact welding and without the use of current limiting fuse protection.

Oscillograph traces are to be supplied to verify that the test parameters have been met. Product submitted (exact rating of poles, etc.) must be product manufactured for at least 5 years so performance record is established (UL listing required).
- M. The transfer switch shall be housed in a NEMA 1 painted steel enclosure.
- N. Provide exercise timer for future automatic operation.

PART 3 EXECUTION

- A. Install proposed ATS in the second level room as designated.
- B. Interconnect all commercial power failure alarms, etc.
- C. Provide NEMA rated hubs for all conduit terminations.
- D. Provide 3/4" conduit with 4# 14 AWG wires Cu. THHN/THWN from ATS to generator control panel.

*****END OF SECTION*****

**SECTION 16620
GAS DETECTION SYSTEM**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. MSA X5000 Gas Detection Monitor
- B. MSA ES103 Alarm Boxes
- C. Ultima X Sample Pump

1.02 RELATED WORK

- A. Section 16123 Wire & Cable

1.03 REFERENCES

- A. ANSI/NFHA OS 1 Metal outlet boxes.
- B. UL Standard Third Party Listing

PART 2 PRODUCTS

2.01 MSA X5000 GAS DETECTION MONITOR

1. The gas monitor shall be capable of measuring flammable and toxic gas concentrations, display the concentration value on its front face, transmit analog signals corresponding to gas levels and provide local alarming via relays.
2. The gas monitor shall be capable of detecting the following gases in the corresponding measuring range:

Gases	Measuring ranges
Flammable gases and vapors	0-100%LEL
Carbon Monoxide, CO	0-100ppm, 0-500ppm, 0-1000ppm
Hydrogen Sulfide, H ₂ S	0-10ppm, 0-50ppm, 0-100ppm
Oxygen deficiency, O ₂	0-25% v/v

3. Each gas monitor shall consist of one or two sensor assemblies and a transmitter assembly.

4. Sensor assembly

- a. A sensor assembly can be a digital catalytic-bead flammable gas sensor, an infra-red flammable gas sensor or a digital electrochemical-cell gas sensor.
- b. It shall be possible to connect up to two digital sensor assemblies or infra-red flammable gas sensors to one transmitter assembly, in any combination.
- c. The digital sensor assembly shall consist of two parts. The front end of the assembly shall contain the sensors and the back end of the assembly shall contain the electronic circuits and wiring. The back end of the sensor assembly shall be permanently attached to the transmitter via a threaded conduit entry. The front end of the sensor assembly shall be detachable from the back end by unscrewing. No tools shall be required. The electrical connections between the front and back end of the sensor assembly shall be certified safe to detach the front end in a gas hazardous environment even while the transmitter is under power.
- d. The infra-red sensor assembly shall be a single part assembly suitable for connection to the transmitter via a threaded conduit entry. The IR sensor assembly shall be suitable and certified for direct mounting unto the X5000 transmitter or for mounting on a remote junction box.
- e. It shall be possible to mount each digital sensor assembly and infra-red sensor assembly on a separate junction box so that it can be remotely positioned from the transmitter. The distance between each remotely mounted sensor and the transmitter shall be up to 100 meters. No power or signal boosters shall be necessary.
- f. Signal connections between a remote sensor assembly and the transmitter shall be by shielded instrument cabling.

g. Catalytic bead sensor

- i. This sensor shall measure flammable gases and vapors through catalyst aided combustion reaction. The measurement range shall be 0-100% LEL.
- ii. The sensor shall be resistant against poisons such as silicones and sulfur based gases.
- iii. The sensor shall be constructed for durability. Both the active and reference beads in the sensor shall be firmly mounted on mechanical support posts and must not be supported by the platinum coil wire only.
- iv. In addition to the measuring range stated above, the sensor shall also be able to withstand flammable gas concentrations above 100% of full scale reading without damage. The transmitter display shall indicate and latch all over-range instances. This indication shall latch until it is reset.
- v. When operated within manufacturer's stated specifications and in the absence of sensor poisons or contaminating agents, the sensor shall have an average operating life of 48 to 60 months.
- vi. A digital catalytic-bead sensor shall be able to operate continuously in ambient temperatures between -40 C to +60 C.

h. Infra-red sensor

- i. This sensor shall measure flammable gases and vapors through infra-red absorption. The measuring range shall be 0-100% LEL.
- ii. In addition to the measuring range stated above, the sensor shall also be able to measure and indicate flammable gas concentrations above 100% of full scale reading without damage. The X5000 display shall indicate and latch all over- range instances. This indication shall latch until it is reset.

- iii. It shall be possible to restore the sensor's span performance by zeroing the sensor.
- iv. It shall be possible to re-calibrate the sensor for a different target gas by selecting the appropriate calibration span value corresponding to the target gas.
- v. When operated within manufacturer's stated specifications, the sensor shall have an average operating life of 10 years.
- vi. The infra-red sensor shall be able to operate continuously in ambient temperatures between -40 C to +60 C.

i. XCell electrochemical-cell sensor

- i. This sensor measures the concentration of toxic gases and oxygen by measuring the electrical currents created by ionic reactions at the electrodes when the target gas, electrode and electrolyte come into contact, creating a triple point reaction.
- ii. The sensor shall not require any periodic addition of electrolyte or reagents. The sensor shall use a non-consuming reaction that provides a longer shelf life.
- iii. There shall be a built-in ASIC (Application Specific Integrated Circuit) to manage sensor functions including gas concentration measurements, active output compensation, sensor life and health monitoring, and digitizing of the raw sensor signal output for interfacing to the transmitter.
- iv. This sensor shall have the ability to self-correct its reading if it detects a drift due to environmental effects so that the gas measurements are as close as possible to the last good calibration. This self-correction

shall be performed automatically without user intervention and without application of span gas. This advance environmental compensation shall happen at least four times a day (six times/day). When the self-correction is no longer able to compensate for measurement drift, the transmitter shall have the ability to warn the operator that a full gas calibration is needed for measurement correction.

- v. When operated within manufacturer's stated specifications and in the absence of sensor poisons or contaminating agents, the sensor shall have an average operating life of 48 months and not less than 36 months.
- vi. The XCell electrochemical-cell sensor shall be able to operate continuously in ambient temperatures between -40 C to +60 C.

5. Transmitter assembly

- a. The transmitter assembly shall house all the electronic circuits that control gas measurements, alarming levels, gas level displays, status indications, local relays, analog signal outputs and data communications. These electronic circuits shall all be contained within a single main module. It shall be possible to unplug and replace the main module without any special tools.
- b. The transmitter shall be operated with a DC voltage of between 10-30 VDC.
- c. Operator interface
 - i. It shall also be possible to configure the transmitter, acknowledge alarms and reset latched alarms directly on the transmitter via a set of built-in IR touch buttons. These IR touch buttons shall be finger touch sensitive. No special tools shall be needed. Opening of any part of the transmitter housing shall also not be necessary.

- ii. Transmitter setup via the touch buttons shall be password protected.

- d. Bluetooth communications

- i. The transmitter shall also have built-in Bluetooth wireless communications for pairing with suitable Bluetooth devices. This pairing shall be password protected. Initial pairing will require the user to touch buttons on the face of the device.

- ii. The transmitter memory shall be capable of pairing up to 25 devices. It shall be possible to erase paired devices from memory easily.

- iii. Using Bluetooth connectivity, it shall be possible for an operator to view gas readings, reset alarms or to re-configure the transmitter using a tablet from a distance of up to 15 meters away.

- e. Analog signal output

- i. The transmitter shall have the capability of providing two independent 0-20mA analog signal outputs. Each sensor that is connected to the transmitter shall have an independent analog signal output.

- ii. For each output, 4 - 20mA shall correspond to 0-100% full scale measurement, 0
 - 4mA shall be used to indicate operating status and a signal greater than 20mA shall indicate gas concentration over-range. The transmitter display shall latch in over-range until the transmitter is manually reset.

- iii. Cabling for each analog signal output shall be a 3-wire (+24V, COM, SIG) shielded cable.

- f. Data communications

- i. HART data shall be superimposed on one of the two analog outputs.

The digital information carried shall include device information, operational status, pre-emptive maintenance data and fault diagnostic data. HART data shall include information for both connected sensors.

g. Relays

- i. It shall be possible to add a set of interposing relays to the transmitter when needed. When added, two of these relays shall be for alarm signaling or equipment tripping purposes and the third relay shall be for fault signaling purposes. The contact ratings of the relays shall not be less than 5A at 24VDC.
- ii. It shall be possible to change the tripping set-point of each alarm relay via the transmitter front display, or via a Bluetooth device, or via HART communications.
- iii. It shall be possible to configure one of the alarm relays for audible control purpose. When configured as such, the state of the relay shall revert to its normal (no alarm) state when an 'audible silence' signal is received by the transmitter. The audible silence signal can be from a certified pushbutton that is attached to the transmitter or from a contact type switch on a remote control device. The transmitter shall have an input to receive this audible silence signal.

h. Display and indications

- i. There shall be both numerical digits and a tachometer bar for gas concentration indications on the user interface display. The numerical digits and tachometer bar shall be easily readable under bright direct sunlight and device status shall be visible from a distance of up to 10 meters.

- ii. For localization purposes, it shall be possible to adapt the OLED display for different language characters or text.
- iii. The display shall include an indication for sensor life and health. The behavior of this indicator (steady, flashing mode) shall be clear and distinct enough to warn the user of remaining sensor life or imminent sensor failure.
- iv. The transmitter shall also be equipped with LEDs for Ready (Green), Alarm (Red) and Fault (Yellow) status indications.
- v. For power saving, there shall be an Eco-Mode for the OLED display whereby the display turns off after a period of non-activity. The display shall automatically activate when the gas monitor enters an alarming state or when the user activates the display via the touch button.

i. Housing

- i. The transmitter housing shall be constructed in stainless steel (SS316). This housing shall have certification for dust and water ingress protection with an ingress rating of NEMA 4 or IP66. The transmitter housing shall be suitable for prolonged use in an industrial type environment. The stainless steel material used for the housing shall offer robust protection against salt-laden atmospheres typically found at offshore oil & gas and marine environments.
- ii. A bracket suitable for two inch pipe mounting shall be an integral part of the transmitter housing.
- iii. There shall be a permanent location on the transmitter housing for attachment of instrument tagging by wire.

- j. Approvals and certifications
 - i. The full gas monitor assembly shall be gas explosion proof and certified safe for use in gas hazardous environments up to NEC Class I Division 1 & 2 Groups A, B, C, D.
 - ii. It shall also be dust explosion proof and certified safe for use in dust hazardous environments up to NEC Class II Division 1 Group F, G and Class III.

2.02 MSA ES103 (DC EQUIVILANT)

- a. Two (2) strobe light alarm and horn boxes.
- b. Sound module to 103 db @ 1 meter.
- c. Provide reset push button.
- d. NEMA 4X Enclosure.
- e. -25 to +50c (-30 to +122F).
- f. 120 VAC to 24 VDC Power Supply.

2.03 ULTIMA X SAMPLE PUMP

- 1. Sample Pump Performance Specs:
 - a. for Ultima X Sampling Module - Pump Model
 - b. MAXIMUM POWER 8.5 watts at 9 to 30 VDC
 - c. CONSUMPTION
 - d. CABLE Four conductor, shielded, 18 AWG (typical)
 - e. REQUIREMENTS
 - f. SAMPLE 30 seconds at 0.5 LPM with 50 feet (15.25 meters)
 - g. TRANSPORT TIME of .180 (4.57 mm) ID sample tubing
 - h. NOMINAL SAMPLE 2 CFH (1 LPM)
 - i. FLOW RATE
 - j. MINIMUM SAMPLE 1 CFH (.500 LPM)
 - k. FLOW RATE
 - l. MAXIMUM SAMPLE 100 feet (30 meters)
 - m. TUBING LENGTH
 - n. MAXIMUM EXHAUST 20 feet (6 meters)
 - o. TUBING LENGTH
 - p. INLET FITTINGS 1/4" (6.35 mm) OD Tube Fitting
 - q. EXHAUST 1/4" (6.35 mm) OD Tube Fitting
 - r. FITTING
 - s. CALIBRATION 1/4" (6.35 mm) OD Barbed Fitting
 - t. FITTING

- u. OVERALL 9" x 6" x 5" (228.5 cm x 152.4 cm x 127 cm)
 - v. DIMENSIONS
 - w. WEIGHT 4.5 lbs. (2 kg)
 - x. RATING Explosion-proof enclosure, Class I,
 - y. Groups A, B, C and D, Division 1, Hazardous Locations
 - z. ELECTRICAL 3/4-14 NPT
 - aa. ENTRY
 - bb. FLOW FAILURE SPDT at 0.6 Amps, 125 Volts AC or 110 Volts DC
 - cc. RELAY at 2.0 Amps, 30 Volts DC
 - dd. TEMPERATURE -20° to 55°C (-4 to 122°F)
 - ee. RANGE
 - ff. HUMIDITY 15 to 95% RH, Non-condensing
2. Provide sample line to draw gas sample from the monitored area.
 3. Provide flow cap to ensure sensor sampling.
 4. Provide end of line filter.

PART 3 EXECUTION

3.01 INSTALLATION

- a. The MSA X5000 shall be dual point system mounted on the top floor with (1) sensor remote mounted at floor level as H2S is heavier than air and (1) sensor integral mounted with the sample delivered from the lower floor via the sample pump.
- b. The sample pump would also be mounted on the top floor. The X5000 shall have new XCell sensor design with 3-year sensor warranty/5-year typical sensor life and TruCal technology which shall limit the frequency of an actual gas calibration - The X 5000 shall have two alarm relays and one fault relay. The two alarm relays would be discrete with one relay dedicated to each sensor and wired to the ES103 Alarm Boxes on the middle level.
- c. The power supply shall be located on the top floor and shall power the (2) ES103 Alarm Boxes located on the middle level. The ES103 Alarm Boxes Shall have a strobe and piezo buzzer as well as a reset button and would have one dedicated to each sensor
- d. Provide a splitter for the 4-20ma signal.
- e. The bottom level would contain the sample tubing and end of line filter.

*****END OF SECTION*****

**SECTION 16623
MOBILE POWER GENERATOR**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including general and supplemental conditions and Division-I Specifications section, apply to work of this section.

1.02 SCOPE

- A. Work included in this section includes providing a single mobile emergency generator package complete with engine, generator, fuel system and instrumentation. Also included in this section are enclosed circuit breakers, and quick connections.

1.03 MODE OF OPERATION

- A. Normal operations of any emergency equipment at each site shall be through commercial power. Upon commercial power failure at the site, City personnel will hitch a vehicle to the generator two-wheel trailer and tow it to the site. At this location, cable will be unrolled from the trailer and connected to the manual transfer switch generator receptacle at each site. Grounding cable will also be unrolled and attached to the pole driven ground rod. The engine will then be started and the load of the particular equipment will then be transferred to the mobile generator. When power is restored, reverse the procedure.

1.04 QUALITY ASSURANCE

- A. The generator shall be capable of properly energizing the listed loads given, and shall be capable of powering simultaneously all the loads listed. The above requirement shall apply to the starting and running KVA and KW demands of the equipment that is actually installed at the project.
- B. The generator set size indicated is minimum. The CONTRACTOR shall furnish and install a generator set as required for compliance with the preceding paragraph. At no time during starting and running of the loads connected to the generator set, will the power output from the generator set be allowed to exceed the nameplate rating. At no time during the starting of motors connected to the generator set will the generator output voltage be allowed to drop below 70% of the rated output voltage as measured by a light beam oscillograph.
- C. It is the purpose and intent of this specification to obtain for the OWNER a complete operating trailer-mounted electric generating set, including all the accessories and

appurtenant equipment necessary to a reliable system. Evidence of a satisfactory installation of similar equipment within a reasonable distance shall be furnished on request. The system shall be built, tested and shipped by the manufacturer of the alternator, who has been regularly engaged in the source of supply and one responsibility. The performance of the electric plant series and manual transfer switch shall have been certified by an independent testing laboratory as to the plant's full power rating, voltage and frequency regulation and shall be warranted under a written and published factor warranty for (5) five years from the date of substantial completion against defects in material and factory workmanship.

- D. Dealer assembled units will not be accepted. The supplier shall have available complete parts and service departments employing full time, factory authorized and factory trained personnel, devoted exclusively to this service, all located within a reasonable distance of the OWNER's site. Service shall be by a factory trained representative in operation and service of the system. A copy of the factory test shall be furnished with the unit.

1.05 WARRANTY

- A. The complete mobile power generating system including the diesel driven generating set shall be warranted by the contract warranty. The warranty shall cover all defects in equipment, parts, assembly and installation. Provide 5 year warranty for generator and system.
- B. The engine generator set supplier shall be the authorized dealer of the engine generator set manufacturer, and shall be fully qualified and authorized to provide service and parts for both the engine and generator at any time during the day or night. Parts and service shall be available 24 hours per day, 7 days per week, from a location within a 100 mile radius of the location of the installed generator set.

1.06 TESTS

- A. Factory Production Model Tests:

Before shipment of the equipment, the generator set and system, components shall be tested for at least 3/4 hour with 1/2 hour under 100% rated load and power factor for performance and proper functioning of control load and interfacing circuits. Testing at unit power factor only (resistance banks only), is not acceptable, since KW output is affected by the higher generator efficiency at unit power factor and the kvar for motor starting and regulation is not correlatable between unity and rated power factor. Other tests shall include:

- a. Single step load pickup per NFPA 76A.
- b. Transient response and steady rate governing.

- c. Alternator temperature rise by resistance method.
- d. Fuel consumption.

B. Information Required For Specified Standby Systems:

Certified final factory test report shall be provided to the ENGINEER, certifying this unit's full power rating, stability, voltage and frequency parts list. A factory trained representative shall consult with CONTRACTOR during installation and start-up. He shall fully instruct OWNER's personnel as to correct operating and testing procedures. Furnish 10 sets of catalog cuts and wiring diagrams for ENGINEER's approval.

- C. Equipment furnished shall be equal in every way to this specification herein, including quality, operation, and function. The equipment spacing, mounts, electrical wiring, ventilation equipment, fuel and exhaust components shall be sized and designed around this equipment. The installing contractor shall be responsible for changes in the building work made necessary for installation of equipment other than the generator without addition cost to the OWNER.
- D. After the installation of the engine generator set is complete and prior to acceptance by the OWNER, the engine generator set shall be subjected to a full load test. Connect a balanced 3-phase load equal to the alternator nameplate KW rating, and run the generator continuously for 4 hours with this load. The test shall be witnessed by the ENGINEER, and any out-of-limit temperatures for either engine or alternator shall be cause for rejection of the installation.
- E. The unit shall be operated for a minimum of 2 hours under normal load during a period when the facility is experiencing maximum demand.
- F. A minimum of 4 transfers from normal to standby, and from standby to normal shall take place during the tests.
- G. Safety shutdown features shall be tested by manually creating shutdown conditions.
- H. A factory trained technician, in the full time employment of the supplier shall be present at initial startup and at the operational tests. A written and certified statement of performance covering all startup and testing shall be submitted to the ENGINEER within seven (7) days after the completion of the tests.
- I. Any defects which become evident during these tests shall be corrected by the installer or supplier.

1.07 MAINTENANCE CONTRACT

- A. The engine generator supplier shall offer an optional maintenance contracting covering one year of operation of the engine generator set. The service contract shall provide for semi-annual inspections and two annual oil and filter changes, labor and materials included. The OWNER, at his discretion, may exercise the option to purchase this contract up to 90 days after acceptance of the generator set. Cost for this contract shall not be included in the price bid for this project, but if said option is requested by the OWNER, the OWNER will separately enter into such maintenance contract and pay for it outside of this project.

1.08 SUBMITTALS

- A. Shop drawings shall include dimensioned drawings of all equipment and complete wiring diagrams. The following minimum data shall appear in the shop drawings.
- Make of engine
 - Number of cylinders
 - Bore and stroke-inches
 - Piston displacement-cubic inches
 - Piston speed-feet per minute-at rated RPM
 - BMEP at rated KW output
 - Make and type of generator
 - Generator electrical rating-KVA
 - Number and type of bearings
 - Exciter type
 - Silencer Data
 - Battery Charger Data
 - Enclosure Data
 - Control Panel Data
 - Multiple Voltage Changeover Panel Data
 - Generator Data
- B. Certified engine horsepower curves shall be submitted showing the manufacturer's approval of the engine in use for the application. The horsepower rating shown shall be a minimum 1.5 HP/Kw when corrected to the altitude and temperature conditions specified.

- C. The shop drawing submittal shall comply with the requirements of the General Conditions and Supplemental Conditions of the Specifications.
- D. Three (3) complete copies of operating instructions and parts list shall be provided within ten (10) days following acceptance of the installation. Parts list shall include schedule of type and quantity of parts recommended for stock.
- E. The supplier shall maintain a complete parts inventory and shall have rental units available when necessary.
- F. The manufacturer shall also provide complete operating/maintenance/repair manuals (5 copies) for the system provided. The manuals shall be delivered to the ENGINEER at the time of shipment.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The mobile engine generator set shall consist of a trailer-mounted diesel engine, direct-connected to an alternating current generator mounted on suitable rigid steel skid supports with vibration isolators. The manufacturer of the unit shall have been engaged in the manufacture of similar generator sets for a period of at least ten (10) years. In a standby power capacity, it shall be capable of continuous service rated output for the duration of any utility power failure.
- B. The engine and generator shall be supplied by one (1) company, and that company and its authorized dealer shall have sole responsibility for the performance of the diesel engine-generator set and its accessories. The unit will be assembled in the United States with major components made in the United States and will display a "Made in U.S.A." emblem.
- C. All fasteners shall be of standard English dimension, with standard S.A.E. and N.F. threads.
- D. Furnish and install an MTU 6R0113 DS150, Caterpillar, or Cummins Onan electric generating system trailer mounted. Generator shall be rated for 150 kw continuous standby. The set shall consist of a water cooled diesel fueled unit and rated for the following voltage:

277/480 VAC 3 Phase 4 wire

- E. The set shall be packaged of new and current equipment, complete with all standard equipment.
- F. It is the intent and purpose of these specifications to also secure the necessary controls and accessories to the extent that this equipment, in conjunction with the diesel engine generator set, will comprise a complete operating package for installation at an elevation of approximately 50 feet above sea level in an ambient temperature of 122 degrees F maximum, 0 degrees F minimum.
- G. Rating of the diesel engine generator set shall be as indicated and shall be the real electric power output (in kilowatts at 0.8 power factor) when equipped with all necessary operating accessories, such as radiator, fan, air cleaners, lubricating oil pump, fuel transfer pump, fuel injection pump, jacket water pump, governor, charging alternator, and exciter regulator.
- H. The diesel engine generator set shall be capable of producing the minimum KW standby electrical power as scheduled in the drawings at 0.8 power factor for power applications at the ambient and altitude conditions stated above.
- I. The generator shall be Tier 4 compliant engine rated for mobile use.

2.02 ENGINE

- A. Engine shall be 6 cylinder, 4 cycle, diesel fueled, radiator cooled with a minimum displacement of 415 cu. in (6.8 Liters) for 150 kW. A minimum rating of bhp at the operating speed of 1800 rpm shall be developed. Intake and exhaust valves shall be heat resisting alloy steel, Stellite faced. Stellite exhaust valve seat inserts shall be provided. Full pressure lubrication shall be supplied by a gear oil pump. The engine shall have an oil filter with replaceable element; oil cooler and fuel pump. Engine speed shall be governed by a hydraulic governor to maintain alternator frequency within 3-cycle from no-load to full-load alternator with transistorized voltage regulator. Starting shall be a 24-volt solenoid shift starter.
- B. Rating of the diesel engine-generator set shall be based on operation of the set when equipped with all necessary operating accessories such as radiator, fan, air cleaners, lubrication oil pump, fuel transfer pump, fuel injection generator and exciter regulator.
- C. Horsepower rating shall be 150 kw continuous/standby; Engine manufacturer's published curves both standby and prime shall be submitted. Set shall be capable of continuous operation for a minimum of 30 days without damage at the standby rating. Prime rating shall be capable of 10% overload for 2 hours of any 24. Fuel tank shall be 400 gallon capacity and shall be mounted permanently as a part of the trailer.

- D. The engine, generator, fuel tank, all control and protective devices, all interconnecting cable and devices and all auxiliary equipment shall be mounted permanently to a two-wheel trailer to make the engine/generator mobile.
- E. The engine shall be furnished with a cooling system having sufficient capacity for cooling with engine when the diesel generator set is delivering full-rated load.
- F. The engine shall be equipped with an engine driven centrifugal-type water circulating pump and thermostatic valve to maintain the engine at recommended temperature level.
- G. An engine mounted radiator, of a type and capacity recommended for the engine manufacturer shall be provided.
- H. Provide engine automatic start control which operates on closing contact and stop control which operates on open contact. A cranking limiter shall be provided to open the starting circuit in approximately 45 seconds if the plant is not started within that time. The electric plant controls shall also include a 2-position selector switch with the following positions: RUN-STOP. High water temperature, low oil pressure and overspeed shutdown shall be provided. A signal light and alarm terminals shall indicator when safety device has operated. An audible alarm with silence and reset buttons shall be wired into the alarm terminals.
- I. The engine speed shall be governed by a full hydraulic governor manufactured by Woodard, or equal, to maintain alternator frequency within 3 hertz from no load to full load alternator output.
- J. The engine instrument panel shall contain an oil pressure gauge, water temperature gauge, battery charge rate ammeter, start-stop switch and signal lights. Include all other standard equipment of the manufacturer.
- K. Provide a separate cord and plug for water jacket heater and battery charger for remote energizing. Provide as SO cable. Provide an SO cord for removable start signal to ATS. Provide for 50 ft. each cable length.

2.03 GENERATOR/ALTERNATOR

- A. The generator/alternator shall be a brushless, 4 pole revolving field type with rotating rectifier exciter and solid state voltage regulator. The starter shall be directly connected to the engine flywheel housing, and the rotor shall be driven through a semiflexible driving flange to insure permanent alignment. Voltage regulation shall be within plus or minus 2% of rated voltage, from no-load to full-load. The instantaneous voltage dip shall be less than 20% of rated voltage when full-load and rated power factor is applied to the

alternator. Recovery to stable operation shall occur within two seconds. Stable or steady state operation is defined as operation with terminal voltage remaining constant within plus or minus 1% of rated voltage. A thermostat shall provide a minimum of plus or minus 5% voltage adjustment from rated value. Temperature rise shall be within rating as defined by NEMA MG1-22.4.

2.04 ALTERNATOR INSTRUMENT PANEL

- A. The alternator instrument panel shall be wired, tested and shock mounted on the electric plant by the manufacturer of the alternator. It shall contain running time meter, frequency meter, AC volt meter for each phase, voltage adjusting rheostat, AC ammeter with phase selector switch, and panel light. Include all other standard equipment of the manufacturer.
- B. Provide a permanently mounted label indicating that all grounding connections shall be made before generator is cranked. Sample: "CAUTION CONNECT ALL GROUNDS BEFORE STARTING ENGINE".
- C. Attached to the generator operating panel shall be a plastic covered shield containing operating and safety instructions (type written).

2.05 MAINLINE CIRCUIT BREAKERS: THERMAL MAGNETIC

- A. All molded case circuit breakers shall be provided for the protection of the generator for the selected voltage and shall be listed by Underwriters' Laboratories, Inc. and meet appropriate classifications of Federal Specifications W C 37511/Gen.. The circuit breaker shall be service entrance rated and sized for selected voltage Selections:

1- 250 Ampere 3 pole for 277/480 volts, 3 phase

2.06 ACCESSORIES

- A. All accessories needed for the proper operation of the generating set shall be furnished and installed. These shall include but are not limited to a muffler, flexible exhaust connection, exhaust pipe, supports, thimbles, starting batteries, battery cables, battery rack, battery charger, fuel tank and lines, flexible fuel line connections to engine, and detailed operation and maintenance manuals with parts lists. Provide full charges of engine oil and antifreeze, and the CONTRACTOR shall leave the fuel tanks full of No. 2

diesel fuel after all testing is complete. Provide a change of oil to each unit after sufficient break-in run time has elapsed.

- B. The engine will be equipped with an electric starting system. The starter will be a heavy duty series wound motor with a shunt coil or a centrifugal device to prevent overspeeding. The drive pinion with built in spague clutch will be mechanically engaged by a solenoid and linkage before the motor is energized. A twelve (12) volt, 74 A.H. battery shall be as recommended by the system manufacturer.
- C. Install permanent type anti-rust anti-freeze in cooling system for temperatures 20 degrees F below zero.

2.07 BATTERY CHARGER

- A. An automatic "float" type battery charger, operating on 120 volts input, shall be provided to maintain the batteries at normal capacity and to recharge batteries after cranking. It shall include AC compensation, current limit, DC ammeter, voltmeter to show battery voltage, AC input and DC output, circuit breakers, complete isolation of AC input and DC output and to be so designed as not to discharge the battery in event of failure.
- B. Include electric water jacket heater and plug. Provide ultra critical grade silencer.
- C. Provide portable connecting plugs and wire so that the battery can be charged while the generator unit is in storage.
- D. The battery charger shall be capable of recharging completely discharged batteries in a maximum of 12 hours. The charger shall bear the Underwriter Laboratory label. The charger shall be LaMarche A-46, Gould, or equal. Charger shall be on a circuit fed by the emergency system.

2.08 FUEL SYSTEM

- A. The fuel system shall be that which is normally used by the engine manufacturer. The fuel storage tank shall be 500 gallon capacity double wall, welded steel, designed to permanently mount on the trailer. A direct reading fuel level gauge shall be located within the enclosure, adjacent to the instrumentation panel.
- B. The fuel system shall be equipped with replaceable fuel filter elements arranged for easy removal without breaking any fuel line connections or disturbing the fuel pumps or any other part of the engine. All fuel filters shall be conveniently located in one (1) accessible housing, ahead of any injection pumps so that fuel will have been thoroughly filtered before it reaches the pumps. No screens or filters requiring cleaning or replacement shall be used in injection pumps or injection valve assemblies. The engine

shall be equipped with a built-in gear-type, engine driven fuel transfer pump, capable of lifting fuel against a head of twelve (12) feet, for supply fuel through the filters to the injections pumps at constant pressure.

2.09 ENGINE/GENERATOR PROTECTIVE HOUSING

- A. The protective housing shall be factory assembled and designed specifically for the generator/engine. Provide housing as sound attenuated for 70 dBA at 23 feet. Provide as 12 ga. aluminum.
- B. The engine generator shall be shock mounted on a welded steel skid with dust shield and interior mounted battery rack (with straps) sized for the required battery. The reinforced sheet steel housing shall have side panels which are easily removed by releasing the securing trunk latches for access to the set.

Provide Hospital Grade level special type stainless steel silencer and complete exhaust system. Silencer shall reduce total engine exhaust noise by by 35 – 45 db. Provide insulation of muffler and exhaust system. Silencer shall be supplied for mounting within the generator set enclosure. Unit shall be complete as side in/end out type with discharge tailpipe, raincap and all required stainless steel hardware. A stainless steel flexible exhaust connection shall connect the engine exhaust outlet to the silencer. A bracket to be located on the removable side panel for convenient padlocking. The stationary end-panel shall contain a rear hinged door with key locking handle to permit access to the engine/alternator instrument panel.

2.10 TRAILER

- A. The electric plant shall be mounted on a custom built two-wheel trailer, specially designed for transporting electric plants with maximum safety at highway speeds. Specifications for the trailer are as follows:
 - 24,000 pound rated capacity
 - ST245/75R16 ply rated nylon tubeless tires
 - (2) 10,000 pound capacity tongue jacks with dolly wheel
 - Top Deck -1/8" Diamond Floor Plate
 - (2) 5/16" x 30 safety chains with 3/8" hooks
 - 5 position adjustable hitch - pintle eye
 - (3) Tandem DEXTER type 8000 lb. axles
 - OEM 8 lug wheels
 - Heavy duty diamond plate fabricated fenders
 - 12" x 2" 12 volt electric surge brakes with control kit and 6-way socket for tow

- truck. Include hydraulic brake actuation via trailer with safety break-away
- 2 combination lights with license light and bracket
- Reflectors on all 4 corners of deck (2 per corner)
- 400 gallon fuel tank under deck integral with the trailer.
- Prime and finish coat paint
- Rear stabilizer jacks

B. Verify sizing to match proposed generator set dimensions.

2.11 GENERATOR CABLE & PLUG CONNECTIONS

- A. Generator Cable and Plug - Provide one output cables 50 ft. each in length (3 Phase, 4 conductor 4/0 AWG copper 3 ungrounded, 1 4/0 AWG copper neutral and 1 # 4 AWG grounding conductor and; one end of the cable to have a plug to match the appropriate service quick connect receptacles; the other to be wired directly into generator panel. Cables shall be coiled in an appropriately sized box mounted on trailer. Provide large phenolic label on the box of coiled cable listed per Town of Holden Beach requirements:
- B. The mating connection shall be UL Listed Cam Lok-style, 180° twist on/off single-pole 45 degree cam-lok connector. Rated for 400 ampere 480 VAC. Provide color coded cam-lok connections to match voltage. Provide Cam-lok for 4/0 AWG wire termination. Provide 3R aluminum Enclosure with die-cast hinges, black powder coat, with foam gasket. Provide dead front panel with pad lockable door. Provide as Power Assemblies, LLC or approved equal.
- C. Provide camLok style male to female connectors as above on the generator end of cable so that cables can be completely disconnected to store in the cable box.

PART 3 - INSTALLATION

3.01 GENERAL

- A. Install generator system accessories as described in the specifications, as shown on the Drawings and in accordance with the manufacturer's instructions.
- B. Provide a driven grounding electrode at each service installation with a quick connect clamp to interconnect to the mobile generator service grounding electrode conductors.

B. START-UP

- A. A factory trained representative shall be on the job for a minimum of one (1) day for installation and start-up and instruct the OWNER's personnel on the operation and maintenance requirements of the equipment.
- B. The contractor shall provide a 4 hour load bank test on the unit at the site. A test report is to be provided to the engineer.
- B. Contractor to provide all fuel for testing and to provide fuel tank full upon acceptance.

END OF SECTION

