
PROJECT MANUAL

AUBURN VALLEY STATE PARK
BENGE ROAD PUMP STATION REPLACEMENT
628 Benge Road
Hockessin, DE 19707

STATE OF DELAWARE
Department of Natural Resources and Environmental Control
Division of Parks and Recreation
89 Kings Highway
Dover, DE 19901

DNREC Contract No.: NAT25828-AVSPSEWER



DELAWARE STATE PARKS
YOUR OUTDOOR ADVENTURE STARTS HERE

Prepared by

Architect/Engineer
AECOM
248 Chapman Road, Suite 101
Newark, DE 19702

Issued for Bid
December 1, 2025



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Specifications for this project are arranged in accordance with the Construction Specification Institute numbering system and format. Section numbering is discontinuous and all numbers not appearing in the Table of Contents are not used for this Project.

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1.1 DESIGN PROFESSIONAL OF RECORD

- A. ARCHITECT/ENGINEER
Edward R. Strauss
AECOM
248 Chapman Road, Suite 101
Newark, DE 19702



- B. ELECTRICAL ENGINEER
Curtis James
Keystone Engineering Group
590 E. Lancaster Ave.
Suite 200
Frazer, PA 19355



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END OF SECTION 00 01 15

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SECTION 00 11 16**INVITATION TO BID**

Sealed bids for **DNREC Contract No. NAT25828-AVSPSEWER**, will be received by the State of Delaware, DNREC, Division of Parks and Recreation at 89 Kings Highway, Dover DE 19901 until **11:00 A.M.** local time on **Thursday, February 5, 2026**. The bids will be opened and read aloud live at **11:00 A.M.** local time on **Thursday, February 5, 2026**, via an online video conference with an option to call in using a telephone. The bid opening will not be held in-person. To attend the bid opening, the public may join via Microsoft Teams enabled computer or mobile app, using Teams Meeting ID: **215 221 309 344 1** and Passcode: **"Qd7t4sw7"**. Audio-only, conference call type of participation is available by calling 1-302-504-8986 and using ID: **"875 809 369#"**

The project generally involves but is not limited to erecting a project sign, maintenance of traffic, constructing a duplex grinder pump station and metering manhole, force main installation by open cut and cover, force main installation by directional drilling, simplex grinder pump construction, gravity sewer, manhole and lateral cleanout installation, driveway paving restoration, state roadway restoration, off-roadway restoration, erosion and sediment control, contingent rock excavation and providing contingent Type C Borrow backfill, including testing, start-up, manufacturer training and O&M manuals.

A MANDATORY Pre-Bid Meeting will be held on **Tuesday, January 13, 2026**, at **11:00 A.M.** at Auburn Valley State Park Office, 628 Benge Road, Hockessin, DE 19707 for the purpose of establishing the listing of subcontractors and to answer questions. Representatives of each party to any Joint Venture must attend this meeting. **ATTENDANCE OF THIS MEETING IS A PREREQUISITE FOR BIDDING ON THIS CONTRACT.**

Sealed bids shall be addressed to the DNREC - Division of Parks and Recreation, 89 Kings Highway, Dover, DE 19901. The outer envelope should clearly indicate: **"DNREC CONTRACT NO. NAT25828-AVSPSEWER - SEALED BID - DO NOT OPEN."** We are also accepting, and prefer, emailed bids. They must be emailed to Shawn.Heacock@delaware.gov and Julio.Seneus@delaware.gov prior to the bid deadline. Bidders bear the risk of late delivery regardless of submission method. Any bids received after the deadline will be rejected.

Contract documents shall be obtained by using the online form located at <https://bit.ly/2TVIu2z> and filling in the required fields. Once the information is provided, bid documents will be sent by email using Egress Switch (State's secure email drop-box type of system). The documents will be e-mailed at no cost.

Bidders will not be subject to discrimination on the basis of race, creed, color, sex, sexual orientation, gender identity or national origin in consideration of this award, and Minority Business Enterprises, Disadvantaged Business Enterprises, Women-Owned Business Enterprises and Veteran-Owned Business Enterprises will be afforded full opportunity to submit bids on this contract. Each bid must be accompanied by a bid security equivalent to ten percent of the bid amount and all additive alternates. The successful bidder must post a performance bond and payment bond in a sum equal to 100 percent of the contract price upon execution of the contract. The Owner reserves the right to reject any or all bids and to waive any informalities therein. The Owner may extend the time and place for the opening of the bids from that described in the advertisement, with not less than two calendar days' notice by e-mail to those bidders receiving plans.

Gregory Patterson, Secretary

END OF SECTION 00 11 16

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INSTRUCTIONS TO BIDDERS

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3. BIDDING DOCUMENTS
4. BIDDING PROCEDURES
5. CONSIDERATION OF BIDS
6. POST-BID INFORMATION
7. PERFORMANCE BOND AND PAYMENT BOND
8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

ARTICLE 1: GENERAL

1.1 DEFINITIONS

1.1.1 Whenever the following terms are used, their intent and meaning shall be interpreted as follows:

1.2 STATE: The State of Delaware.

1.3 AGENCY: Contracting State Agency as noted on cover sheet.

1.4 DESIGNATED OFFICIAL: The agent authorized to act for the Agency.

1.5 BIDDING DOCUMENTS: Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement for Bid, Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders (if any), General Conditions, Supplementary General Conditions, General Requirements, Special Provisions (if any), the Bid Form (including the Non-collusion Statement), and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, as well as the Drawings, Specifications (Project Manual) and all Addenda issued prior to execution of the Contract.

1.6 CONTRACT DOCUMENTS: The Contract Documents consist of the, Instructions to Bidders, Supplementary Instructions to Bidders (if any), General Conditions, Supplementary General Conditions, General Requirements, Special Provisions (if any), the form of agreement between the Owner and the Contractor, Drawings (if any), Specifications (Project Manual), and all addenda.

1.7 AGREEMENT: The form of the Agreement shall be AIA Document A101, Standard Form of Agreement between Owner and Contractor where the basis of payment is a STIPULATED SUM. In the case of conflict between the instructions contained therein and the General Requirements herein, these General Requirements shall prevail.

1.8 GENERAL REQUIREMENTS (or CONDITIONS): General Requirements (or conditions) are instructions pertaining to the Bidding Documents and to contracts in general. They contain, in summary, requirements of laws of the State; policies of the Agency and instructions to bidders.

1.9 SPECIAL PROVISIONS: Special Provisions are specific conditions or requirements peculiar to the bidding documents and to the contract under consideration and are supplemental to the General Requirements. Should the Special Provisions conflict with the General Requirements, the Special Provisions shall prevail.

1.10 ADDENDA: Written or graphic instruments issued by the Owner/Architect prior to the execution of the contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

1.11 BIDDER OR VENDOR: A person or entity who formally submits a Bid for the material or Work contemplated, acting directly or through a duly authorized representative who meets the requirements set forth in the Bidding Documents.

- 1.12 SUB-BIDDER: A person or entity who submits a Bid to a Bidder for materials or labor, or both for a portion of the Work.
- 1.13 BID: A complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.
- 1.14 BASE BID: The sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids (if any are required to be stated in the bid).
- 1.15 ALTERNATE BID (or ALTERNATE): An amount stated in the Bid, where applicable, to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents is accepted.
- 1.16 UNIT PRICE: An amount stated in the Bid, where applicable, as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.
- 1.17 SURETY: The corporate body which is bound with and for the Contract, or which is liable, and which engages to be responsible for the Contractor's payments of all debts pertaining to and for his acceptable performance of the Work for which he has contracted.
- 1.18 BIDDER'S DEPOSIT: The security designated in the Bid to be furnished by the Bidder as a guaranty of good faith to enter into a contract with the Agency if the Work to be performed or the material or equipment to be furnished is awarded to him.
- 1.19 CONTRACT: The written agreement covering the furnishing and delivery of material or work to be performed.
- 1.20 CONTRACTOR: Any individual, firm or corporation with whom a contract is made by the Agency.
- 1.21 SUBCONTRACTOR: An individual, partnership or corporation which has a direct contract with a contractor to furnish labor and materials at the job site, or to perform construction labor and furnish material in connection with such labor at the job site.
- 1.22 CONTRACT BOND: The approved form of security furnished by the contractor and his surety as a guaranty of good faith on the part of the contractor to execute the work in accordance with the terms of the contract.
- 1.23 CUSTOM FABRICATION: As defined in 29 Del. C. § 6902, the term "custom fabrication" means the offsite fabrication, assembly, or other production of non-standard goods or materials, including components, fixtures or parts thereof, specifically for a public works project. Such goods and materials shall include those used in the following trades or systems: (1) Plumbing or pipe fitting systems, including heating, ventilating, air-conditioning, refrigeration systems, sheet metal or other duct systems; (2) Electrical systems; (3) Mechanical insulation work; (4) Ornamental iron work; and (5) Commercial signage that does not attempt or appear to direct the movement of traffic on highways or roadways or interfere with, imitate, or resemble any official traffic sign, signal or device.

ARTICLE 2: BIDDER'S REPRESENTATIONS

2.1 PRE-BID MEETING

2.1.1 A pre-bid meeting for this project will be held at the time and place designated. Attendance at this meeting is a pre-requisite for submitting a Bid, unless this requirement is specifically waived elsewhere in the Bid Documents.

2.2 By submitting a Bid, the Bidder represents that:

2.2.1 The Bidder has read and understands the Bidding Documents and that the Bid is made in accordance therewith.

2.2.2 The Bidder has visited the site, become familiar with existing conditions under which the Work is to be performed, and has correlated the Bidder's his personal observations with the requirements of the proposed Contract Documents.

2.2.3 The Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception.

2.2.4 Bidder has accounted for the possibility of price increases due to the direct and indirect effect of tariffs, other international events, inflation, and supply chain interruptions. Change Orders will be denied if they are based upon any of these events. Bidder is expected to account for these possibilities and include them in the bid.

2.3 JOINT VENTURE REQUIREMENTS

2.3.1 For Public Works Contracts, each Joint Venturer shall be qualified and capable to complete the Work with their own forces.

2.3.2 Included with the Bid submission, and as a requirement to bid, a copy of the executed Joint Venture Agreement shall be submitted and signed by all Joint Venturers involved.

2.3.3 All required Bid Bonds, Performance Bonds, Material and Labor Payment Bonds must be executed by both Joint Venturers and be placed in both of their names.

2.3.4 All required insurance certificates shall name both Joint Venturers.

2.3.5 Both Joint Venturers shall sign the Bid Form.

2.3.6 Both Joint Venturers shall include their Federal E.I. Number with the Bid.

2.3.7 In the event of a mandatory Pre-bid Meeting, each Joint Venturer shall have a representative in attendance.

2.3.8 Due to exceptional circumstances and for good cause shown, one or more of these provisions may be waived at the discretion of the State.

2.4 ASSIGNMENT OF ANTITRUST CLAIMS

- 2.4.1 As consideration for the award and execution by the Owner of this contract, the Contractor hereby grants, conveys, sells, assigns and transfers to the State of Delaware all of its right, title and interests in and to all known or unknown causes of action it presently has or may now or hereafter acquire under the antitrust laws of the United States and the State of Delaware, relating to the particular goods or services purchased or acquired by the Owner pursuant to this contract.

ARTICLE 3: BIDDING DOCUMENTS

3.1 COPIES OF BID DOCUMENTS

- 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the Architectural/Engineering firm designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein.
- 3.1.2 Bidders shall use complete sets of Bidding Documents for preparation of Bids. The issuing Agency nor the Architect assumes no responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 3.1.3 Any errors, inconsistencies or omissions discovered shall be reported to the Architect immediately.
- 3.1.4 The Agency and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

- 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall report any errors, inconsistencies, or ambiguities discovered to the Architect.
- 3.2.2 Bidders or Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect at least seven days prior to the date for receipt of Bids. Interpretations, corrections and changes to the Bidding Documents will be made by written Addendum. Interpretations, corrections, or changes to the Bidding Documents made in any other manner shall not be binding.
- 3.2.3 The apparent silence of the specifications as to any detail, or the apparent omission from it of detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and only material and workmanship of the first quality are to be used. Proof of specification compliance will be the responsibility of the Bidder.
- 3.2.4 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all permits, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.

3.2.5 The Owner will bear the costs for all impact and user fees associated with the project.

3.3 SUBSTITUTIONS

3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of quality, required function, dimension, and appearance to be met by any proposed substitution. The specification of a particular manufacturer or model number is not intended to be proprietary in any way. Substitutions of products for those named will be considered, providing that the Vendor certifies that the function, quality, and performance characteristics of the material offered is equal or superior to that specified. It shall be the Bidder's responsibility to assure that the proposed substitution will not affect the intent of the design, and to make any installation modifications required to accommodate the substitution.

3.3.2 Requests for substitutions shall be made in writing to the Architect at least ten days prior to the date of the Bid Opening. Such requests shall include a complete description of the proposed substitution, drawings, performance and test data, explanation of required installation modifications due the substitution, and any other information necessary for an evaluation. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval shall be final. The Architect is to notify Owner prior to any approvals.

3.3.3 If the Architect approves a substitution prior to the receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding.

3.3.4 The Architect shall have no obligation to consider any substitutions after the Contract award.

3.4 ADDENDA

3.4.1 Addenda will be mailed or delivered to all who are known by the Architect to have received a complete set of the Bidding Documents.

3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

3.4.3 No Addenda will be issued later than 2 calendar days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which extends the time or changes the location for the opening of bids.

3.4.4 Each bidder shall ascertain prior to submitting his Bid that they have received all Addenda issued, and shall acknowledge their receipt in their Bid in the appropriate space. Not acknowledging an issued Addenda could be grounds for determining a bid to be non-responsive.

ARTICLE 4: BIDDING PROCEDURES

4.1 PREPARATION OF BIDS

4.1.1 Submit the bids on the Bid Forms included with the Bidding Documents.

- 4.1.2 Submit the original Bid Form for each bid. Bid Forms may be removed from the project manual for this purpose.
- 4.1.3 Execute all blanks on the Bid Form in a non-erasable medium (typewriter or manually in ink).
- 4.1.4 Where so indicated by the makeup on the Bid Form, express sums in both words and figures, in case of discrepancy between the two, the written amount shall govern.
- 4.1.5 BID ALL REQUESTED ALTERNATES AND UNIT PRICES, IF ANY. If there is no change in the Base Bid for an Alternate, enter "No Change". The Contractor is responsible for verifying that they have received all addenda issued during the bidding period. Work required by Addenda shall automatically become part of the Contract.
- 4.1.6 Make no additional stipulations on the Bid Form and do not qualify the Bid in any other manner.
- 4.1.7 Each copy of the Bid shall include the legal name of the Bidder and a statement whether the Bidder is a sole proprietor, a partnership, a corporation, or any legal entity, and each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current Power of Attorney attached, certifying agent's authority to bind the Bidder.
- 4.1.8 Bidder shall complete the Non-Collusion Statement form included with the Bid Forms and include it with their Bid.
- 4.1.9 In the construction of all Public Works projects for the State of Delaware or any agency thereof, preference in employment of laborers, workers or mechanics shall be given to bona fide legal citizens of the State who have established citizenship by residence of at least 90 days in the State.
- 4.1.10 Each bidder shall include a signed Affidavit for the Bidder certifying compliance with OMB Regulation 4104 - "Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on "Large Public Works Projects." "Large Public Works" is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.
- 4.2 BID SECURITY
- 4.2.1 All bids shall be accompanied by a deposit of either a good and sufficient bond to the agency for the benefit of the agency, with corporate surety authorized to do business in this State, the form of the bond and the surety to be approved by the agency, or a security of the bidder assigned to the agency, for a sum equal to at least 10% of the bid plus all add alternates, or in lieu of the bid bond a security deposit in the form of a certified check, bank treasurer's check, cashier's check, money order, or other prior approved secured deposit assigned to the State. The bid bond need not be for a specific sum, but may be stated to be for a sum equal to 10% of the bid plus all add alternates to which it relates and not to exceed a certain stated sum, if said sum is equal to at least 10% of the bid. The Bid Bond form used shall be the

standard OMB form (attached). The bid bond may be an electronic bond and need not be transmitted as a paper document.

4.2.2 The Agency has the right to retain the bid security of Bidders to whom an award is being considered until either a formal contract has been executed and bonds have been furnished or the specified time has elapsed so the Bids may be withdrawn or all Bids have been rejected.

4.2.3 In the event of any successful Bidder refusing or neglecting to execute a formal contract and bond within 20 days of the awarding of the contract, the bid bond or security deposited by the successful bidder shall be forfeited.

4.3 SUBCONTRACTOR LIST

4.3.1 In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, each Bidder shall submit with their Bid a completed List of Sub-Contractors included with the Bid Form. NAME ONLY ONE SUBCONTRACTOR FOR EACH TRADE. The bidder must list **in each category** the full name and address (City & State) of the subcontractor that the Bidder will be using to perform the work and provide material for that subcontractor category. Should the Bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the Bidder shall list that third-tier contractor's full name and address (City & State). **If the Bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the Bidder intends to perform the work themselves, the Bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

4.3.2 It is the responsibility of the Contractor to ensure that their Subcontractors are in compliance with the provisions of this law. Also, if a Contractor elects to list themselves as a Subcontractor for any category, they must specifically name themselves on the Bid Form and be able to document their capability to act as Subcontractor in that category in accordance with this law.

4.4 AFFIDAVIT OF CONTRACTOR QUALIFICATIONS

4.4.1 In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, each Bidder shall submit with their Bid the Affidavit of Contractor Qualifications certifying that the Bidder will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term. After a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

4.5 AFFIDAVIT OF CRAFT TRAINING COMPLIANCE

4.5.1 In accordance with Title 29, Chapter 69, Section 6962(c)(13) of the Delaware Code, contractors and subcontractors must provide craft training for journeyman and apprentice levels if **all** of the following apply:

- A. A project meets the prevailing wage requirement under Title 29, Chapter 69, Section 6960 of the Delaware Code.
- B. The contractor employs 10 or more total employees.
- C. The project is not a federal highway project

Failure to provide required craft training on the project may subject the successful contractor and/or subcontractor(s) to penalties as outlined in Title 29, Chapter 69, Section 6962(c)(13) of the Delaware Code.

Bidders shall submit the Affidavit of Craft Training Compliance prior to contract execution.

4.6 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

4.6.1 During the performance of this contract, the contractor agrees as follows:

- A. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, sex, color, sexual orientation, gender identity or national origin. The Contractor will take affirmative action to ensure the applicants are employed, and that employees are treated during employment, without regard to their race, creed, sex, color, 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 by the contracting agency setting forth this nondiscrimination clause.
- B. 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 consideration for employment without regard to race, creed, sex, color, sexual orientation, gender identity or national origin."

4.7 PREVAILING WAGE REQUIREMENT

4.7.1 Wage Provisions: For renovation and new construction projects whose costs exceed the thresholds contained in Delaware Code, Title 29, Section 6960, the minimum wage rates for various classes of laborers and mechanics shall be as determined by the Department of Labor, Division of Industrial Affairs of the State of Delaware.

4.7.2 The employer shall pay all mechanics and labors employed directly upon the site of work, or engaged in custom fabrication work, as that term is defined in Article 1.23 herein and as also as defined in 29 Del. C. § 6902 and described in 29 Del. C. § 6960(b), regardless of where

the work is performed, unconditionally and not less often than 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 specifications, regardless of any contractual relationship which may be alleged to exist between the employer and such laborers and mechanics.

4.7.3 As per 29 Del. C. § 6960(b), the scale of the wages to be paid must be posted by the employer in a prominent and easily accessible place at the site of the work. There may be withheld from the employer so much of accrued payments as may be considered necessary by the Department of Labor to pay laborers and mechanics employed by the employer the difference between the rates of wages required by the contract to be paid laborers and mechanics on the work and rates of wages received by such laborers and mechanics to be remitted to the Department of Labor for distribution upon resolution of any claims.

4.7.4 Every contract based upon these specifications shall contain a stipulation that sworn payroll information, as required by the Department of Labor, be furnished weekly. The Department of Labor shall keep and maintain the sworn payroll information for a period of 6 months from the last day of the work week covered by the payroll.

4.8 SUBMISSION OF BIDS

4.8.1 Enclose the Bid, the Bid Security, and any other documents required to be submitted with the Bid.

4.8.2 Deposit Bids at the designated location prior to the time and date for receipt of bids indicated in the Invitation to Bid. Bids received after the time and date for receipt of bids will be marked "LATE BID" and returned.

4.8.3 Bidder assumes full responsibility for timely delivery at location designated for receipt of bids.

4.8.4 Oral, telephonic or telegraphic bids are invalid and will not receive consideration.

4.8.5 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids, provided that they are then fully in compliance with these Instructions to Bidders.

4.8.6 Compliance with Federal Bureau of Investigation rules mandates training for Contractors, Subcontractors, their employees, and custodial workers with access to locations that have access to Criminal Justice Information Services (CJIS). The contract awardee must have fingerprinting and background checks done for all Subcontractors and employees.

4.9 MODIFICATION OR WITHDRAW OF BIDS

4.9.1 Prior to the closing date for receipt of Bids, a Bidder may withdraw a Bid by personal request and by showing proper identification to the Architect. A request for withdraw by letter or fax, if the Architect is notified in writing prior to receipt of fax, is acceptable. A fax directing a modification in the bid price will render the Bid informal, causing it to be ineligible for consideration of award. Telephone directives for modification of the bid price shall not be permitted and will have no bearing on the submitted proposal in any manner.

- 4.9.2 Bidders submitting Bids that are late shall be notified as soon as practicable and the bid shall be returned.
- 4.9.3 A Bid may not be modified, withdrawn or canceled by the Bidder during a thirty (30) day period following the time and date designated for the receipt and opening of Bids, and Bidder so agrees in submitting their Bid. Bids shall be binding for 30 days after the date of the Bid opening.

ARTICLE 5: CONSIDERATION OF BIDS

5.1 OPENING/REJECTION OF BIDS

- 5.1.1 Unless otherwise stated, Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids will be made available to Bidders.
- 5.1.2 The Agency shall have the right to reject any and all Bids. A Bid not accompanied by a required Bid Security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.
- 5.1.3 If the Bids are rejected, it will be done within thirty (30) calendar day of the Bid opening.

5.2 COMPARISON OF BIDS

- 5.2.1 After the Bids have been opened and read, the bid prices will be compared and the result of such comparisons will be made available to the public. Comparisons of the Bids may be based on the Base Bid plus desired Alternates. The Agency shall have the right to accept Alternates in any order or combination.
- 5.2.2 The Agency reserves the right to waive technicalities, to reject any or all Bids, or any portion thereof, to advertise for new Bids, to proceed to do the Work otherwise, or to abandon the Work, if in the judgment of the Agency or its agent(s), it is in the best interest of the State.
- 5.2.3 An increase or decrease in the quantity for any item is not sufficient grounds for an increase or decrease in the Unit Price.
- 5.2.4 The prices quoted are to be those for which the material will be furnished F.O.B. Job Site and include all charges that may be imposed during the period of the Contract.
- 5.2.5 No qualifying letter or statements in or attached to the Bid, or separate discounts will be considered in determining the low Bid except as may be otherwise herein noted. Cash or separate discounts should be computed and incorporated into Unit Bid Price(s).
- 5.2.6 Bidder must account for the possibility of price increases due to the direct and indirect effect of tariffs or other international events, inflation, and supply chain interruptions. Change Orders will be denied if they are based upon any of these events. Bidder is expected to account for these possibilities and include them in the bid.

5.3 DISQUALIFICATION OF BIDDERS

- 5.3.1 An agency shall determine that each Bidder on any Public Works Contract is responsible before awarding the Contract. Factors to be considered in determining the responsibility of a Bidder include:
- A. The Bidder's financial, physical, personnel or other resources including Subcontracts;
 - B. The Bidder's record of performance on past public or private construction projects, including, but not limited to, defaults and/or final adjudication or admission of violations of the Prevailing Wage Laws in Delaware or any other state;
 - C. The Bidder's written safety plan;
 - D. Whether the Bidder is qualified legally to contract with the State;
 - E. Whether the Bidder supplied all necessary information concerning its responsibility; and,
 - F. Any other specific criteria for a particular procurement, which an agency may establish; provided however, that, the criteria be set forth in the Invitation to Bid and is otherwise in conformity with State and/or Federal law.
 - G. Any Bidder who is debarred in another State and/or by the United States Government is also debarred in Delaware.
- 5.3.2 If an agency determines that a Bidder is nonresponsive and/or nonresponsible, the determination shall be in writing and set forth the basis for the determination. A copy of the determination shall be sent to the affected Bidder within five (5) working days of said determination.
- 5.3.3 In addition, any one or more of the following causes may be considered as sufficient for the disqualification of a Bidder and the rejection of their Bid or Bids.
- 5.3.3.1 More than one Bid for the same Contract from an individual, firm or corporation under the same or different names.
 - 5.3.3.2 Evidence of collusion among Bidders.
 - 5.3.3.3 Unsatisfactory performance record as evidenced by past experience.
 - 5.3.3.4 If the Unit Prices are obviously unbalanced either in excess or below reasonable cost analysis values.
 - 5.3.3.5 If there are any unauthorized additions, interlineation, conditional or alternate bids or irregularities of any kind which may tend to make the Bid incomplete, indefinite or ambiguous as to its meaning.
 - 5.3.3.6 If the Bid is not accompanied by the required Bid Security and other data required by the Bidding Documents.

5.3.3.7 If any exceptions or qualifications of the Bid are noted on the Bid Form.

5.4 ACCEPTANCE OF BID AND AWARD OF CONTRACT

5.4.1 A formal Contract shall be executed with the successful Bidder within twenty (20) calendar days after the award of the Contract.

5.4.2 Per Section 6962(d)(13)a., Title 29, Delaware Code, “The contracting agency shall award any public works contract within thirty (30) days of the bid opening to the lowest responsive and responsible Bidder, unless the Agency elects to award on the basis of best value, in which case the election to award on the basis of best value shall be stated in the Invitation To Bid. Any public school district and its board shall award public works contracts in accordance with this section’s requirements except it shall award the contract within 60 days of the bid opening.”

5.4.3 Each Bid on any Public Works Contract must be deemed responsive by the Agency to be considered for award. A responsive Bid shall conform in all material respects to the requirements and criteria set forth in the Contract Documents and specifications.

5.4.4 The Agency shall have the right to accept Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid, plus accepted Alternates.

5.4.5 The successful Bidder shall execute a formal contract, submit the required Insurance Certificate, and furnish good and sufficient bonds, unless specifically waived in the General Requirements, in accordance with the General Requirement, within twenty (20) days of official notice of contract award. The successful Bidder shall provide, at least two business days prior to contract execution, copies of the Employee Drug Testing Program for the Bidder and all listed Subcontractors. Bonds shall be for the benefit of the Agency with surety in the amount of 100% of the total contract award. Said Bonds shall be conditioned upon the faithful performance of the contract. Bonds shall remain in effect for period of two (2) years after the date of the Certificate of Final Payment.

5.4.6 If the successful Bidder fails to execute the required Contract, Bond and all required information, as aforesaid, within twenty (20) calendar days after the date of official Notice of the Award of the Contract, their Bid guaranty shall immediately be taken and become the property of the State for the benefit of the Agency as liquidated damages, and not as a forfeiture or as a penalty. Award will then be made to the next lowest qualified Bidder of the Work or readvertised, as the Agency may decide.

5.4.7 Each bidder shall supply with its bid its taxpayer identification number (i.e., federal employer identification number or social security number) and should the vendor be awarded a contract, such vendor shall provide to the agency the taxpayer identification license numbers of such subcontractors. Such numbers shall be provided on the later of the date on which such subcontractor is required to be identified or the time the contract is executed. The successful Bidder shall provide to the agency to which it is contracting, within 30 days of entering into such public works contract, copies of all Delaware Business licenses of subcontractors and/or independent contractors that will perform work for such public works contract. However, if a subcontractor or independent contractor is hired or contracted more than 20 days after the Bidder entered the public works contract the

Delaware Business license of such subcontractor or independent contractor shall be provided to the agency within 10 days of being contracted or hired.

- 5.4.8 The Bid Security shall be returned to the successful Bidder upon the execution of the formal contract. The Bid Securities of unsuccessful bidders shall be returned within thirty (30) calendar days after the opening of the Bids.

ARTICLE 6: POST-BID INFORMATION

6.1 CONTRACTOR'S QUALIFICATION STATEMENT

- 6.1.1 Bidders to whom an award of a Contract is under consideration shall, if requested by the Agency, submit a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a statement has been previously required and submitted.

- 6.2 Bidders to whom an award of a Contract has been made must produce their Delaware Business License before the Contract can be executed.

ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

7.1 BOND REQUIREMENTS

- 7.1.1 The cost of furnishing the required Bonds, that are stipulated in the Bidding Documents, shall be included in the Bid.

- 7.1.2 If the Bidder is required by the Agency to secure a bond from other than the Bidder's usual sources, changes in cost will be adjusted as provide in the Contract Documents.

- 7.1.3 The Performance and Payment Bond forms used shall be the standard OMB forms (attached).

7.2 TIME OF DELIVERY AND FORM OF BONDS

- 7.2.1 The bonds shall be dated on or after the date of the Contract.

- 7.2.2 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix a certified and current copy of the power of attorney.

- 7.2.3 The Performance Bond and/or the Payment Bond may be electronic bonds and need not be transmitted as paper documents.

ARTICLE 8: FORM OF AGREEMENT BETWEEN AGENCY AND CONTRACTOR

- 8.1 Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum.

END OF INSTRUCTIONS TO BIDDERS

AUBURN VALLEY STATE PARK
BENGE ROAD PUMP STATION REPLACEMENT
HOCKESSIN, DE 19707
DIVISION OF PARKS AND RECREATION CONTRACT No. NAT25828-AVSPSEWER

BID FORM

For Bids Due: February 5, 2026; 11:00 AM To: Dept. of Natural Resources and Environmental Control
Division of Parks and Recreation
Office of Design and Development
89 Kings Highway, Dover DE 19901

Name of Bidder: _____

Delaware Business License No.: _____ **Taxpayer ID No.:** _____

(Other License Nos.): _____

Phone No.: () _____ - _____ **Fax No.:** () _____ - _____

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum itemized below:

\$ _____

(\$ _____)

AUBURN VALLEY STATE PARK
BENGE ROAD PUMP STATION REPLACEMENT
HOCKESSIN, DE 19707
DIVISION OF PARKS AND RECREATION CONTRACT No. NAT25828-AVSPSEWER

BID FORM

LUMP SUM AND UNIT PRICES

Prices conform to applicable project specification section. Refer to the Definition of Bid Items specifications for a complete description of the following Prices:

LUMP SUM BASE BID PRICES

			LUMP SUM PRICE
LUMP SUM PRICE No. 1	Project Sign	\$	_____
LUMP SUM PRICE No. 2	Maintenance of Traffic	\$	_____
LUMP SUM PRICE No. 3	Duplex Grinder Pump Station (DX502) and Metering Manhole	\$	_____
LUMP SUM PRICE No. 4	Benge Road Forcemain, Open Cut and Cover Installation	\$	_____
LUMP SUM PRICE No. 5	Benge Road Forcemain, Directional Drill Installation	\$	_____
LUMP SUM PRICE No. 6	Benge Road Forcemain Installed in Sleeves	\$	_____
LUMP SUM PRICE No. 7	Simplex Grinder Pump Station (DH071-61)	\$	_____
LUMP SUM PRICE No. 8	Gravity Sewer, Manholes and Lateral Cleanouts	\$	_____
LUMP SUM PRICE No. 9	Driveway Paving Restoration	\$	_____
LUMP SUM PRICE No. 10	Benge Road Paving Restoration	\$	_____
LUMP SUM PRICE No. 11	Off-Roadway Restoration	\$	_____

LUMP SUM PRICE No. 12	Erosion and Sediment Control	\$	_____
LUMP SUM PRICE No. 13	Mobilization	\$	_____
SUBTOTAL LUMP SUM PRICES		\$	_____

UNIT PRICES

		UNIT PRICE	TOTAL PRICE
Unit PRICE No. 14	Contingent Rock Excavation per Cubic Yard (Assume 50 Cy)	\$	\$
		_____	_____
Unit PRICE No. 15	Contingent Borrow Type C per Cubic Yard (Assume 50 CY)	\$	\$
		_____	_____
SUBTOTAL UNIT PRICES		\$	_____

TOTAL PROJECT PRICE

TOTAL PROJECT PRICE	\$	_____

AUBURN VALLEY STATE PARK
BENGE ROAD PUMP STATION REPLACEMENT
HOCKESSIN, DE 19707

DIVISION OF PARKS AND RECREATION CONTRACT No. NAT25828-AVSPSEWER

BID FORM

I/We acknowledge Addendums numbered _____ and the price(s) submitted include any cost/schedule impact they may have.

This bid shall remain valid and cannot be withdrawn for thirty (30) days from the date of opening of bids (60 days for School Districts and Department of Education), and the undersigned shall abide by the Bid Security forfeiture provisions. Bid Security is attached to this Bid.

The Owner shall have the right to reject any or all bids, and to waive any informality or irregularity in any bid received.

This bid is based upon work being accomplished by the Sub-Contractors named on the list attached to this bid.

Should I/We be awarded this contract, I/We pledge to achieve substantial completion of all the work within _____ calendar days of the Notice to Proceed.

The undersigned represents and warrants that he has complied and shall comply with all requirements of local, state, and national laws; that no legal requirement has been or shall be violated in making or accepting this bid, in awarding the contract to him or in the prosecution of the work required; that the bid is legal and firm; that he has not, directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken action in restraint of free competitive bidding.

Upon receipt of written notice of the acceptance of this Bid, the Bidder shall, within twenty (20) calendar days, execute the agreement in the required form and deliver the Contract Bonds, and Insurance Certificates, required by the Contract Documents.

I am / We are an Individual / a Partnership / a Corporation

By _____ Trading as _____
(Individual's / General Partner's / Corporate Name)

(State of Corporation)

Business Address: _____

AUBURN VALLEY STATE PARK
BENGE ROAD PUMP STATION REPLACEMENT
HOCKESSIN, DE 19707
DIVISION OF PARKS AND RECREATION CONTRACT No. NAT25858-AVSP

BID FORM

Witness: _____ **By:** _____
(Authorized Signature)
(SEAL) _____
(Title)
Date: _____

ATTACHMENTS

Sub-Contractor List
Non-Collusion Statement
Affidavit of Employee Drug Testing Program
Affidavit of Contractor Qualifications
Bid Security
(Others as Required by Project Manuals)

AUBURN VALLEY STATE PARK
 BENGE ROAD PUMP STATION REPLACEMENT
 HOCKESSIN, DE 19707
 DIVISION OF PARKS AND RECREATION CONTRACT No. NAT25828-AVSPSEWER

BID FORM

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b of the Delaware Code, the following subcontractor listing must accompany any bid submittal. The bidder must list **in each category** the full name and address (City & State) of the sub-contractor that the bidder will be using to perform the work and provide material for that subcontractor category. Should the bidder's listed subcontractor intend to provide any of their subcontractor category of work through a third-tier contractor, the bidder shall list that third-tier contractor's full name and address (City & State). **If the bidder intends to perform any category of work itself, it must list its full name and address.** For clarification, if the bidder intends to perform the work themselves, the bidder **may not** insert "not applicable", "N/A", "self" or anything other than its own full name and address (City & State). To do so shall cause the bid to be rejected. In addition, the failure to produce a completed subcontractor list with the bid submittal shall cause the bid to be rejected. If you have more than three (3) third-tier contractors to report in any subcontractor category, print out additional page(s) containing the appropriate category, complete the rest of your list of third-tier contractors for that category, notate the addition in parentheses as (CONTINUATION) next to the subcontractor category and an asterisk (*) next to any additional third-tier contractors, and submit it with your bid.

	Subcontractor Category	Subcontractor	Address (City & State)	Subcontractors tax payer ID # or Delaware Business license #
1.	Sitework-A	_____	_____	_____
	Sitework-B	_____	_____	_____
	Sitework-C	_____	_____	_____
		_____	_____	_____
2.	Paving -A	_____	_____	_____
	Paving -B	_____	_____	_____
	Paving -C	_____	_____	_____
		_____	_____	_____
3.	Site Utilities-A	_____	_____	_____
	Site Utilities-B	_____	_____	_____
	Site Utilities-C	_____	_____	_____
		_____	_____	_____

4.	HDD-A			
	HDD-B			
	HDD-C			
5.	Electric-A			
	Electric-B			
	Electric-C			

AUBURN VALLEY STATE PARK
BENGE ROAD PUMP STATION REPLACEMENT
HOCKESSIN, DE 19707
DIVISION OF PARKS AND RECREATION CONTRACT No. NAT25828-AVSPSEWER

BID FORM

NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date to the Division of Natural Resources and Environmental Control.

All the terms and conditions of **Contract Number NAT25828-AVSPSEWER** have been thoroughly examined and are understood.

NAME OF BIDDER: _____

**AUTHORIZED REPRESENTATIVE
(TYPED):** _____

**AUTHORIZED REPRESENTATIVE
(SIGNATURE):** _____

TITLE: _____

ADDRESS OF BIDDER: _____

E-MAIL: _____

PHONE NUMBER: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

AUBURN VALLEY STATE PARK
BENGE ROAD PUMP STATION REPLACEMENT
HOCKESSIN, DE 19707
DIVISION OF PARKS AND RECREATION CONTRACT No. NAT25828-AVSPSEWER

**AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite, including subcontractors, that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

AUBURN VALLEY STATE PARK
BENGE ROAD PUMP STATION REPLACEMENT
HOCKESSIN, DE 19707
DIVISION OF PARKS AND RECREATION CONTRACT No. NAT25828-AVSPSEWER

**AFFIDAVIT
OF
CONTRACTOR QUALIFICATIONS**

We hereby certify that we will abide by the contractor's qualifications outlined in the construction bid specifications for the duration of the contract term.

In accordance with Title 29, Chapter 69, Section 6962(d)(10)b.3 of the Delaware Code, after a contract has been awarded the successful bidder shall not substitute another subcontractor whose name was submitted on the Subcontractor Form except for the reasons in the statute and not without written consent from the awarding agency. Failure to utilize the subcontractors on the list will subject the successful bidder to penalties as outlined in the General Requirements Section 5.2 of the contract.

Contractor Name: _____

Contractor Address: _____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

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STATE OF DELAWARE
DEPARMTENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

BID BOND

TO ACCOMPANY PROPOSAL
(Not necessary if security is used)

KNOW ALL MEN BY THESE PRESENTS That: _____
_____ of _____ in the County of _____
_____ and State of _____ as **Principal**, and _____
_____ of _____ in the County of _____
and State of _____ as **Surety**, legally authorized to do business in the State of Delaware
("State"), are held and firmly unto the **State** in the sum of _____
_____ Dollars (\$ _____), or _____ percent not to exceed _____
_____ Dollars (\$ _____)
of amount of bid on Contract No. _____, to be paid to the **State** for the use and
benefit of _____ (*insert State agency name*) for which payment
well and truly to be made, we do bind ourselves, our and each of our heirs, executors, administrators, and
successors, jointly and severally for and in the whole firmly by these presents.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH That if the above bonded **Principal**
who has submitted to the _____ (*insert State agency name*) a
certain proposal to enter into this contract for the furnishing of certain material and/or services within the
State, shall be awarded this Contract, and if said **Principal** shall well and truly enter into and execute this
Contract as may be required by the terms of this Contract and approved by the _____
_____ (*insert State agency name*) this Contract to be entered into within twenty days after
the date of official notice of the award thereof in accordance with the terms of said proposal, then this
obligation shall be void or else to be and remain in full force and virtue.

Sealed with _____ seal and dated this _____ day of _____ in the year of our Lord two
thousand and _____ (20____).

SEALED, AND DELIVERED IN THE
Presence of

Name of Bidder (Organization)

Corporate
Seal

By:

Authorized Signature

Attest _____

Title

Name of Surety

Witness: _____

By:

Title

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STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DIVISION OF PARKS AND RECREATION

AIA 101-2017 AGREEMENT BETWEEN OWNER AND CONTRACTOR

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AIA[®] Document A101[™] – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

The Architect:
(Name, legal status, address and other information)

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101[™]–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201[™]–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- ☐ The date of this Agreement.
- ☐ A date set forth in a notice to proceed issued by the Owner.
- ☐ Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

☐ Not later than () calendar days from the date of commencement of the Work.

☐ By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work

Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item

Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item

Price

Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item

Price

§ 4.4 Unit prices, if any:

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item

Units and Limitations

Price per Unit (\$0.00)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than () days after the Architect receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™-2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201-2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201-2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:
(Insert any other conditions for release of retainage upon Substantial Completion.)

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

§ 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

%

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2017

☐ Litigation in a court of competent jurisdiction

☐ Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

(Name, address, email address, and other information)

§ 8.3 The Contractor's representative:

(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™-2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201-2017, may be given in accordance with AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203-2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™-2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™-2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

Init.

☐ AIA Document E204™-2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

☐ The Sustainability Plan:

Title	Date	Pages

☐ Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

OWNER (Signature)

CONTRACTOR (Signature)

(Printed name and title)

(Printed name and title)

Init.



AIA Document A101™ – 2017 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the day of in the year
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

THE CONTRACTOR:
(Name, legal status and address)

TABLE OF ARTICLES

A.1 GENERAL

A.2 OWNER'S INSURANCE

A.3 CONTRACTOR'S INSURANCE AND BONDS

A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Document A201™–2017, General Conditions of the Contract for Construction. Article 11 of A201™–2017 contains additional insurance provisions.

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 **Causes of Loss.** The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 **Specific Required Coverages.** The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 **Deductibles and Self-Insured Retentions.** If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 **Occupancy or Use Prior to Substantial Completion.** The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to

the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

- ☐ **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.
- ☐ **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.
- ☐ **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.
- ☐ **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.
- ☐ **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.
- ☐ **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.
- ☐ **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

- ☐ **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information.
(Indicate applicable limits of coverage or other conditions in the fill point below.)

Init.

[] § A.2.5.2 Other Insurance

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage

Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than (\$) each occurrence, (\$) general aggregate, and (\$) aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

Init.

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than (\$) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than (\$) each accident, (\$) each employee, and (\$) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

- ☐ § A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:
(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

- ☐ § A.3.3.2.2 Railroad Protective Liability Insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate, for Work within fifty (50) feet of railroad property.

- ☐ § A.3.3.2.3 Asbestos Abatement Liability Insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

- ☐ § A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

- ☐ § A.3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

- ☐ § A.3.3.2.6 Other Insurance
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage

Limits

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

(Specify type and penal sum of bonds.)

Type**Penal Sum (\$0.00)**

Payment Bond

Performance Bond

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

Init.

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DIVISION OF PARKS AND RECREATION

AIA 201-2017 SUPPLEMENT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR A101-2017

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SUPPLEMENT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR A101-2017

The following supplements modify the “Standard Form of Agreement Between Owner and Contractor,” AIA Document A101-2017. Where a portion of the Standard Form of Agreement is modified or deleted by the following, the unaltered portions of the Standard Form of Agreement shall remain in effect.

ARTICLE 3: DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 Delete paragraph 3.1 in its entirety and replace with the following:

“The date of Commencement of the Work shall be a date set forth in a notice to proceed issued by the Owner.”

ARTICLE 5: PAYMENTS

5.1 PROGRESS PAYMENTS

5.1.3 Delete paragraph 5.1.3 in its entirety and replace with the following:

“Provided that a valid Application for Payment is received by the Architect that meets all requirements of the Contract, payment shall be made by the Owner not later than 30 days after the Owner receives the valid Application for Payment.”

5.3 Insert the interest rate of “1% per month not to exceed 12% per annum.”

ARTICLE 6: DISPUTE RESOLUTION

6.2 BINDING DISPUTE RESOLUTION

Check Other – and add the following sentence:

"Any remedies available in law or in equity."

ARTICLE 7: TERMINATION or SUSPENSION

7.1.1 Delete paragraph 7.1.1 in its entirety.

ARTICLE 8: MISCELLANEOUS PROVISIONS

8.4 Delete paragraph 8.4 in its entirety and replace with the following:

“The Contractor’s representative shall not be changed without ten days written notice to the Owner.”

END OF SUPPLEMENT TO AGREEMENT BETWEEN OWNER AND CONTRACTOR

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SUPPLEMENT TO A101-2017 – EXHIBIT ‘A’ INSURANCE AND BONDS

The following supplements modify the “Standard Form of Agreement Between Owner and Contractor,” AIA Document A101-2017 Exhibit A Insurance and Bonds. Where a portion of the Standard Form of Agreement is modified or deleted by the following, the unaltered portions of the Standard Form of Agreement shall remain in effect.

ARTICLE A.2 OWNER’S INSURANCE

A.2.1 General

Delete paragraph A.2.1 in its entirety.

A.2.2 Liability Insurance

Delete paragraph A.2.2 in its entirety, except in the case of school projects this paragraph shall remain.

A.2.3 Required Property Insurance

Delete paragraph A.2.3 in its entirety.

A.2.4 Optional Extended Property Insurance

Delete paragraph A.2.4 in its entirety.

A.2.5 Other Optional Insurance

Delete paragraph A.2.5 in its entirety.

ARTICLE A.3 CONTRACTORS INSURANCE AND BONDS

A.3.1.3 Additional Insured Obligations

In the first sentence after “coverage to include (1)” delete “(1) the Owner,”.

Strike the remainder of the first sentence beginning at the semicolon “; and (2) the Owner” through the end of the sentence.

Delete the second sentence in its entirety.

A.3.3.2.1 Delete paragraph 3.3.2.1 in its entirety and replace with the following:

Property Insurance of the same type and scope satisfying the requirements identified in Section A.2.3, The Contractor shall comply with all obligations of the Owner under A.2.3 except to the extent provided below. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required.

END SUPPLEMENT TO A101-2017 – EXHIBIT ‘A’ INSURANCE AND BONDS

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STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

PERFORMANCE BOND

Bond Number: _____

KNOW ALL PERSONS BY THESE PRESENTS, that we, _____, as principal (“**Principal**”), and _____, a _____ corporation, legally authorized to do business in the State of Delaware, as surety (“**Surety**”), are held and firmly bound unto the _____ (“**Owner**”) (*insert State agency name*), in the amount of _____ (\$_____), to be paid to **Owner**, for which payment well and truly to be made, we do bind ourselves, our and each and every of our heirs, executors, administrations, successors and assigns, jointly and severally, for and in the whole, firmly by these presents.

Sealed with our seals and dated this _____ day of _____, 20__.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if **Principal**, who has been awarded by **Owner** that certain contract known as Contract No. _____ dated the _____ day of _____, 20__ (the “Contract”), which Contract is incorporated herein by reference, shall well and truly provide and furnish all materials, appliances and tools and perform all the work required under and pursuant to the terms and conditions of the Contract and the Contract Documents (as defined in the Contract) or any changes or modifications thereto made as therein provided, shall make good and reimburse **Owner** sufficient funds to pay the costs of completing the Contract that **Owner** may sustain by reason of any failure or default on the part of **Principal**, and shall also indemnify and save harmless **Owner** from all costs, damages and expenses arising out of or by reason of the performance of the Contract and for as long as provided by the Contract; then this obligation shall be void, otherwise to be and remain in full force and effect.

Surety, for value received, hereby stipulates and agrees, if requested to do so by **Owner**, to fully perform and complete the work to be performed under the Contract pursuant to the terms, conditions and covenants thereof, if for any cause **Principal** fails or neglects to so fully perform and complete such work.

Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of **Surety** and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition or change in or to the Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any work to be performed or any monies due or to become due thereunder; and **Surety** hereby waives notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to **Surety** as though done or omitted to be done by or in relation to **Principal**.

Surety hereby stipulates and agrees that no modifications, omissions or additions in or to the terms of the Contract shall in any way whatsoever affect the obligation of **Surety** and its bond.

Any proceeding, legal or equitable, under this Bond may be brought in any court of competent jurisdiction in the State of Delaware. Notices to **Surety** or Contractor may be mailed or delivered to them at their respective addresses shown below.

IN WITNESS WHEREOF, **Principal** and **Surety** have hereunto set their hand and seals, and such of them as are corporations have caused their corporate seal to be hereto affixed and these presents to be signed by their duly authorized officers, the day and year first above written.

PRINCIPAL

Name: _____

Witness or Attest: Address: _____

_____ Name: (Corporate Seal)	By: _____(SEAL) Name: Title:

SURETY

Name: _____

Witness or Attest: Address: _____

_____ Name: (Corporate Seal)	By: _____(SEAL) Name: Title:

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

PAYMENT BOND

Bond Number: _____

KNOW ALL PERSONS BY THESE PRESENTS, that we, _____, as principal (“**Principal**”), and _____, a _____ corporation, legally authorized to do business in the State of Delaware, as surety (“**Surety**”), are held and firmly bound unto the _____ (“**Owner**”) (*insert State agency name*), in the amount of _____ (\$ _____), to be paid to **Owner**, for which payment well and truly to be made, we do bind ourselves, our and each and every of our heirs, executors, administrations, successors and assigns, jointly and severally, for and in the whole firmly by these presents.

Sealed with our seals and dated this _____ day of _____, 20__.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if **Principal**, who has been awarded by **Owner** that certain contract known as Contract No. _____ dated the _____ day of _____, 20__ (the “Contract”), which Contract is incorporated herein by reference, shall well and truly pay all and every person furnishing materials or performing labor or service in and about the performance of the work under the Contract, all and every sums of money due him, her, them or any of them, for all such materials, labor and service for which **Principal** is liable, shall make good and reimburse **Owner** sufficient funds to pay such costs in the completion of the Contract as **Owner** may sustain by reason of any failure or default on the part of **Principal**, and shall also indemnify and save harmless **Owner** from all costs, damages and expenses arising out of or by reason of the performance of the Contract and for as long as provided by the Contract; then this obligation shall be void, otherwise to be and remain in full force and effect.

Surety, for value received, for itself and its successors and assigns, hereby stipulates and agrees that the obligation of **Surety** and its bond shall be in no way impaired or affected by any extension of time, modification, omission, addition or change in or to the Contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provisions thereof, or by any assignment, subletting or other transfer thereof or of any work to be performed or any monies due or to become due thereunder; and **Surety** hereby waives notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to assignees, subcontractors, and other transferees shall have the same effect as to **Surety** as though done or omitted to be done by or in relation to **Principal**.

Surety hereby stipulates and agrees that no modifications, omission or additions in or to the terms of the Contract shall in any way whatsoever affect the obligation of **Surety** and its bond.

Any proceeding, legal or equitable, under this Bond may be brought in any court of competent jurisdiction in the State of Delaware. Notices to **Surety** or Contractor may be mailed or delivered to them at their respective addresses shown below.

IN WITNESS WHEREOF, **Principal** and **Surety** have hereunto set their hand and seals, and such of them as are corporations have caused their corporate seal to be hereto affixed and these presents to be signed by their duly authorized officers, the day and year first above written.

PRINCIPAL

Name: _____

Witness or Attest: Address: _____

Name:

(Corporate Seal)

By: _____(SEAL)
Name:
Title:

SURETY

Name: _____

Witness or Attest: Address: _____

Name:

(Corporate Seal)

By: _____(SEAL)
Name:
Title:

Application and Certificate for Payment

TO OWNER:		PROJECT: BHJ	APPLICATION NO: 001	Distribution to:
			PERIOD TO:	☐ OWNER: ☐
			CONTRACT FOR: General Construction	☐ ARCHITECT: ☐
			CONTRACT DATE:	☐ CONTRACTOR: ☐
			PROJECT NOS: / /	☐ FIELD: ☐
				☐ OTHER: ☐

FROM	VIA	ARCHITECT:
CONTRACTOR:	Bernardon Haber Holloway Architects	
	PC	
	Three Mill Road, Suite 211	
	Wilmington, Delaware 19806	

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM \$ 0.00
2. Net change by Change Orders \$ 0.00
3. CONTRACT SUM TO DATE (Line 1 + 2) \$ 0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) \$ 0.00

5. RETAINAGE:

- a. 0 % of Completed Work
(Column D + E on G703) \$ 0.00
 - b. 0 % of Stored Material
(Column F on G703) \$ 0.00
- Total Retainage (Lines 5a + 5b or Total in Column I of G703) \$ 0.00

6. TOTAL EARNED LESS RETAINAGE \$ 0.00
(Line 4 Less Line 5 Total)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT \$ 0.00
(Line 6 from prior Certificate)

8. CURRENT PAYMENT DUE \$ 0.00

9. BALANCE TO FINISH, INCLUDING RETAINAGE
(Line 3 less Line 6) \$ 0.00

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$ 0.00	\$ 0.00
Total approved this Month	\$ 0.00	\$ 0.00
TOTALS	\$ 0.00	\$ 0.00
NET CHANGES by Change Order	\$	0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of: _____

County of: _____

Subscribed and sworn to before
me this _____ day of _____

Notary Public:

My Commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$ 0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract

AIA[®] Document G703[™] – 1992

Continuation Sheet

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.

In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO: 001

APPLICATION DATE:

PERIOD TO:

ARCHITECT'S PROJECT NO:

A ITEM NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		E THIS PERIOD	F MATERIALS PRESENTLY STORED (NOT IN D OR E)	G TOTAL COMPLETED AND STORED TO DATE (D+E+F)	H BALANCE TO FINISH (C - G)	I RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD					
		\$ 0.00	\$ 0.00		\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00
	GRAND TOTAL								

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONSERVATION

DIVISION OF PARKS AND RECREATION

GENERAL CONDITIONS

TO THE

CONTRACT

The General Conditions of this Contract are as stated in the American Institute of Architects Document AIA A201 (2017 Edition) entitled General Conditions of the Contract for Construction as revised by the Supplementary General Conditions and is part of this project manual as if herein written in full.

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AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

THE ARCHITECT:
(Name, legal status and address)

TABLE OF ARTICLES

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- 4 ARCHITECT**
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- 10 PROTECTION OF PERSONS AND PROPERTY**
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- 13 MISCELLANEOUS PROVISIONS**
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT**
- 15 CLAIMS AND DISPUTES**

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

Init.

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User Notes:

(3B9ADA53)

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent

consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the

Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the

Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations

and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor,

prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work,

promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will

affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and

unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

- § 9.10.4** The making of final payment shall constitute a waiver of Claims by the Owner except those arising from
- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
 - .2 failure of the Work to comply with the requirements of the Contract Documents;
 - .3 terms of special warranties required by the Contract Documents; or
 - .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 **Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 **Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to

the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance,

the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the

Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SUPPLEMENTARY GENERAL CONDITIONS A201-2017

The following supplements modify the "General Conditions of the Contract for Construction," AIA Document A201-2017. Where a portion of the General Conditions is modified or deleted by the Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

TABLE OF ARTICLES

1. GENERAL PROVISIONS
2. OWNER
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6. CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
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14. TERMINATION OR SUSPENSION OF THE CONTRACT

ARTICLE 1: GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

Strike the last sentence of Section 1.1.1 in its entirety and replace with the following:

“The Contract Documents also include Advertisement for Bid, Instructions to Bidder, sample forms, the Bid Form, the Contractor’s completed Bid and the Award Letter.”

Add the following Section:

“1.1.1.1 In the event of conflict or discrepancies among the Contract Documents, the Documents prepared by the State of Delaware, Division of Facilities Management shall take precedence over all other documents.”

1.1.8 INITIAL DECISION MAKER

Strike the last sentence of Section 1.1.8 in its entirety and add the following to the end of the remaining sentence:

“ and certify termination of the Agreement under Section 14.2.2.”

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1.2.1.1 Insert “if possible” at the end of the second sentence.

Add the following Sections:

“1.2.4 In the case of an inconsistency between the Drawings and the Specifications, or within either document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect’s interpretation.”

“1.2.5 The word “PROVIDE” as used in the Contract Documents shall mean “FURNISH AND INSTALL” and shall include, without limitation, all labor, materials, equipment, transportation, services and other items required to complete the Work.”

“1.2.6 The word “PRODUCT” as used in the Contract Documents means all materials, systems and equipment.”

1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

Strike Section 1.5.1 in its entirety and replace with the following:

“All pre-design studies, drawings, specifications and other documents, including those in electronic form, prepared by the Architect under this Agreement are, and shall remain, the property of the Owner whether the Project for which they are made is executed or not.

Such documents may be used by the Owner to construct one or more like Projects without the approval of, or additional compensation to, the Architect. The Contractor, Subcontractors, Sub-subcontractors, and Material or Equipment Suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants appropriate to and for use in the execution of their Work under the Contract Documents. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or Material and Equipment Supplier on other Projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and Architect's consultants.

The Architect shall not be liable for injury or damage resulting from the re-use of drawings and specifications if the Architect is not involved in the re-use Project. Prior to re-use of construction documents for a Project in which the Architect is not also involved, the Owner will remove from such documents all identification of the original Architect, including name, address and professional seal or stamp."

Strike Section 1.5.2 in its entirety.

1.7 DIGITAL DATA USE AND TRANSMISSION

Strike Section 1.7 in its entirety and replace with the following:

"The parties shall agree upon protocols governing transmission and use of Instruments of Service or any other information or documentation in digital form."

1.8 BUILDING INFORMATION MODELS USE AND RELIANCE

Strike Section 1.8 in its entirety.

ARTICLE 2: OWNER

2.2 EVIDENCE OF THE OWNERS FINANCIAL ARRANGEMENTS

Strike Section 2.2 in its entirety.

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.3.2 Strike the term "architecture" and replace with "engineering" in Section 2.3.2.

2.3.3 Strike 2.3.3 in its entirety.

2.3.4 Add the following sentence at the end of the paragraph:

"The Contractor, at their expense shall bear the costs to accurately identify the location of all underground utilities in the area of their excavation and shall bear all cost for any repairs required, out of failure to accurately identify said utilities."

Strike Section 2.3.6 in its entirety and replace with the following:

“2.3.6The Contractor shall be furnished free of charge (1) electronic set of the Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.”

2.5 OWNER’S RIGHT TO CARRY OUT THE WORK

Add “, except as outlined in Section 3.15” after the reference to “Article 15” at the end of the last sentence of the Section.

ARTICLE 3: CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.2 Add “and Owner” after “report to the Architect” in the second sentence.

3.2.4 Strike “subject to Section 15.1.7” in the second sentence.

3.2.4 Strike the third sentence.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following Sections:

“3.3.2.1 The Contractor shall immediately remove from the Work, whenever requested to do so by the Owner, any person who is considered by the Owner or Architect to be incompetent or disposed to be so disorderly, or who for any reason is not satisfactory to the Owner, and that person shall not again be employed on the Work without the consent of the Owner or the Architect.”

“3.3.4The Contractor must provide suitable storage facilities at the Site for the proper protection and safe storage of their materials, or as otherwise identified by the specifications. Consult the Owner and the Architect before storing any materials.”

“3.3.5When any room is used as a shop, storeroom, office, etc., by the Contractor or Subcontractor(s) during the construction of the Work, the Contractor making use of these areas will be held responsible for any repairs, patching or cleaning arising from such use.”

3.4 LABOR AND MATERIALS

Add the Following Sections:

“3.4.4Before starting the Work, each Contractor shall carefully examine all preparatory Work that has been executed to receive their Work. Check carefully, by whatever means are required, to insure that its Work and adjacent, related Work, will finish to proper contours, planes and levels. Promptly notify the Architect & Owner of any defects or imperfections in preparatory Work which will in any way affect satisfactory completion of its Work. Absence of such notification will be construed as an acceptance of preparatory Work and later claims of defects will not be recognized.”

“3.4.5 Under no circumstances shall the Contractor’s Work proceed prior to preparatory Work having been completely cured, dried and/or otherwise made satisfactory to receive this Work. Responsibility for timely installation of all materials rests solely with the Contractor responsible for that Work, who shall maintain coordination at all times.”

3.5 WARRANTY

Add the following Sections:

“3.5.3 The Contractor will guarantee all materials and workmanship against original defects, except injury from proper and usual wear when used for the purpose intended, for two years after Acceptance by the Owner, and will maintain all items in perfect condition during the period of warranty.”

“3.5.4 Defects appearing during the period of warranty will be made good by the Contractor at his expense upon demand of the Owner, it being required that all work will be in perfect condition when the period of warranty will have elapsed.”

“3.5.5 Upon notification by the Owner of a defect covered by the Contractor’s warranty, the Contractor shall respond within 4 hours of the notification.”

“3.5.6 In addition to the General Warranty there are other warranties required for certain items for different periods of time than the two years as above, and are particularly so stated in that part of the specifications referring to same. The said warranties will commence at the same time as the General Warranty.”

“3.5.7 If the Contractor fails to remedy any failure, defect or damage within a reasonable time after receipt of notice, the Owner will have the right to replace, repair, or otherwise remedy the failure, defect or damage at the Contractor’s expense.”

3.8 ALLOWANCES

Add the following Section:

“3.8.1.1 For costs to be covered under a project allowance, (included in the schedule of values) the Contractor shall submit a summary of those costs anticipated and an Allowance Access Authorization Form to the Architect and Owner, reflecting the projected costs. The Allowance Access Authorization Form must be signed by the Owner prior to initiating any work associated with the allowance.”

3.10 CONTRACTOR’S CONSTRUCTION AND SUBMITTAL SCHEDULES

3.10.1 Add “estimated” after “and the” and before “date of” in the second sentence.

3.10.2 Strike “and thereafter as necessary to maintain a current submittal schedule” in the first sentence.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following Sections:

“3.11.1 During the course of the Work, the Contractor shall maintain a record set of drawings on which the Contractor shall mark the actual physical location of all piping, valves, equipment, conduit, outlets, access panels, controls, actuators, including all appurtenances that will be concealed once construction is complete, etc., including all invert elevations.”

“3.11.2 At the completion of the project, the Contractor shall obtain a set of the conformed contract drawings from the Architect, and neatly transfer all information outlined in 3.11.1 to provide a complete record of the as-built conditions.”

“3.11.3 Upon completion of the work noted in 3.11.2 the contractor shall schedule a meeting with the Architect/Engineer and Owner to review the final record drawings and closeout documents prior to submission. After this meeting the Contractor shall make adjustments per the review, and submit one (1) original markup and (2) copies of the red line drawings (as-built conditions, to the Owner and one (1) print to the Architect. In addition, attach one complete set of the as-built documents to each of the Operating and Maintenance Instructions/Manuals. The Contractor will include (2) USB drives, each containing all “red line drawings (as-built) and Closeout Documents properly tabbed in accordance with closeout requirements as defined elsewhere in the contract documents.”

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.10.2 Strike “If the Contract Documents require” from the beginning of the sentence.

3.12.10.2 Strike “to” between “professional” and certify” and replace with “shall”.

3.17 Insert “indemnify and” between “shall” and “hold” in the second sentence.

ARTICLE 4: ARCHITECT

4.1 GENERAL

Add the following to Section 4.1.1:

The term “Architect” means Engineer.

4.2 ADMINISTRATION OF THE CONTRACT

4.2.7 Strike the first sentence and replace with the following:

“The Architect will review and approve or take other appropriate action upon the Contractor’s submittals such as Shop Drawings, Product Data and Samples for the purpose of checking for conformance with the Contract Documents.”

4.2.7 Strike the second sentence and replace with the following:

“The Architect’s action will be taken with such reasonable promptness as to cause no delay in the Work in the activities of the Owner, Contractor or separate Contractors, while allowing sufficient time in the Owner’s professional judgment to permit adequate review.”

Add the following Section:

“4.2.10.1 There will be no full-time Project Representative provided by the Owner or Architect on this project.”

“4.2.13 Add “and in compliance with all local requirements.” to the end of the sentence.”

ARTICLE 5: SUBCONTRACTORS

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.3 Strike Section 5.2.3 in its entirety and replace with the following:

“If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection, subject to the statutory requirements of 29 Delaware Code § 6962(d)(10)b.3 and 4.”

5.2.4 Strike Section 5.2.4 in its entirety and replace with the following:

”The Contractor may not substitute any Subcontractor listed in its Bid unless the Contractor complies with the requirements of 29 Delaware Code § 6962(d)(10)b.3 and 4. Failure to comply with this requirement shall subject the Contractor to a penalty as outlined in Section 5.2 of the Owner’s General Requirements.”

Add the following Section:

“5.2.5 The Contractor shall comply and shall ensure all Subcontractors comply with all requirements for drug testing as set forth in TITLE 19 LABOR
DELAWARE ADMINISTRATIVE CODE 4000 Office of Management and Budget 4100
Division of Facilities Management **4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects.**”

ARTICLE 6: CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER’S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1 Strike “and waiver of subrogation” from the end of the second sentence.

6.1.4 Strike Section 6.1.4 in its entirety.

6.2 MUTUAL RESPONSIBILITY

6.2.3 Strike “shall” and replace with “may” in the second sentence.

RTICLE 7: CHANGES IN THE WORK

(SEE ARTICLE 7: CHANGES IN WORK IN THE STATE OF DELAWARE DIVISION OF FACILITIES MANAGEMENT GENERAL REQUIREMENTS)

7.3.4.1 Strike “and other employee costs approved by the Architect” after “worker’s compensation insurance,”

7.3.4.4 Add “work attributable to the” before “change” at the end of the sentence.

7.4 MINOR CHANGES IN WORK

Add “unless such changes are approved” at the end of the third sentence.

ARTICLE 8: TIME

8.2 PROGRESS AND COMPLETION

8.2.1 Add the following Section:

“8.2.1.1 Refer to Project Specifications Section SUMMARY OF WORK for Contract time requirements.”

8.2.2 After “by the Contractor” strike “and” and insert “to”.

8.2.4 Add the following Section:

“8.2.4If the Work falls behind the Progress Schedule as submitted by the Contractor, the Contractor shall employ additional labor and/or equipment necessary to bring the Work into compliance with the Progress Schedule at no additional cost to the Owner.”

8.3 DELAYS AND EXTENSION OF TIME

8.3.1 Strike “binding dispute resolution” and insert “any and all remedies at law or in equity”.

Add the following Section:

“8.3.2.1 The Contractor shall update the status of the suspension, delay, or interruption of the Work with each Application for Payment. (The Contractor shall report the termination of such cause immediately upon the termination thereof.) Failure to comply with this procedure shall constitute a waiver for any claim for adjustment of time or price based upon said cause.”

Strike Section 8.3.3 in its entirety and replace with the following:

8.3.3 “Except in the case of a suspension of the Work directed by the Owner, an extension of time under the provisions of Section 8.3.1 shall be the Contractor’s sole remedy in the progress of the Work and there shall be no payment or compensation to the Contractor for any expense or damage resulting from the delay.”

Add the following Section:

“8.3.4 By permitting the Contractor to work after the expired time for completion of the project, the Owner does not waive their rights under the Contract.”

ARTICLE 9: PAYMENTS AND COMPLETION

9.2 SCHEDULE OF VALUES

Add the following Sections:

“9.2.1 The Schedule of Values shall be submitted using AIA Document G703, Continuation Sheet to G702.”

“9.2.2 The Schedule of Values is to include a line item for Project Closeout Document Submittal. The value of this item is to be no less than 1.5% of the initial contract amount.”

9.3 APPLICATIONS FOR PAYMENT

9.3.1 Strike Section 9.3.1 in its entirety and replace with the following:

“At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values for completed portions of the Work. The application shall be notarized, and supported by all data substantiating the Contractor’s right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage.”

Add the following Sections:

“9.3.1.3 Application for Payment shall be submitted on AIA Document G702 “Application and Certificate for Payment”, supported by AIA Document G703 “Continuation Sheet”. Said Applications shall be fully executed and notarized.”

“9.3.4 Until Closeout Documents have been received and outstanding items completed the Owner will pay 95% (ninety-five percent) of the amount due the Contractor on account of progress payments.”

“9.3.5 The Contractor shall provide a current and updated Progress Schedule to the Architect with each Application for Payment. Failure to provide Schedule will be just cause for rejection of Application for Payment.”

9.5 DECISIONS TO WITHHOLD CERTIFICATION

Add the following Subsections to 9.5.1:

- .8 failure to provide a current Progress Schedule;
- .9 a lien or attachment is filed;
- .10 failure to comply with mandatory requirements for maintaining Record Documents.

9.6 PROGRESS PAYMENTS**9.6.1** Strike Section 9.6.1 in its entirety and replace with the following:

“9.6.1 After the Architect has approved and issued a Certificate for Payment, payment shall be made by the Owner within 30 days after Owner’s receipt of the Certificate for Payment.”

9.6.8 Strike “Provided the Owner has fulfilled its payment obligations under the Contract Documents,” in the first sentence.**9.7 FAILURE OF PAYMENT**

Strike Section 9.7 in its entirety and replace with the following:

“If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within fourteen days after receipt of the Contractor’s Application for Payment, or if the Owner does not pay the Contractor within thirty days after the date established in the Contract Documents, the amount certified by the Architect, then the Contractor may, upon thirty additional days’ notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor’s reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.”

9.8 SUBSTANTIAL COMPLETION**9.8.3** At the end of Section 9.8.3, add the following sentence:

“If the Architect is required to make more than 2 inspections of the same portion of work, the Contractor shall be responsible for all costs associated with subsequent inspections including but not limited to any Architect’s fees.”

9.8.5 Strike “shall” and insert “may” in the second sentence.**9.8.5** Insert “1/2 of the” after “make payment of” in the second sentence.**9.9 PARTIAL OCCUPANCY OR USE****9.9.1** Strike the the first sentence and replace with the following (the remainder of the Section remains as written):

“The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use authorized by public authorities having jurisdiction over the Project.”

9.10.2 Strike “to remain in force after final payment is currently in effect” after “required by the Contract Documents” and replace with “shall remain in force until final payment is completed” in the first sentence.**9.10.4.4** Strike “if permitted by the Contract Documents,”

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

Add the following Sections:

10.1.1 Each Contractor shall develop a safety program in accordance with the Occupational Safety and Health Act of 1970. A copy of said plan shall be furnished to the Owner and Architect prior to the commencement of that Contractor's Work.

10.1.2 Each Contractor shall appoint a Safety Representative. Safety Representatives shall be someone who is on site on a full time basis. If deemed necessary by the Owner or Architect, Contractor Safety meetings will be scheduled. The attendance of all Safety Representatives will be required. Minutes will be recorded of said meetings by the Contractor and will be distributed to all parties as well as posted in all job offices/trailers etc.

10.2 SAFETY OF PERSONS AND PROPERTY

Add the following Section:

10.2.4.1 As required in the Hazardous Chemical Act of June 1984, all vendors supplying any material that may be defined as hazardous must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a caution warning on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in foreseeable emergency situations. Material Safety Data Sheets shall be provided directly to the Owner, along with the shipping slips that include those products.

10.2.5 Strike the second sentence in its entirety.

10.3 HAZARDOUS MATERIALS AND SUBSTANCES

10.3.3 Strike Section 10.3.3 in its entirety.

10.3.4 Insert "hazardous" in the last sentence after "handling of such" .

10.3.6 Strike Section 10.3.6 in its entirety.

ARTICLE 11: INSURANCE AND BONDS

11.1 CONTRACTOR'S INSURANCE AND BONDS

11.1.1 Strike "Owner" from the the third sentence .

11.2 OWNER'S LIABILITY INSURANCE

Strike 11.2 in its entirety, except that in the case of school projects in which case Section 11.2 shall remain.

11.3 WAIVERS OF SUBROGATION

Delete Section 11.3 in its entirety

11.4 LOSS OF USE, BUSINESS INTERRUPTION, AND DELAY IN COMPLETION
INSURANCE

Delete Section 11.4 in its entirety

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

12.2.2 AFTER SUBSTANTIAL COMPLETION

Add the following Section:

“12.2.2.1.1 At any time during the progress of the Work, or in any case where the nature of the defects will be such that it is not expedient to have corrected, the Owner, at its option, will have the right to deduct such sum, or sums, of money from the amount of the Contract as it considers justified to adjust the difference in value between the non-conforming work and that required under contract including any damage to the structure.”

12.2.2.1 Strike all references to “one year” or “one-year” and replace with “two years”.

12.2.2.2 Strike “one-year” and replace with “two years”.

12.2.2.3 Strike “one-year” and replace with “two years”.

12.2.5 Strike “one-year” and replaced with “two years”.

ARTICLE 13: MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Strike the last sentence.

13.4 TESTS AND INSPECTIONS

13.4.1 Strike the last sentence and replace with the following:

“The Owner shall pay for tests, inspections, or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.”

13.5 INTEREST

Strike “the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located” and replace with “30 days of presentment of the authorized Certificate of Payment at the annual rate of 12% or 1% per month.”

Insert the following Section:

“13.6 CONFLICTS WITH FEDERAL STATUTES OR REGULATIONS

13.6.1 If any provision, specifications or requirement of the Contract Documents conflict or is inconsistent with any statute, law or regulation of the government of the United State of America, the Contractor shall notify the Architect and Owner immediately upon discovery.”

ARTICLE 14: TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.1.4 Insert “, upon the Contractors’ request,” after “”furnish to the Contractor” .

14.1.3 Strike “and profit on Work not executed, and” after “as well as reasonable overhead” and replace with “, profit, and reasonable”

14.3 SUSPENSION BY OWNER FOR CONVENIENCE

14.3.2 Strike “Adjustment of the Contract Sum shall include profit”.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

14.4.3 Strike Section 14.4.3 in its entirety and replace with the following:

“In case of such termination for the Owner’s convenience, the Contractor shall be entitled to receive payment for Work executed, and reasonable costs incurred by reason of such termination along with reasonable overhead.”

ARTICLE 15: CLAIMS AND DISPUTES

15.1 CLAIMS

15.1.2 TIME LIMITS ON CLAIMS

Strike the last sentence.

15.1.3 NOTICE OF CLAIM

Strike all references to “21” and replace with “45”.

15.1.5 CLAIMS FOR ADDITIONAL COSTS

Strike the first sentence and replace with the following:

“Contractor shall not proceed to execute any portion of the Work that is subject to the Claim without prior approval of the costs or method of payment for the costs associated with the Claim as determined by the Architect and approved by the Owner.”

15.1.7 WAIVER OF CLAIMS FOR CONSEQUENTIAL DAMAGES

Strike Section 15.1.7 in its entirety.

15.2 INITIAL DECISION

15.2.1 Strike “and binding dispute resolution” in the fourth sentence and replace with “or any and all remedies at law or in equity”.

15.2.5 Strike Section 15.2.5 in its entirety and replace with the following:

“The Architect will approve or reject Claims by written decision, which shall state the reasons therefore and shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Architect shall be subject to mediation and any or all remedies at law or in equity.”

15.2.6 Strike Section 15.2.6 and its sub-Sections in their entirety.

15.3 MEDIATION

15.3.1 Strike “binding dispute resolution” and replace with “any or all remedies at law or in equity”.

15.3.2 Strike “, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedure in effect on the date of the Agreement,” in the first sentence.

15.3.2 Strike all references to “binding dispute resolution” and replace with “any or all remedies at law and in equity”.

15.3.3 Strike Section 15.3.3 in its entirety.

15.4 ARBITRATION

Strike Section 15.4 and its Subsections in their entirety.

END OF SUPPLEMENTARY GENERAL CONDITIONS

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONSERVATION

DIVISION OF FACILITIES MANAGEMENT

DELAWARE DEPARTMENT OF LABOR PREVAILING WAGE RATES

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STATE OF DELAWARE
DEPARTMENT OF LABOR
DIVISION OF INDUSTRIAL AFFAIRS
OFFICE OF LABOR LAW ENFORCEMENT
PHONE: (302) 318-2769

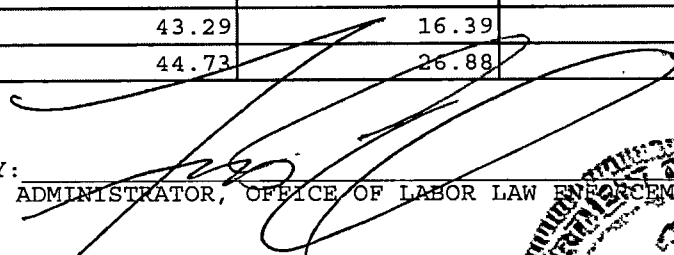
Mailing Address:
252 Chapman Road
Suite 210
Newark, DE 19702

Located at:
252 Chapman Road
Suite 210
Newark, DE 19702

PREVAILING WAGES FOR HEAVY CONSTRUCTION EFFECTIVE MARCH 14, 2025

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
ASBESTOS WORKERS	28.89	25.41	55.24
BOILERMAKERS	90.82	41.97	77.00
BRICKLAYERS	90.12	77.39	32.55
CARPENTERS	62.56	62.56	50.80
CEMENT FINISHERS	56.98	31.82	23.71
DIVER	103.26	Call DOL	Call DOL
DIVER TENDER	116.61	Call DOL	Call DOL
ELECTRICAL LINE WORKERS	96.29	96.29	96.29
ELECTRICIANS	83.92	83.92	83.92
GLAZIERS	26.67	23.17	15.70
INSULATORS	69.12	69.12	69.12
IRON WORKERS	78.58	79.67	78.58
LABORERS	57.65	57.65	57.65
MILLWRIGHTS	88.35	88.35	70.97
PAINTERS	95.76	95.76	95.76
PILEDRIVERS	91.12	51.44	40.03
PLASTERERS	25.12	21.85	15.00
PLUMBERS/PIPEFITTERS/STEAMFITTERS	99.88	101.73	25.47
POWER EQUIPMENT OPERATORS	83.29	89.93	83.29
SHEET METAL WORKERS	40.16	24.92	23.41
SPRINKLER FITTERS	43.29	16.39	15.00
TRUCK DRIVERS	44.73	26.88	29.10

CERTIFIED: 10/28/2025

BY: 

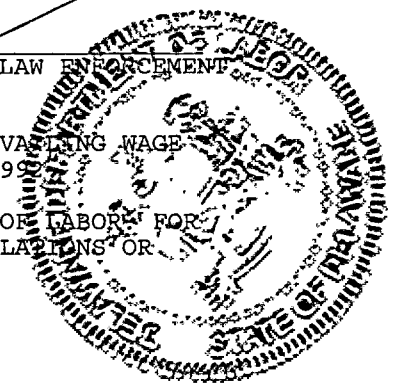
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

NOTE: THESE RATES ARE PROMULGATED AND ENFORCED PURSUANT TO THE PREVAILING WAGE REGULATIONS ADOPTED BY THE DEPARTMENT OF LABOR ON APRIL 3, 1980.

CLASSIFICATIONS OF WORKERS ARE DETERMINED BY THE DEPARTMENT OF LABOR. FOR ASSISTANCE IN CLASSIFYING WORKERS, OR FOR A COPY OF THE REGULATIONS OR CLASSIFICATIONS, PHONE (302) 318-2769.

NON-REGISTERED APPRENTICES MUST BE PAID THE MECHANIC'S RATE.

PROJECT: NAT23824_Bengeroad Auburn Valley State Park NVF Benge Road Lift Station, New Castle County



PREVAILING WAGE DEBARMENT LIST

The following contractors have been debarred for violations of the prevailing wage law 29Del.C. §6960 or other applicable State statutes.

Therefore, no public construction contract in this State shall be bid on, awarded to, or received by contractors and individuals on this list for a period of (3) three years from the date of the judgment or as deemed by a court of competent jurisdiction.

Contractor	Address	Date of Debarment
Mullen Brothers, Inc. and Daniel Mullen, individually	3375 Garnett Road, Boothwyn, PA 19060	Indefinite/ Civil Contempt
State Contractors Corporation, and Jose Oscar Rivera, individually	13004 Hathaway Drive Silver Spring, MD 20906	Indefinite/ 19 <u>Del.C.</u> 2374(f)
Green Granite and Jason Green, individually	604 Heatherbrooke Court Avondale, PA 19311	Indefinite/ Civil Contempt
Pro Image Landscaping, Inc. and Owner(s) individually	23 Commerce Street Wilmington, DE 19801 and/or 2 Cameo Road Claymont, DE 19703	Indefinite/19 <u>Del.C.</u> §108 & 10 <u>Del.C.</u> 542(c)
Liberty Mechanical, LLC and Owner(s), individually	2032 Duncan Road Wilmington, DE 19801	Indefinite/ 19 <u>Del.C.</u> 2374(f)
Integrated Mechanical and Fire Systems Inc. and Allison Sheldon, individually	4601 Governor Printz Boulevard Wilmington, DE 19809	Indefinite/19 <u>Del.C.</u> §108 & 10 <u>Del.C.</u> 542(c)
ACH 1, INC.	873 Salem Church Road Newark, DE 19702	Indefinite/19 <u>Del.C.</u> 6960

Updated: July 6, 2022

GENERAL REQUIREMENTS

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7. CHANGES IN THE WORK
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12. UNCOVERING AND CORRECTION OF WORK
13. MISCELLANEOUS PROVISIONS
14. TERMINATION OR SUSPENSION OF THE CONTRACT

ARTICLE 1: GENERAL

1.1 CONTRACT DOCUMENTS

1.1.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary and what is required by one shall be as binding as if required by all. Performance by the Contractor shall be required to an extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results.

1.1.2 Work including material purchases shall not begin until the Contractor is in receipt of a bonafide State of Delaware Purchase Order. Any work performed or material purchases prior to the issuance of the Purchase Order is done at the Contractor's own risk and cost.

1.2 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

1.2.1 For Public Works Projects financed in whole or in part by state appropriation the Contractor agrees that during the performance of this contract:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, sex, color, sexual orientation, gender identity or national origin. The Contractor will take positive steps to ensure that applicants are employed and that employees are treated during employment without regard to their race, creed, sex, color, 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 by the contracting agency setting forth 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 consideration for employment without regard to race, creed, sex, color, sexual orientation, gender identity or national origin."

ARTICLE 2: OWNER

(NO ADDITIONAL GENERAL REQUIREMENTS – SEE SUPPLEMENTARY GENERAL CONDITIONS)

ARTICLE 3: CONTRACTOR

3.1 Schedule of Values: The successful Bidder shall within twenty (20) days after receiving notice to proceed with the work, furnish to the Owner a complete schedule of values on the various items comprising the work.

3.2 Subcontracts: Upon approval of Subcontractors, the Contractor shall award their Subcontracts as soon as possible after the signing of their own contract and see that all

material, their own and those of their Subcontractors, are promptly ordered so that the work will not be delayed by failure of materials to arrive on time.

- 3.3 Before commencing any work or construction, the General Contractor is to consult with the Owner as to matters in connection with access to the site and the allocation of Ground Areas for the various features of hauling, storage, etc.
- 3.4 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions.
- 3.5 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
- 3.6 The Contractor warrants to the Owner that materials and equipment furnished will be new and of good quality, unless otherwise permitted, and that the work will be free from defects and in conformance with the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved, may be considered defective. If required by the Owner, the Contractor shall furnish evidence as to the kind and quality of materials and equipment provided.
- 3.7 Unless otherwise provided, the Contractor shall pay all sales, consumer, use and other similar taxes, and shall secure and pay for required permits, fees, licenses, and inspections necessary for proper execution of the Work.
- 3.8 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work. The Contractor shall promptly notify the Owner if the Drawings and Specifications are observed to be at variance therewith.
- 3.9 The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under contract with the Contractor.
- 3.10 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project all waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials. The Contractor shall be responsible for returning all damaged areas to their original conditions.
- 3.11 STATE LICENSE AND TAX REQUIREMENTS
- 3.11.1 Each Contractor and Subcontractor shall be licensed to do business in the State of Delaware and shall pay all fees and taxes due under State laws. In conformance with Section 2503, Chapter 25, Title 30, Delaware Code, "the Contractor shall furnish the Delaware Department of Finance within ten (10) days after entering into any contract with a contractor or subcontractor not a resident of this State, a statement of total value of such contract or contracts together with the names and addresses of the contracting parties."

- 3.12 The Contractor shall comply with all requirements set forth in Section 6962, Chapter 69, Title 29 of the Delaware Code.
- 3.13 During the contract Work, the Contractor and each Subcontractor, shall implement an Employee Drug Testing Program in accordance with OMB Regulation 4104 - "Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on "Large Public Works Projects". "Large Public Works" is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.

ARTICLE 4: ADMINISTRATION OF THE CONTRACT

4.1 CONTRACT SURETY

4.1.1 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

- 4.1.2 All bonds will be required as follows unless specifically waived elsewhere in the Bidding Documents.

- 4.1.3 Contents of Performance Bonds – The bond shall be in the form approved by the Office of Management and Budget. The bond shall be conditioned upon the faithful compliance and performance by the successful bidder of each and every term and condition of the contract and the proposal, plans, specifications, and bid documents thereof. Each term and condition shall be met at the time and in the manner prescribed by the Contract, Bid documents and the specifications, including the payment in full to every person furnishing materiel or performing labor in the performance of the Contract, of all sums of money due the person for such labor and materiel. (The bond shall also contain the successful bidder's guarantee to indemnify and save harmless the State and the agency from all costs, damages and expenses growing out of or by reason of the Contract in accordance with the Contract.)

- 4.1.4 Invoking a Performance Bond – The agency may, when it considers that the interest of the State so requires, cause judgement to be confessed upon the bond.

- 4.1.5 Within twenty (20) days after the date of notice of award of contract, the Bidder to whom the award is made shall furnish a Performance Bond and Labor and Material Payment Bond, each equal to the full amount of the Contract price to guarantee the faithful performance of all terms, covenants and conditions of the same. The bonds are to be issued by an acceptable Bonding Company licensed to do business in the State of Delaware and shall be issued in duplicate.

- 4.1.6 Performance and Payment Bonds shall be maintained in full force (warranty bond) for a period of two (2) years after the date of the Certificate for Final Payment. The Performance Bond shall guarantee the satisfactory completion of the Project and that the Contractor will make good any faults or defects in his work which may develop during the period of said guarantees as a result of improper or defective workmanship, material or apparatus, whether furnished by themselves or their Sub-Contractors. The Payment Bond shall guarantee that the Contractor shall pay in full all persons, firms or corporations who furnish labor or material or both labor and material for, or on account of, the work included herein. The

bonds shall be paid for by this Contractor. The Owner shall have the right to demand that the proof parties signing the bonds are duly authorized to do so.

4.2 FAILURE TO COMPLY WITH CONTRACT

- 4.2.1 If any firm entering into a contract with the State, or Agency that neglects or refuses to perform or fails to comply with the terms thereof, the Agency which signed the Contract may terminate the Contract and proceed to award a new contract in accordance with this Chapter 69, Title 29 of the Delaware Code or may require the Surety on the Performance Bond to complete the Contract in accordance with the terms of the Performance Bond. Nothing herein shall preclude the Agency from pursuing additional remedies as otherwise provided by law.

4.3 CONTRACT INSURANCE AND CONTRACT LIABILITY

- 4.3.1 In addition to the bond requirements stated in the Bid Documents, each successful Bidder shall purchase adequate insurance for the performance of the Contract and, by submission of a Bid, agrees to indemnify and save harmless and to defend all legal or equitable actions brought against the State, any Agency, officer and/or employee of the State, for and from all claims of liability which is or may be the result of the successful Bidder's actions during the performance of the Contract.

- 4.3.2 The purchase or nonpurchase of such insurance or the involvement of the successful Bidder in any legal or equitable defense of any action brought against the successful Bidder based upon work performed pursuant to the Contract will not waive any defense which the State, its agencies and their respective officers, employees and agents might otherwise have against such claims, specifically including the defense of sovereign immunity, where applicable, and by the terms of this section, the State and all agencies, officers and employees thereof shall not be financially responsible for the consequences of work performed, pursuant to said contract.

4.4 RIGHT TO AUDIT RECORDS

- 4.4.1 The Owner shall have the right to audit the books and records of a Contractor or any Subcontractor under any Contract or Subcontract to the extent that the books and records relate to the performance of the Contract or Subcontract.
- 4.4.2 Said books and records shall be maintained by the Contractor for a period of seven (7) years from the date of final payment under the Prime Contract and by the Subcontractor for a period of seven (7) years from the date of final payment under the Subcontract.

ARTICLE 5: SUBCONTRACTORS

5.1 SUBCONTRACTING REQUIREMENTS

- 5.1.1 All contracts for the construction, reconstruction, alteration or repair of any public building (not a road, street or highway) shall be subject to the following provisions:
1. A contract shall be awarded only to a Bidder whose Bid is accompanied by a statement containing, for each Subcontractor category, the name and address (city or town and State only – street number and P.O. Box addresses not

required) of the subcontractor whose services the Bidder intends to use in performing the Work and providing the material for such Subcontractor category.

2. A Bid will not be accepted nor will an award of any Contract be made to any Bidder which, as the Prime Contractor, has listed itself as the Subcontractor for any Subcontractor unless:

- A. It has been established to the satisfaction of the awarding Agency that the Bidder has customarily performed the specialty work of such Subcontractor category by artisans regularly employed by the Bidder's firm;
- B. That the Bidder is duly licensed by the State to engage in such specialty work, if the State requires licenses; and
- C. That the Bidder is recognized in the industry as a bona fide Subcontractor or Contractor in such specialty work and Subcontractor category.

- 5.1.2 The decision of the awarding Agency as to whether a Bidder who list itself as the Subcontractor for a Subcontractor category shall be final and binding upon all Bidders, and no action of any nature shall lie against any awarding agency or its employees or officers because of its decision in this regard.

- 5.1.3 After such a Contract has been awarded, the successful Bidder shall not substitute another Subcontractor for any Subcontractor whose name was set forth in the statement which accompanied the Bid without the written consent of the awarding Agency.

- 5.1.4 No Agency shall consent to any substitution of Subcontractors unless the Agency is satisfied that the Subcontractor whose name is on the Bidders accompanying statement:

- A. Is unqualified to perform the work required;
- B. Has failed to execute a timely reasonable Subcontract;
- C. Has defaulted in the performance on the portion of the work covered by the Subcontract; or
- D. Is no longer engaged in such business.

- 5.1.5 Should a Bidder be awarded a contract, such successful Bidder shall provide to the agency the taxpayer identification license numbers of such subcontractors. Such numbers shall be provided on the later of the date on which such subcontractor is required to be identified or the time the contract is executed. The successful Bidder shall provide to the agency to which it is contracting, within 30 days of entering into such public works contract, copies of all Delaware Business licenses of subcontractors and/or independent contractors that will perform work for such public works contract. However, if a subcontractor or independent contractor is hired or contracted more than 20 days after the Bidder entered the public works contract the Delaware Business license of such subcontractor or independent contractor shall be provided to the agency within 10 days of being contracted or hired.

- 5.1.6 The Contractor may employ additional Subcontractors on the jobsite only after submitting a copy of the Subcontractor's Employee Drug Testing Program to the Owner for approval. A Contractor or Subcontractor shall not commence work until the Owner has concluded its review and determined that the submitted Employee Drug Testing Program complies with OMB Regulation 4104.

5.2 PENALTY FOR SUBSTITUTION OF SUBCONTRACTORS

- 5.2.1 Should the Contractor fail to utilize any or all of the Subcontractors in the Contractor's Bid statement in the performance of the Work on the public bidding, the Contractor shall be penalized in the amount of (project specific amount*). The Agency may determine to deduct payments of the penalty from the Contractor or have the amount paid directly to the Agency. Any penalty amount assessed against the Contractor may be remitted or refunded, in whole or in part, by the Agency awarding the Contract, only if it is established to the satisfaction of the Agency that the Subcontractor in question has defaulted or is no longer engaged in such business. No claim for the remission or refund of any penalty shall be granted unless an application is filed within one year after the liability of the successful Bidder accrues. All penalty amounts assessed and not refunded or remitted to the contractor shall be reverted to the State.

*one (1) percent of contract amount not to exceed \$10,000

5.3 ASBESTOS ABATEMENT

- 5.3.1 The selection of any Contractor to perform asbestos abatement for State-funded projects shall be approved by the Office of Management and Budget, Division of Facilities Management pursuant to Chapter 78 of Title 16.

5.4 STANDARDS OF CONSTRUCTION FOR THE PROTECTION OF THE PHYSICALLY HANDICAPPED

- 5.4.1 All Contracts shall conform with the standard established by the Delaware Architectural Accessibility Board unless otherwise exempted by the Board.

5.5 CONTRACT PERFORMANCE

- 5.5.1 Any firm entering into a Public Works Contract that neglects or refuses to perform or fails to comply with its terms, the Agency may terminate the Contract and proceed to award a new Contract or may require the Surety on the Performance Bond to complete the Contract in accordance with the terms of the Performance Bond.

ARTICLE 6: CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

- 6.1 The Owner reserves the right to simultaneously perform other construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other Projects at the same site.
- 6.2 The Contractor shall afford the Owner and other Contractors reasonable opportunity for access and storage of materials and equipment, and for the performance of their activities, and shall connect and coordinate their activities with other forces as required by the Contract Documents.

ARTICLE 7: CHANGES IN THE WORK

- 7.1 The Owner, without invalidating the Contract, may order changes in the Work consisting of Additions, Deletions, Modifications or Substitutions, with the Contract Sum and Contract completion date being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Professional, as the duly authorized agent, the Contractor and the Owner.
- 7.2 The Contract Sum and Contract Completion Date shall be adjusted only by a fully executed Change Order.
- 7.3 The additional cost, or credit to the Owner resulting from a change in the Work shall be by mutual agreement of the Owner, Contractor and the Architect. In all cases, this cost or credit shall be based on the 'DPE' wages required and the "invoice price" of the materials/equipment needed.
- 7.3.1 "DPE" shall be defined to mean "direct personnel expense". Direct payroll expense includes prevailing wage rates plus a maximum multiplier of 1.35 times DPE. For example, if the prevailing wage rate is \$50/hour, the DPE would be \$67.50/hour (50 x 1.35).
- 7.3.2 "Invoice price" of materials/equipment shall be defined to mean the actual cost of materials and/or equipment that is paid by the Contractor, (or subcontractor), to a material distributor, direct factory vendor, store, material provider, or equipment leasing entity. Rates for equipment that is leased and/or owned by the Contractor or subcontractor(s) shall not exceed those listed in the latest version of the "Means Building Construction Cost Data" publication.
- 7.3.3 In addition to the above, the General Contractor is allowed a fifteen percent (15%) markup for overhead and profit for additional work performed by the General Contractor's own forces. For additional subcontractor work, the Subcontractor is allowed a fifteen (15) percent overhead and profit on change order work above and beyond the direct costs stated previously. To this amount, the General Contractor will be allowed a mark-up not exceeding seven and one half percent (7.5%) on the subcontractors work. These mark-ups shall include all costs including, but not limited to: overhead, profit, bonds, insurance, supervision, etc. No markup is permitted on the work of the subcontractors subcontractor. No additional costs shall be allowed for changes related to the Contractor's onsite superintendent/staff, or project manager, unless a change in the work changes the project duration and is identified by the CPM schedule. There will be no other costs associated with the change order.

ARTICLE 8: TIME

- 8.1 Time limits, if any, are as stated in the Project Manual. By executing the Agreement, the Contractor confirms that the stipulated limits are reasonable, and that the Work will be completed within the anticipated time frame.
- 8.2 If progress of the Work is delayed at any time by changes ordered by the Owner, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions, unavoidable casualties or other causes beyond the Contractor's control, the Contract Time shall be extended for such reasonable time as the Owner may determine.

8.3 Any extension of time beyond the date fixed for completion of the construction and acceptance of any part of the Work called for by the Contract, or the occupancy of the building by the Owner, in whole or in part, previous to the completion shall not be deemed a waiver by the Owner of his right to annul or terminate the Contract for abandonment or delay in the matter provided for, nor relieve the Contractor of full responsibility.

8.4 SUSPENSION AND DEBARMENT

8.4.1 Per Section 6962(d)(14), Title 29, Delaware Code, “Any Contractor who fails to perform a public works contract or complete a public works project within the time schedule established by the Agency in the Invitation To Bid, may be subject to Suspension or Debarment for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the Project.”

8.4.2 “Upon such failure for any of the above stated reasons, the Agency that contracted for the public works project may petition the Director of the Office of Management and Budget for Suspension or Debarment of the Contractor. The Agency shall send a copy of the petition to the Contractor within three (3) working days of filing with the Director. If the Director concludes that the petition has merit, the Director shall schedule and hold a hearing to determine whether to suspend the Contractor, debar the Contractor or deny the petition. The Agency shall have the burden of proving, by a preponderance of the evidence, that the Contractor failed to perform or complete the public works project within the time schedule established by the Agency and failed to do so for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the project. Upon a finding in favor of the Agency, the Director may suspend a Contractor from Bidding on any project funded, in whole or in part, with public funds for up to 1 year for a first offense, up to 3 years for a second offense and permanently debar the Contractor for a third offense. The Director shall issue a written decision and shall send a copy to the Contractor and the Agency. Such decision may be appealed to the Superior Court within thirty (30) days for a review on the record.”

8.5 RETAINAGE

8.5.1 Per Section 6962(d)(5) a.3, Title 29, Delaware Code: The Agency may at the beginning of each public works project establish a time schedule for the completion of the project. If the project is delayed beyond the completion date due to the Contractor’s failure to meet their responsibilities, the Agency may forfeit, at its discretion, all or part of the Contractor’s retainage.

8.5.2 This forfeiture of retainage also applies to the timely completion of the punchlist. A punchlist will only be prepared upon the mutual agreement of the Owner, Architect and Contractor. Once the punchlist is prepared, all three parties will by mutual agreement, establish a schedule for its completion. Should completion of the punchlist be delayed beyond the established date due to the Contractor’s failure to meet their responsibilities, the Agency may hold permanently, at its discretion, all or part of the Contractor’s retainage.

ARTICLE 9: PAYMENTS AND COMPLETION**9.1 APPLICATION FOR PAYMENT**

9.1.1 Applications for payment shall be made upon AIA Document G702. There will be a five percent (5%) retainage on all Contractor's monthly invoices until completion of the project. This retainage may become payable upon receipt of all required closeout documentation, provided all other requirements of the Contract Documents have been met.

9.1.2 A date will be fixed for the taking of the monthly account of work done. Upon receipt of Contractor's itemized application for payment, such application will be audited, modified, if found necessary, and approved for the amount. Statement shall be submitted to the Owner.

9.1.3 Section 6516, Title 29 of the Delaware Code annualized interest is not to exceed 12% per annum beginning thirty (30) days after the "presentment" (as opposed to the date) of the invoice.

9.2 PARTIAL PAYMENTS

9.2.1 Any public works Contract executed by any Agency may provide for partial payments at the option of the Owner with respect to materials placed along or upon the sites or stored at secured locations, which are suitable for use in the performance of the contract.

9.2.2 When approved by the agency, partial payment may include the values of tested and acceptable materials of a nonperishable or noncontaminative nature which have been produced or furnished for incorporation as a permanent part of the work yet to be completed, provided acceptable provisions have been made for storage.

9.2.2.1 Any allowance made for materials on hand will not exceed the delivered cost of the materials as verified by invoices furnished by the Contractor, nor will it exceed the contract bid price for the material complete in place.

9.2.3 If requested by the Agency, receipted bills from all Contractors, Subcontractors, and material, men, etc., for the previous payment must accompany each application for payment. Following such a request, no payment will be made until these receipted bills have been received by the Owner.

9.3 SUBSTANTIAL COMPLETION

9.3.1 When the building has been made suitable for occupancy, but still requires small items of miscellaneous work, the Owner will determine the date when the project has been substantially completed.

9.3.2 If, after the Work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor, and without terminating the Contract, the Owner may make payment of the balance due for the portion of the Work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment that it shall not constitute a waiver of claims.

9.3.3 On projects where commissioning is included, the commissioning work as defined in the specifications must be complete prior to the issuance of substantial completion.

9.4 FINAL PAYMENT

- 9.4.1 Final payment, including the five percent (5%) retainage if determined appropriate, shall be made within thirty (30) days after the Work is fully completed and the Contract fully performed and provided that the Contractor has submitted the following closeout documentation (in addition to any other documentation required elsewhere in the Contract Documents):
- 9.4.1.1 Evidence satisfactory to the Owner that all payrolls, material bills, and other indebtedness connected with the work have been paid,
 - 9.4.1.2 An acceptable RELEASE OF LIENS,
 - 9.4.1.3 Copies of all applicable warranties,
 - 9.4.1.4 As-built drawings,
 - 9.4.1.5 Operations and Maintenance Manuals,
 - 9.4.1.6 Instruction Manuals,
 - 9.4.1.7 Consent of Surety to final payment.
 - 9.4.1.8 The Owner reserves the right to retain payments, or parts thereof, for its protection until the foregoing conditions have been complied with, defective work corrected and all unsatisfactory conditions remedied.

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY

- 10.1 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take all reasonable precautions to prevent damage, injury or loss to: workers, persons nearby who may be affected, the Work, materials and equipment to be incorporated, and existing property at the site or adjacent thereto. The Contractor shall give notices and comply with applicable laws ordinances, rules regulations, and lawful orders of public authorities bearing on the safety of persons and property and their protection from injury, damage, or loss. The Contractor shall promptly remedy damage and loss to property at the site caused in whole or in part by the Contractor, a Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable.
- 10.2 The Contractor shall notify the Owner in the event any existing hazardous material such as lead, PCBs, asbestos, etc. is encountered on the project. The Owner will arrange with a qualified specialist for the identification, testing, removal, handling and protection against exposure or environmental pollution, to comply with applicable regulation laws and ordinances. The Contractor and Architect will not be required to participate in or to perform this operation. Upon completion of this work, the Owner will notify the Contractor and Architect in writing the area has been cleared and approved by the authorities in order for the work to proceed. The Contractor shall attach documentation from the authorities of said approval.

- 10.3 As required in the Hazardous Chemical Information Act of June 1984, all vendors supplying any materials that may be defined as hazardous, must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a warning caution on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in any foreseeable emergency situation. Material Safety Data Sheets must be provided directly to the Owner along with the shipping slips that include those products.
- 10.4 The Contractor shall certify to the Owner that materials incorporated into the Work are free of all asbestos. This certification may be in the form of Material Safety Data Sheet (MSDS) provided by the product manufacturer for the materials used in construction, as specified or as provided by the Contractor.

ARTICLE 11: INSURANCE AND BONDS

- 11.1 The Contractor shall carry all insurance required by law, such as Unemployment Insurance, etc. The Contractor shall carry such insurance coverage as they desire on their own property such as a field office, storage sheds or other structures erected upon the project site that belong to them and for their own use. The Subcontractors involved with this project shall carry whatever insurance protection they consider necessary to cover the loss of any of their personal property, etc.
- 11.2 Upon being awarded the Contract, the Contractor shall obtain a minimum of two (2) copies of all required insurance certificates called for herein, and submit one (1) copy of each certificate, to the Owner, within 20 days of contract award.
- 11.3 Bodily Injury Liability and Property Damage Liability Insurance shall, in addition to the coverage included herein, include coverage for injury to or destruction of any property arising out of the collapse of or structural injury to any building or structure due to demolition work and evidence of these coverages shall be filed with and approved by the Owner.
- 11.4 The Contractor's Property Damage Liability Insurance shall, in addition to the coverage noted herein, include coverage on all real and personal property in their care, custody and control damaged in any way by the Contractor or their Subcontractors during the entire construction period on this project.
- 11.5 Builders Risk (including Standard Extended Coverage Insurance) on the existing building during the entire construction period, may be provided by the Contractor under this contract. The Owner shall insure the existing building and all of its contents and all this new alteration work under this contract during entire construction period for the full insurable value of the entire work at the site. Note, however, that the Contractor and their Subcontractors shall be responsible for insuring building materials (installed and stored) and their tools and equipment whenever in use on the project, against fire damage, theft, vandalism, etc.
- 11.6 Certificates of the insurance company or companies stating the amount and type of coverage, terms of policies, etc., shall be furnished to the Owner, within 20 days of contract award.

11.7 The Contractor shall, at their own expense, (in addition to the above) carry the following forms of insurance:

11.7.1 Contractor's Contractual Liability Insurance

Minimum coverage to be:

Bodily Injury	\$500,000	for each person
	\$1,000,000	for each occurrence
	\$1,000,000	aggregate
Property Damage	\$500,000	for each occurrence
	\$1,000,000	aggregate

11.7.2 Contractor's Protective Liability Insurance

Minimum coverage to be:

Bodily Injury	\$500,000	for each person
	\$1,000,000	for each occurrence
	\$1,000,000	aggregate
Property Damage	\$500,000	for each occurrence
	\$500,000	aggregate

11.7.3 Automobile Liability Insurance

Minimum coverage to be:

Bodily Injury	\$1,000,000	for each person
	\$1,000,000	for each occurrence
Property Damage	\$500,000	per accident

11.7.4 Prime Contractor's and Subcontractors' policies shall include contingent and contractual liability coverage in the same minimum amounts as 11.7.1 above.

11.7.5 Workmen's Compensation (including Employer's Liability):

11.7.5.1 Minimum Limit on employer's liability to be as required by law.

11.7.5.2 Minimum Limit for all employees working at one site.

11.7.6 Certificates of Insurance must be filed with the Owner guaranteeing fifteen (15) days prior notice of cancellation, non-renewal, or any change in coverages and limits of liability shown as included on certificates.

11.7.7 Social Security Liability

- 11.7.7.1 With respect to all persons at any time employed by or on the payroll of the Contractor or performing any work for or on their behalf, or in connection with or arising out of the Contractor's business, the Contractor shall accept full and exclusive liability for the payment of any and all contributions or taxes or unemployment insurance, or old age retirement benefits, pensions or annuities now or hereafter imposed by the Government of the United States and the State or political subdivision thereof, whether the same be measured by wages, salaries or other remuneration paid to such persons or otherwise.
- 11.7.7.2 Upon request, the Contractor shall furnish Owner such information on payrolls or employment records as may be necessary to enable it to fully comply with the law imposing the aforesaid contributions or taxes.
- 11.7.7.3 If the Owner is required by law to and does pay any and/or all of the aforesaid contributions or taxes, the Contractor shall forthwith reimburse the Owner for the entire amount so paid by the Owner.

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

- 12.1 The Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of two years from the date of Substantial Completion, or by terms of an applicable special warranty required by the Contract Documents. The provisions of this Article apply to work done by Subcontractors as well as to Work done by direct employees of the Contractor.
- 12.2 At any time during the progress of the work, or in any case where the nature of the defects shall be such that it is not expedient to have them corrected, the Owner, at their option, shall have the right to deduct such sum, or sums, of money from the amount of the contract as they consider justified to adjust the difference in value between the defective work and that required under contract including any damage to the structure.

ARTICLE 13: MISCELLANEOUS PROVISIONS**13.1 CUTTING AND PATCHING**

- 13.1.1 The Contractor shall be responsible for all cutting and patching. The Contractor shall coordinate the work of the various trades involved.

13.2 DIMENSIONS

- 13.2.1 All dimensions shown shall be verified by the Contractor by actual measurements at the project site. Any discrepancies between the drawings and specifications and the existing conditions shall be referred to the Owner for adjustment before any work affected thereby has been performed.

13.3 LABORATORY TESTS

13.3.1 Any specified laboratory tests of material and finished articles to be incorporated in the work shall be made by bureaus, laboratories or agencies approved by the Owner and reports of such tests shall be submitted to the Owner. The cost of the testing shall be paid for by the Contractor.

13.3.2 The Contractor shall furnish all sample materials required for these tests and shall deliver same without charge to the testing laboratory or other designated agency when and where directed by the Owner.

13.4 ARCHAEOLOGICAL EVIDENCE

13.4.1 Whenever, in the course of construction, any archaeological evidence is encountered on the surface or below the surface of the ground, the Contractor shall notify the authorities of the State Historic Preservation Office and suspend work in the immediate area for a reasonable time to permit those authorities, or persons designated by them, to examine the area and ensure the proper removal of the archaeological evidence for suitable preservation by the Division of Historical and Cultural Affairs.

13.5 GLASS REPLACEMENT AND CLEANING

13.5.1 The General Contractor shall replace without expense to the Owner all glass broken during the construction of the project. If job conditions warrant, at completion of the job the General Contractor shall have all glass cleaned and polished.

13.6 WARRANTY

13.6.1 For a period of two (2) years from the date of substantial completion, as evidenced by the date of final acceptance of the work, the contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect of equipment, material or workmanship performed by the contractor or any of his subcontractors or suppliers. However, manufacturer's warranties and guarantees, if for a period longer than two (2) years, shall take precedence over the above warranties. The contractor shall remedy, at his own expense, any such failure to conform or any such defect. The protection of this warranty shall be included in the Contractor's Performance Bond.

ARTICLE 14: TERMINATION OF CONTRACT

14.1 If the Contractor defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents or fails to perform a provision of the Contract, the Owner, after seven days written notice to the Contractor, may make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor. Alternatively, at the Owner's option, and the Owner may terminate the Contract and take possession of the site and of all materials, equipment, tools, and machinery thereon owned by the Contractor and may finish the Work by whatever method the Owner may deem expedient. If the costs of finishing the Work exceed any unpaid compensation due the Contractor, the Contractor shall pay the difference to the Owner.

- 14.2 “If the continuation of this Agreement is contingent upon the appropriation of adequate state, or federal funds, this Agreement may be terminated on the date beginning on the first fiscal year for which funds are not appropriated or at the exhaustion of the appropriation. The Owner may terminate this Agreement by providing written notice to the parties of such non-appropriation. All payment obligations of the Owner will cease upon the date of termination. Notwithstanding the foregoing, the Owner agrees that it will use its best efforts to obtain approval of necessary funds to continue the Agreement by taking appropriate action to request adequate funds to continue the Agreement.”

END OF GENERAL REQUIREMENTS

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONSERVATION

DIVISION OF PARKS AND RECREATION

DRUG TESTING FORMS

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EMPLOYEE DRUG TESTING REPORT FORM

Period Ending: _____

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds maintain testing data that includes but is not limited to the data elements below.

Project Number: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

Number of employees who worked on the jobsite during the report period: _____

Number of employees subject to random testing during the report period: _____

Number of Negative Results _____ Number of Positive Results _____

Action taken on employee(s) in response to a failed or positive random test:

Date: _____

This form is not required to be submitted to the Owner. Included as a reference to show information required to be maintained by the Contractor. The Owner shall have the right to periodically audit all Contractor and Subcontractor test results at the Contractor's or Subcontractor's offices (or by other means to make the data available for inspection by the Owner).

**EMPLOYEE DRUG TESTING
REPORT OF POSITIVE RESULTS**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds to notify the Owner in writing of a positive random drug test.

Project Number: _____

Project Name: _____

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

Name of employee with positive test result: _____

Last 4 digits of employee SSN: _____

Date test results received: _____

Action taken on employee in response to a positive test result:

Authorized Representative of Contractor/Subcontractor: _____
(typed or printed)

Authorized Representative of Contractor/Subcontractor: _____
(signature)

Date: _____

This form shall be sent by mail to the Owner within 24 hours of receipt of test results.

Enclose this test results form in a sealed envelope with the notation "Drug Testing Form – DO NOT OPEN" on the face thereof and place in a separate mailing envelope.

**AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors implement a program of mandatory drug testing for Employees who work on Large Public Works Contracts funded all or in part with public funds.

We hereby certify that we have in place or will implement during the entire term of the contract a Mandatory Drug Testing Program for our employees on the jobsite that complies with this regulation:

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED FOR YOUR BID TO BE CONSIDERED.

**AFFIDAVIT OF
CRAFT TRAINING COMPLIANCE**

We, the contractor, hereby certify that we and all applicable subcontractors will abide by the contractor and subcontractor craft training requirements outlined below for the duration of the contract. Craft training is defined as “an apprenticeship program approved by and registered with any State apprenticeship agency or the United States Department of Labor.”¹ A list of crafts for which there are approved and registered training programs is maintained by the Delaware Department of Labor and can be found at [https://det.delawareworks.com/apprenticeship/documents/Apprenticeship Occupation List for 29Del6962 Compliance.pdf](https://det.delawareworks.com/apprenticeship/documents/Apprenticeship%20Occupation%20List%20for%2029Del6962%20Compliance.pdf)

If you have questions regarding craft training programs, please submit them in writing to the Delaware Department of Labor at: apprenticeship@delaware.gov. The Craft Training Compliance Affidavit must be submitted prior to contract execution. In addition to this Affidavit, all information pertaining to craft training for subcontractors must also be submitted prior to contract execution. Information to be provided is the craft, company name, registration number (indicate DE, US DOL or identify other state) or that craft training requirements do not apply and the reason.

In accordance with Title 29, Chapter 69, Section 6962(d)(13) of the Delaware Code, contractors and subcontractors must provide craft training for journeyman and apprentice levels if **all** of the following apply:

- A. A project meets the prevailing wage requirement under Title 29, Chapter 69, Section 6960 of the Delaware Code.
- B. The contractor employs 10 or more total employees.
- C. The project is not a federal highway project

Failure to provide required craft training on the project may subject the successful contractor and/or subcontractor(s) to penalties as outlined in Title 29, Chapter 69, Section 6962(d)(13) of the Delaware Code.

Craft(s)

Contractor Name:

Contractor Address:

Contractor Program**Registration Number**

On this line also indicate whether DE, Other State (identify) or US Registration Number

Or

☐ **Craft Training requirements are not applicable because:**

Authorized Representative (typed or printed):

Authorized Representative (signature):

¹ Title 29, Chapter 69, Section 6902(7) of the Delaware Code.

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

THIS PAGE MUST BE SIGNED AND NOTARIZED TO BE CONSIDERED.

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work under separate contract.
4. Allowances.
5. Unit Prices.
6. Applications for Payment.
7. Owner Supplied Construction Documents.
8. Coordination.
9. Access to site.
10. Coordination with occupants.
11. Work restrictions.
12. Specification and drawing conventions.
13. Field Engineering.
14. References and Standards.
15. Miscellaneous provisions.

- B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Auburn Valley Master Plan NVF Site Benge Road Pump Station Replacement.

1. Project Location: 628 Benge Road, Hockessin, DE 19707.

- B. Owner: State of Delaware, Division of Natural Resources and Environmental Control, Parks and Recreation, 89 Kings Highway, Dover, DE 19901.

- C. Architect/Engineer's Identification: The Contract Documents, dated August 29, 2024, were prepared for this Project by AECOM, 248 Chapman Road, Suite 101, Newark, DE 19702.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Project generally involves but is not limited to erecting a project sign, maintenance of traffic, constructing a duplex grinder pump station and metering manhole, force main installation by open cut and cover, force main installation by directional drilling, simplex grinder pump construction, gravity sewer, manhole and lateral cleanout installation, driveway paving restoration, state roadway restoration, off-roadway restoration, erosion and sediment control, contingent rock excavation and providing contingent Type C Borrow backfill, including testing, start-up, manufacturer training and O&M manuals.

- B. Type of Contract:

1. Project will be constructed under an itemized lump sum prime contract with contingent unit price items.

1.5 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts as it will have an impact on the General Contractor's scope of work. The General Contractor shall allow the separate contractors access to scaffolding and/or high reaches.

1. Note work to be completed by others under State contract, by tenant or others that is not included with this Project's scope of work. List the work that may occur immediately before, during or immediately afterwards that might impact the scope of work and require GC coordination and scheduling. This could be hazardous material abatement, archeology, security systems, fire alarms, etc.

2. Items noted "NIC" (Not in Contract) will be furnished and installed by others.

1.6 ALLOWANCES

- A. Schedule of Allowances: Refer to Section 012100 Allowances.

1.7 UNIT PRICES

- A. Unit Prices quoted on the Bid form will be exercised as Owner option.

- B. Coordinate related work and modify surrounding work affected by accepted unit prices as required to complete the Work.
- C. Schedule of Unit Prices: Refer to Section 012200 Unit Prices.

1.8 APPLICATIONS FOR PAYMENT

- A. Submit three (3) originals of each application under procedures of Section 012900 Payment Procedures.
- B. Content and Format: Use the Project Manual table of contents to develop the Schedule of Values.

1.9 OWNER SUPPLIED CONSTRUCTION DOCUMENTS

- A. The Contractor will be furnished, free of charge one electronic PDF file drawings and Project Manuals that are conformed to include all drawings and specification revised during the bid process. Paper sets will be furnished at the cost of reproduction, postage and handling.

1.10 COORDINATION

- A. Coordinate Work of the various sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.
- B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical, electrical and plumbing work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas (except as otherwise shown), conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Execute cutting and patching to integrate elements of Work, uncover ill-timed defective and non-conforming work, provide openings for penetrations of existing surfaces, and provide samples for testing. Seal penetrations through floors, walls, and ceilings.

1.11 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

- B. Use of Site: Limit use of Project site to areas within the Contract limits. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limits: Confine construction operations to the areas as indicated. The building/site is currently occupied and the Owner's operations shall not be disturbed. The surrounding buildings/site are occupied and the Owner's operations shall not be disturbed.
 2. Driveways, Walkways and Entrances: Keep public roads, public parking, driveways and entrances outside of the work area serving premises clear and available to Owner, Owner's employees, emergency vehicles and general public at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 3. The adjacent building areas, site and properties are occupied and shall not be disturbed.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weather tight condition throughout construction period. Repair damage caused by construction operations.

1.12 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, entrances, corridors, stairs and other adjacent occupied or used facilities. Do not close or obstruct walkways, entrances, stairs, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction. Entrances shall be open for the Owner's use at all times.
 2. Barricade work areas to keep the public from entering.
 3. Notify Owner not less than one week in advance of activities that will affect Owner's operations.

1.13 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
 2. Refer to Section 011400 "Work Restrictions" for additional requirements.

- B. On-Site Work Hours: Limit work to the site and/or existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
 - 1. Weekend Hours: Weekend work shall not be allowed unless preapproved by the Owner.
 - 2. Early Morning Hours: Early morning hours are not allowed unless required for utility shut downs.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in any level of noise and vibration, odors, or other disruption to the occupancy or use of adjacent occupied areas, the buildings and adjacent properties with the Owner.
 - 1. Notify Architect and Owner not less than seven (7) days in advance of proposed disruptive operations.
 - 2. Obtain Architect's and/or Owner's written permission before proceeding with disruptive operations.
- D. Nonsmoking Campus and Building: Smoking is prohibited within the boundaries of all state workplaces including all buildings, facilities, indoor and outdoor spaces and all the surrounding grounds owned by the State. This policy also includes but is not limited to parking lots, walkways, State vehicles and private vehicles parked or operated on State workplace property.

1.14 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.15 FIELD ENGINEERING

- A. Provide field engineering services; establish grades, lines, and levels, by use of recognized engineering survey practices.
- B. Control datum for survey is that shown on drawings. Locate and protect control and reference points.

1.16 REFERENCES AND STANDARDS

- A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the Bid date, except when a specific date is specified.
- C. Obtain copies of standards when required by Contract Documents. Maintain copy at job site during progress of the specific work.

1.17 MISCELLANEOUS PROVISIONS

A. SCHEDULE

1. The following is the required schedule for this work:

- a. Bids Due: February 5, 2026 at 11:00 A.M.
- b. Notice of Building Contract Award: Within thirty (30) days of receipt and acceptance of qualified low bid.
- c. Purchase Order Issuance: The issuance of a State of Delaware purchase order is contingent upon the successful Contractor submitting bonds on State-approved forms, signed contracts and insurance certificates to the State of Delaware within 20 days of Notice of Award. A purchase order will be issued in approximately thirty days after these items have been submitted to the State of Delaware.
- d. On-Site Mobilization: Upon receipt of State of Delaware purchase order.
- e. Substantial Completion: 365 calendar days from the date of commencement of the Work.
- f. Completion of Punch List: 21 days from date of substantial completion.

- 1) Refer to the General Requirements for additional details.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 011400 - WORK RESTRICTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to the limits indicated on the drawings. Do not disturb areas to remain occupied during the renovations.
 - 2. Owner Occupancy: The existing pump station is currently in operation and will remain operational and accessible to the Owner during construction until after successful startup and testing of the new pump station and force main, and sewage is diverted to the new pump station. The surrounding occupied areas, site, buildings, roadways, access into the buildings, etc. beyond the work area shall remain accessible to the Owner.
 - 3. Parking: Auburn Valley State Park office parking lot.
 - 4. Dumpster: Auburn Valley State Park office parking lot is the designated location for the dumpster. The dumpster shall be covered to avoid windblown debris. Debris shall be removed on a regular basis in order to avoid an overflowing dumpster. Restoration of grounds disturbed by the dumpster will be required upon completion of the Project. "No Trespassing" signs shall be placed on the dumpster.
 - 5. Access: Auburn Valley State Park office parking lot.
 - 6. Storage: Auburn Valley State Park office parking lot.
 - 7. Public Roadways, Driveways, Entrances and Public Sidewalks: Keep public roadways, driveways, entrances and public sidewalks serving premises clear and available to the Public, Owner, Owner's employees and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of roadways, driveways, sidewalks and entrances.
 - b. The Owner will not sign for any deliveries at any time.
 - c. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - 8. Contractor and subcontractor promotional signage will not be allowed at the project site or within the Park unless approved by the Owner.
- B. Use of Existing Building: Maintain the existing building in a weathertight condition throughout renovation period. Repair damage caused by construction operations. Protect building and its contents during construction period.
 - 1. The Contractor shall be provided full access to the site as necessary to complete the work.

2. Use of the Owner's telephones will not be allowed.
3. Flammable materials shall not be stored in the Mill Building. Flammable materials shall be kept outside, away from all buildings, in a flammable liquid/material storage box.
4. Gas powered equipment will not be allowed in the buildings or near windows and intake louvers at any time.
5. Debris shall be removed from and around the site including the sidewalks, trails and parking areas on a daily basis.
6. At no times shall equipment be left operating in and around the site after hours or when no one is present in the building.
7. Noisy activities shall take place during the hours defined and prescheduled with the Owner to avoid disruption of their activities.
8. Access to water will be provided.
9. There will be no restroom facilities available. The Contractor shall provide a self-contained toilet unit securely attached to the ground and kept locked after hours.
10. Dogs or other animals shall not be brought onto the property at any time.
11. Children shall not be brought onto the site at any time.
12. The general surrounds of the site are open to the public and those working at the site shall not use abusive language.
13. Radios or other music-playing devices will not be allowed. Head phones and ear buds will not be allowed.
14. Fire extinguishers shall be kept in the areas under renovation at the site at all times.
15. All work taking place on the site shall be monitored by the contractor's project superintendent at all times even if the General Contractor's work forces are not working at the site.
16. The Project superintendent shall discuss weekly with the DNREC Project Manager to review the activities planned for that week to avoid miscommunication, facilitate the renovation process and to maintain the Owner's operations.
17. Walk off mats shall be provided at entrances to all construction areas from public ways.
18. Provide protective barriers and covers at entrances and public access areas where work is taking place overhead.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011400

SECTION 012200 - DEFINITION OF BID ITEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for bid prices.
- B. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

- A. Lump Sum Bid Price shall be deemed to include, without limitation, any and all direct or indirect costs incurred by the Contractor and any and all elements of overhead and profit as well as any and all direct and indirect costs of the Contractor including, but not limited to: the cost of all insurance and bonds of any kind or nature whatsoever that the Contractor must carry pursuant to the Contract, as well as all payroll taxes or other statutory or contractual costs or expenses that the Contractor must pay on behalf of its employees. The Lump Sum Bid Price shall also include the Contractor's costs or expenses for tools, small tools, equipment and accessories, whether owned or rented, shoring, dewatering equipment, travel, transportation, and mobilization. Unless otherwise specified, the Lump Sum Bid Price shall further be deemed to include any costs, expenses, overhead or profit if the Contractor subcontracts all or any part of the Services.
- B. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. The prices bid shall include indirect costs related to the performance of this contract in accordance with the provisions contained on the drawings and as specified in these special provisions and the Standard Specifications for Construction.
- B. Work as shown on the Contract Drawings and/or included in the specifications is to be paid for under the items listed in the proposal. The absence from the proposal of bid items for any

specific category of work shall be interpreted as meaning that the cost of such work accomplished as defined by the drawings and specifications shall be included in the prices bid for related items which are listed in the proposal.

- C. Prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- D. Measurement and Payment: This Section provides for work that requires establishment of lump sum or unit prices. Methods of measurement and payment for unit prices are specified in this Section.
- E. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

Requests for payment shall be made on Owner provided forms, which will be distributed at the pre-construction meeting. The Contractor shall complete and present required information in typewritten form.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

LUMP SUM BASE BID

3.1 Bid Item 1 - Project Sign

- A. Measurement – This item will not be measured. The Lump Sum payment for this item will be full compensation for providing and erecting a Project Sign, maintaining the sign during construction, and removing the sign at the close of the project.
- B. Payment – This bid item includes all labor, materials, equipment, and appurtenances required to provide and erect a project sign in accordance with the construction site sign requirements shown in, Figure 1 of the Delaware Water Pollution Control Revolving Loan Fund Program requirements. Payment shall also include removal and disposal of the project sign and restoration of the sign location at the close of the project.

3.2 Bid Item 2 – Maintenance of Traffic

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the control of traffic throughout the course of the work in accordance with DE Department of Transportation Specifications for Road and Bridge Standards.

- B. Payment – Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid in equal intervals of the unit price bid over the duration of the construction. The price bid shall include, but not be limited to final coordination approval of traffic control plans with DNREC, the Bond required by DE Department of Transportation Specifications for Road and Bridge Standards in accordance with the permit issued for the work, furnishing, transporting and setting up all lights, signs, flags, equipment, materials and labor including flagmen when required to complete the work in accordance with the DE Department of Transportation Specifications for Road and Bridge Standards.

3.3 Bid Item 3 – Duplex Grinder Pump Station (DX502) and 5' Diameter Metering Manhole

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of a complete grinder pump station, metering manhole, and associated appurtenances in accordance with the plans and specifications.
- B. Payment – Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid based on the percentage of work completed over the duration of the construction. The price bid shall include, but not be limited to full compensation for providing all labor, material, equipment, tools and incidentals necessary to furnish and install support of excavation, dewatering, demolition of existing sewer pipe, manholes and the existing pump station; proposed wet well, pumps, piping, valves, influent sewer connections, pedestals, cabinets and controls, electric meter, conduit and wiring, grounding grid, generator, chain link fence, bollards, five foot diameter metering manhole, piping, fittings and flow meter, related concrete work and ballast, vent pipe, and electric service to the site and coordination with DELMARVA Power. The price bid shall also include control strategies, manufacturer startup, O&M Manuals, testing, coordination, and inspections with New Castle County including appurtenances and related work in accordance with the project plans and specifications.

3.4 Bid Item 4 – Benge Road Forcemain, Open Cut and Cover Installation

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of 1-1/4" HDPE, IPS, PE4710, DR11 HDPE Pipe, Buttresses, Combination Air Valves, Buried 1-1/4" Valves and In-line Cleanout Assemblies installed by open cut and cover, in accordance with the plans and specifications.
- B. Payment – Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid based on the percentage of work completed over the duration of the construction. The price bid shall include, but not be limited to 1-1/4" HDPE, IPS, PE4710, DR11 HDPE pipe, Buttresses, Combination Air Valves, Buried 1-1/4" Valves and In-line Cleanout Assemblies installed per the requirements of the Contract Documents. The price bid for these items will be full compensation for providing all labor, material, equipment, tools and incidentals necessary to furnish and install the pipe including pipe appurtenances including but not limited to test pitting of existing utilities, fabricated fittings, restrained/unrestrained couplings, thrust blocks, anchor blocks, notifications, excavation, shoring, tree protection, dewatering, tracer wire attached to the pipe, bedding per contract documents, furnishing and placing Type C backfill per the contract documents, testing of

backfill trench maintenance including dust control, other restoration, and pressure test of pipe after placement and all other items of work necessary to furnish and install the piping per the plans and specifications. Any additional excavation, offsite disposal, or fill resulting from an expanded trench width for excavation support shall be the Contractor's expense.

3.5 Bid Item 5 – Benge Road Forcemain, Directional Drill Installation

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of 1-1/4" HDPE, IPS, PE4710, DR11 HDPE Pipe installed by directional drilling, in accordance with the plans and specifications.
- B. Payment – Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid based on the percentage of work completed over the duration of the construction. The price bid shall include, but not be limited to 1-1/4" HDPE, IPS, PE4710, DR11 HDPE Pipe installed per the requirements of the Contract Documents. The price bid for these items will be full compensation for providing all labor, material, equipment, tools and incidentals necessary to furnish and install the pipe including pipe appurtenances including but not limited to fabricated fittings, restrained/unrestrained couplings, thrust blocks, anchor blocks, notifications, excavation, shoring, tree protection, dewatering, tracer wire attached to the pipe, bedding per contract documents, test pitting of existing utilities, preparation and implementation of a frac out plan, monitoring of stream crossing during drilling, and pressure test of pipe after placement and all other items of work necessary to furnish and install the piping per the plans and specifications. Any additional excavation, and offsite disposal of excess drill fluids, shall be the Contractor's expense.

3.6 Bid Item 6 – Benge Road Forcemain Installed in Sleeves

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of 1-1/4" and 1-1/2" HDPE, IPS, PE4710, DR11 HDPE Pipe installed through the existing 3" PVC sleeve between Sta 4+00 and Sta 10+00, through 12" VCP conduit beneath Yorklyn Road, and through 4" HDPE casing pipe between Sta 14+00 +/- and Sta 16+00 +/- in accordance with the plans and specifications.
- B. Payment – Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid based on the percentage of work completed over the duration of the construction. The price bid shall include, but not be limited to 1-1/4" and 1-1/2" HDPE, IPS, PE4710, DR11 HDPE Pipe installed per the requirements of the Contract Documents. The price bid for these items will be full compensation for providing all labor, material, equipment, tools and incidentals necessary to furnish and install the pipe including pipe appurtenances including but not limited to cleaning the existing sleeve, fabricated fittings, casing spacers, restrained/unrestrained couplings, thrust blocks, anchor blocks, notifications, excavation, shoring, stabilization, dewatering, tracer wire attached to the pipe, bedding per contract documents, test pitting of existing utilities, restoration, and pressure test of pipe after placement and all other items of work necessary to furnish and install the piping per the plans and specifications. Any additional excavation shall be the Contractor's expense.

3.7 Bid Item 7 – Simplex Grinder Pump Station (DH071-61)

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of a complete packaged grinder pump station and associated appurtenances in accordance with the plans and specifications.
- B. Payment – Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid based on the percentage of work completed over the duration of the construction. The price bid shall include, but not be limited to full compensation for providing all labor, material, equipment, tools and incidentals necessary to furnish and install support of excavation, dewatering, demolition of existing sewer pipe, manholes; proposed packaged pump station, pumps, piping, valves, influent sewer connections, grinder connection to existing forcemain installed by others, control panel, conduit and wiring, connection to new electric service at rear of carriage house installed by others, related concrete work and ballast. The price bid shall include, but not be limited to control strategies, manufacturer startup, O&M Manuals, testing, coordination, and inspections with New Castle County including appurtenances and related work in accordance with the project plans and specifications. **The price bid also includes protection of the adjacent small gauge railroad tracks and access area as necessary and determined by DNREC parks staff. Demolition of the existing manhole and installation of the new simplex grinder pump station shall be by hand excavation and backfill so not to damage the adjacent small gauge railroad.**

3.8 Bid Item 8 – Gravity Sewer, Manholes, and Lateral Cleanouts

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of SDR 35 PVC gravity sanitary sewer and associated Manholes, Frames and Covers, Lateral Cleanouts, plus connection to existing laterals.
- B. Payment – Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid based on the percentage of work completed over the duration of the construction. The price bid shall include, but not be limited to installation of SDR 35 PVC gravity sanitary sewer and associated Pre-Cast Concrete Manholes, Inside Drop Manholes, Frames and Covers, Lateral Cleanouts, plus connection to existing laterals, installed per the requirements of the Contract Documents. The price bid for these items will be full compensation for providing all labor, material, equipment, tools and incidentals necessary to furnish and install the pipe and fittings including test pitting of existing utilities, pipe appurtenances including but not limited to restrained/unrestrained couplings, notifications, excavation, shoring, tree protection, dewatering, tracer wire attached to the pipe, bedding per contract documents, furnishing and placing Type C backfill per the contract documents, testing of backfill trench maintenance including dust control, other restoration, and pressure test of pipe after placement and all other items of work necessary to furnish and install the piping per the plans and specifications. Any additional excavation, offsite disposal, or fill resulting from an expanded trench width for excavation support shall be the Contractor's expense.

3.9 Bid Item 9 – Driveway Paving Restoration

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of Asphalt Paving at full depth or at depth depicted on the Contract Drawings of Type C Asphalt Paving and associated GABC placed in existing driveways to the edge of existing paving, where indicated on the contract drawings.
- B. Payment - The price for this Item will be full compensation for providing all labor, materials, equipment tools and incidentals to complete removal and disposal of existing asphalt and subbase material and permanent paving in driveways per the details on the plans including the placement of 8" GABC and 5" of Type C Asphalt as shown or specified.

3.10 Bid Item 10 – Benge Road Paving Restoration

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of Asphalt Paving at full depth or at depth depicted on the Contract Drawings.
- B. Payment – This bid item includes all labor, materials, equipment, and appurtenances required to complete removal and disposal of existing asphalt and subbase material and install asphalt paving as specified in the Contract Documents. This item shall include the removal and disposal of existing paving, placement of 14" BCBC (Placed in two lifts), painting with traffic markings, restoration of road signage within the limit of disturbance depicted on the Contract Drawings and in accordance with DelDOT specifications. Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid for after paving is acceptable to DelDOT.

3.11 Bid Item 11 – Off-Roadway Restoration

- A. Measurement – This item will not be measured. The lump sum payment for this item is for the installation of topsoil, seeding and mulch restoration area that was restored where disturbed by the installation of the work.
- B. Payment – Bid Item includes all labor, materials, equipment, water and appurtenances required to satisfactorily install Topsoil, Seed and Mulch and establish grass growth, within the limit of disturbance depicted on the Contract Drawings and in accordance with plans, specification and State of Delaware Erosion and Sediment Handbook. Payment will be made based upon the price bid in the proposal.

3.12 Bid Item 12 – Erosion and Sediment Control

- A. Measurement – This item will not be measured. The lump sum payment for this item is for sediment control measures and maintenance for the duration of the construction.

- B. Payment – Payment will be based upon completion of the work in accordance with the Plans and Specifications and will be paid based on the percentage of work completed over the duration of the construction. The price bid shall include, but not be limited to erosion and sediment control measures and maintenance of for the duration of the construction, clearing, grading, removal of unsuitable material, management of groundwater discharge, in accordance with the project plans and specifications and State of Delaware Erosion and Sediment Handbook.

3.13 Bid Item 13 – Mobilization (Not to exceed 5% of total)

- A. Measurement – This item will not be measured. The Lump Sum payment for this item will be full compensation for providing services and facilities required to mobilize and commence the work of this project as shown, specified, and required to provide a complete project.
- B. Payment – The payment for mobilization will be made at 50% of the price bid on the first payment requested with the remainder paid in even monthly increment spread out over the Contract Time. Costs to be included under this item shall include such items as bonds, insurance, shop drawings, submittals, temporary facilities, and controls, permits, mobilization of equipment, notifications along with other costs and incidentals associated with initiating the work.

UNIT PRICE BID

3.14 Bid Item 14 – Contingent Rock Excavation

- A. Measurement – This contingent bid item shall consist of rock excavation, of all unsuitable material below subgrade for structures or pipe bedding, or of all material in addition to that shown on the Drawings, specified, or included in other Bid Items, and in accordance with the written direction of the Engineer. Measurement under this item will be made on the basis of the volume of material excavated in compliance with the Contract Documents, in cubic yards measured in place, as directed and approved by the Engineer.
- B. Payment – Payment for work completed under this item will be made at the unit price bid per cubic yard for Contingent Unclassified Excavation which price shall include and cover furnishing all labor, materials, equipment, tools and incidentals required to perform the unclassified excavation, and includes excavation support, loading, hauling, disposal (at permitted disposal location) and all related work required to satisfactorily complete the work as shown, specified or directed.

3.15 Bid Item 15 – Contingent Borrow Type C

- A. Measurement – This item of work shall consist of furnishing and placing complete backfill in addition to that which is required as shown on the Drawings, specified, or as included in other Bid Items and in the event that sufficient suitable material is not available from the excavations at the Contract sites, and in accordance with the written direction of the Engineer. This item will be made on the basis of the actual in-place cubic yard volume of material satisfactorily

furnished and placed in compliance with the Contract Documents, as directed by the Engineer. The maximum width for payment for utilities shall be as indicated on the Drawings and shall apply from trench sub-grade or top of required bedding material up to finished grade, less any thickness required for stone aggregate, bituminous concrete, concrete, topsoil, or other surface restoration materials.

- B. Payment – Payment for this item shall include the disposal of all unsuitable or excess materials excavated from the site at a permitted off-site disposal location of the Contractor's own choosing.

END OF SECTION 012200

SECTION 012400 - PERMITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes permits that have been issued for this Project as well as permits-in-progress initiated by the Owner and those required Contractor application.

1.3 DEFINITIONS

- A. Permits: A document issued by the Authorities having jurisdiction approving specific construction. Permits may approve the documents as submitted or contain caveats that are to be followed.
 - 1. Preconstruction Permits: Permits issued prior to the bidding and award and which are required prior to proceeding to this stage.
 - 2. Post Bid Permits: Permits required to be applied for by the successful contractor. These include demolition permits, building permits and sub-permits such as mechanical, electrical, fire suppression and plumbing.
 - 3. Post Construction Permits: Permits issued by the authorities having jurisdiction stating that a structure or portion of the structure has been approved as complying with applicable laws, regulations and codes and may be occupied and put to its intended use.

1.4 RESPONSIBILITIES

- A. The Contractor shall abide by the approved permits which are to include the notations provided by the entity/person approving the permit.
- B. The Contractor is responsible for obtaining and paying for all construction permits unless stated otherwise in the construction documents.
 - 1. The Contractor shall conform to all of the regulations and requirements, and shall be responsible for costs associated therewith, of all permits required of the Work.
 - 2. The Contractor shall be responsible for scheduling all inspections as required by the permits.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ISSUED PERMITS

- A. Delaware Department of Transportation (DelDOT).
 - 1. Traffic Control Plan.
 - 2. Safety Permit.
- B. Department of Natural Resources and Environmental Control (DNREC).
 - 1. Sediment and Stormwater Plan Approval. (Minor Linear Utility Disturbance)
- C. State of Delaware Architectural Accessibility Board.
- D. Jurisdiction Having Authority Historic Area Commission.
- E. Delaware State Historic Preservation Office (SHPO).

3.2 SCHEDULE OF PENDING PERMITS.

- A. None

END OF SECTION 012400

SECTION 012500 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittal Procedures for" administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

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

- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.

- d. Contractor's name and address.
 - e. Date of submittal.
2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
- a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Change Orders (numbers) that affect value.
 - d. Dollar value.
- 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
- a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Schedule of Values.
 - 3. Contractor's Construction Schedule (preliminary if not final).
 - 4. List of Contractor's staff assignments (Project Superintendent specifically).
 - 5. Copies of building permits.
 - 6. Certificates of insurance and insurance policies.
 - 7. Performance and payment bonds.
- G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
- H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - 1. Updated final statement, accounting for final changes to the Contract Sum.
 - 2. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 3. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 - 4. AIA Document G707, "Consent of Surety to Final Payment."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
 - 2. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with subcontractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.

1.4 SUBMITTALS

- A. Staff Names: Within 15 days of notice to proceed, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.5 PROJECT MEETINGS

- A. General: The Architect will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
 2. Minutes: The Architect will record significant discussions and agreements achieved. The minutes will be distributed to everyone concerned, including Owner, within 7 days of the meeting.
- B. Preconstruction Conference: A preconstruction conference will be scheduled before the start of construction, at a time convenient to the Owner and Contractor, but no later than 15 days after execution of the Agreement. The conference will be held at the Project. The meeting will be conducted to review responsibilities and personnel assignments.
 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Items of significance that could affect progress will be discussed, including the following:
 - a. Tentative construction schedule.
 - b. Designation of responsible personnel.
 - c. Procedures for processing field decisions and Change Orders.
 - d. Procedures for processing Applications for Payment.
 - e. Submittal procedures.
 - f. Preparation of Record Documents.
 - g. Use of the premises.
 - h. Responsibility for temporary facilities and controls.
 - i. Parking availability.
 - j. Storage areas.
 - k. Equipment deliveries and priorities.

- l. Progress cleaning.
 - m. Working hours.
- C. Progress Meetings: Progress meetings will be conducted every two weeks. Coordinate dates of meetings with preparation of payment requests.
 1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Deliveries.
 - 2) Off-site fabrication.
 - 3) Access.
 - 4) Site utilization.
 - 5) Temporary facilities and controls.
 - 6) Work hours.
 - 7) Progress cleaning.
 - 8) Quality and work standards.
 3. Reporting: The Architect will distribute minutes of the meeting to each party present and to parties who should have been present. A brief summary, in narrative form, of progress since the previous meeting and report will be included.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. The revised schedule will be issued concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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SECTION 013150 – FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions and procedural requirements for Field Engineering services, including, but not necessarily limited to the following:

- 1. Land Survey Work.
- 2. Engineering services.

1.3 SUBMITTALS

- A. Certificates: Submit a certificate signed by the Land Surveyor certifying that the location and elevation of improvements comply with the Contract Documents.
- B. Project Record Documents: Submit a record of Work performed and record survey data as required under provisions of Sections "Submittals" and "Project Closeout".

1.4 QUALITY ASSURANCE

- A. Surveyor: Engage a Professional Land Surveyor, licensed in the State of Delaware, to perform required surveying services to ensure that grades, lines, levels, and locations of the Work are in compliance with the Contract Documents.
- B. Engineer: Engage a Professional Engineer of the discipline required, registered in the State of Delaware, to perform required engineering services.

1.5 EXAMINATION

- A. The Owner will identify existing control points and property line corner stakes.
- B. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks before proceeding to layout the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
 - 1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
 - 2. Promptly replace lost or destroyed Project control points. Base replacements on the original survey control points.

- C. Establish and maintain a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- D. Existing utilities and equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction.

1.6 PERFORMANCE

- A. Working from lines and levels established by the property survey, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
 - 1. Advise entities engaged in construction activities, of marked lines and levels provided for their use.
 - 2. As construction proceeds, check every major element for line, level and plumb.
- B. Surveyor's Log: Maintain a surveyor's log of control and other survey Work. Make this log available for reference.
 - 1. Record deviations from required lines and levels, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.
 - 2. On completion of foundation walls, major site improvements, and other Work requiring field engineering services, prepare a certified survey showing dimensions, locations, angles and elevations of construction and sitework.
- C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means.
- D. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels and control lines and levels required for mechanical and electrical work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013150

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Field condition reports.
 - 3. Special reports.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Major Area: A story of construction, a separate building, or a similar significant construction element.
- F. Milestone: A key or critical point in time for reference or measurement.

1.4 SUBMITTALS

- A. Preliminary Construction Schedule: Submit two opaque copies.
- B. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
- C. Field Condition Reports: Submit two copies at time of discovery of differing conditions.
- D. Special Reports: Submit two copies at time of unusual event.

1.5 COORDINATION

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.

3. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 1. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Use of premises restrictions.
 - c. Provisions for future construction.
 - d. Seasonal variations.
 - e. Environmental control.
 2. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Mockups.
 - b. Fabrication.
 - c. Deliveries.
 - d. Installation.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

2.2 CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit horizontal bar-chart-type construction schedule within five days of date established for commencement of the Work.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.

5. Material deliveries.
6. High and low temperatures and general weather conditions.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (refer to special reports).
10. Stoppages, delays, shortages, and losses.
11. Emergency procedures.
12. Orders and requests of authorities having jurisdiction.
13. Change Orders received and implemented.
14. Construction Change Directives received and implemented.
15. Substantial Completions authorized.

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

2.4 SPECIAL REPORTS

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule at each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, and other parties identified by Contractor with a need-to-know schedule responsibility.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final Completion construction photographs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
 - 2. Division 01 Section "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.
 - 3. Division 02 Section "Selective Demolition" for photographic documentation before selective demolition operations commence.

1.3 SUBMITTALS

- A. Construction Digital Images: Submit a complete set of digital image electronic files as part of the Project closeout on CD-ROM, DVD or flash drive. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in uncompressed TIFF or JPEG format, produced by a digital camera with minimum sensor size of 12.0 megapixels, and at an image resolution of not less than 4000 by 3000 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Photographs are to be taken weekly at a minimum during normal construction and daily during small duration projects or significant activities.

2. Photographs are to be taken prior to the start of the work to record existing conditions.
 3. Photographs are to be taken when areas are opened prior to the start of the new work.
 4. Photographs are to be taken during demolition operations.
 5. Provide temporary lighting when required to produce clear, well-lit photographs without obscuring shadows.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
1. Date and Time: Include date and time in filename for each image.
 2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.
- C. Preconstruction Photographs: Before commencement of excavation and/or demolition, and starting of construction take color, digital photographs of Project building interior and exterior, site and surrounding properties, including existing items to remain during construction, from different vantage points, or as directed by Architect.
1. Flag excavation areas and construction limits before taking construction photographs.
 2. Take a minimum of eight photographs to show existing conditions adjacent to building before starting the Work.
 3. Take a minimum of eight photographs of existing buildings adjacent to the building to accurately record physical conditions at start of construction.
 4. Take a minimum of four photographs of each existing room even if renovations are not planned in that space.
 5. Take as many photographs as necessary to document the exterior of the existing building.
 6. Take additional photographs as required to record settlement or cracking of adjacent pavements, and other improvements.
- D. Architect-Directed Construction Photographs: From time to time, Architect will instruct the Contractor about number and frequency of color, digital photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.
- E. Final Completion Construction Photographs: Take a minimum of four color photographs of each room and eight color photographs of the exterior after date of Substantial Completion for submission as Project Record Documents. Architect will direct photographer for desired vantage points.
1. Do not include date stamp.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
 - 3. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
 - 4. Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
 - 5. Division 1 Section "Closeout Procedures" for submitting warranties.
 - 6. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 7. Division 1 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.

1.3 DEFINITIONS

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

1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals. The Contractor will be responsible for field verifying existing conditions.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.

- E. Deviations: Highlight or otherwise specifically identify deviations from the Contract Documents on submittals.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
 - 2. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
 - 1. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Submittal and transmittal distribution record.
 - k. Remarks.
 - l. Signature of transmitter.
 - 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked "Furnish as Submitted".
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

- J. Use for Construction: Use only final submittals with mark indicating "Furnish as Submitted" or "Revise as Noted & Furnish" taken by Architect.

1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
 - 1. CADD files are limited to those that have been generated for this Project.
 - 2. CADD files for the floor plans and roof plans shall be provided. Files for details, etc. will not be provided.
 - 3. Contractor will be asked to sign Architects waiver of release form before files will be delivered to the contractor.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operation and maintenance manuals.
 - k. Compliance with specified referenced standards.
 - l. Testing by recognized testing agency.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - 4. Submit Product Data before or concurrent with Samples.

5. Number of Copies: Submit six (6) copies of Product Data, unless otherwise indicated. Architect will return three copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 - m. Relationship to adjoining construction clearly indicated.
 - n. Seal and signature of professional engineer if specified.
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
 3. Number of Copies: Submit six (6) opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. Architect will retain three copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit four sets of Samples. Architect will retain three Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least four sets of paired units that show approximate limits of variations.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product.
 2. Number and name of room or space.
 3. Location within room or space.
 4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return two copies.
 - a. Mark up and retain one returned copy as a Project Record Document.

- F. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.
- G. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- H. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."
- I. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."
- J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
 - 4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return two copies.
 - a. Mark up and retain one returned copy as a Project Record Document.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. Architect will not return copies.
 - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."
- B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."
- C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- M. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."
- N. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- O. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed

before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- P. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Q. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."
- R. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- S. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- T. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- U. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

- V. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.
 - 1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. Furnish as Submitted.
 - 2. Furnish as Corrected.
 - 3. Revise & Resubmit.
 - 4. Rejected
 - 5. For Information Only
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 013591 - HISTORIC TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general protection and treatment procedures for designated historic spaces, areas and surfaces in Project.

1.3 DEFINITIONS

- A. Consolidate: To strengthen loose or deteriorated materials in place.
- B. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- C. Dismantle: To disassemble or detach a historic item from a surface, or a non-historic item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- D. Historic: Spaces, areas, surfaces, materials, finishes, and overall appearance that are important to the successful preservation, rehabilitation, restoration and reconstruction as determined by Architect. Designated historic spaces, areas and surfaces are indicated on Drawings.
 - 1. Restoration Zones Grade 1 Areas: Areas of greatest architectural importance, integrity, and visibility; to be preserved and restored to the original, design and finish as indicated on Drawings.
 - 2. Renovation Zones Grade 2 Areas: Areas of significant architectural importance, integrity, and visibility; to be preserved and restored consistent with the remaining historic fabric and to the extent indicated on Drawings.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.

- H. Remove: To take down or detach a nonhistoric item located within a historic space, area, or room, using methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- I. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- J. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- K. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- L. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- M. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.
- N. Retain: To keep existing items that are not to be removed or dismantled.
- O. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.
- P. Salvage: To protect removed or dismantled items and deliver them to Owner[**ready for reuse**].
- Q. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.
- R. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 COORDINATION

- A. Historic Treatment Subschedule: A construction schedule coordinating the sequencing and scheduling of historic treatment work for entire Project, including each activity to be performed in historic spaces and areas, and on historic surfaces; and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for historic treatment work.
 - 1. Schedule construction operations in sequence required to obtain best historic treatment results.
 - 2. Coordinate sequence of historic treatment work activities to accommodate the following:
 - a. Owner's continuing occupancy of existing building.
 - b. Other known work in progress.
 - c. Tests and inspections.
 - 3. Detail sequence of historic treatment work, with start and end dates.

4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
5. Use of existing stairs and entrance doors.
6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use. Do not use such equipment without certification from the Architect and Owner that the structure and surfaces can support the imposed loadings without damage. This is specific to the terrace fronting the Museum on the South side. The brick terrace may not support high reaches.

- B. Public Circulation: Coordinate historic treatment work with public circulation patterns at Project site. Some work is near public circulation patterns, specifically the south terrace and north handicap ramp. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.5 PROJECT MEETINGS FOR HISTORIC TREATMENT

- A. Preliminary Historic Treatment Conference: Before starting historic treatment work, Architect will conduct conference at Project site to be held during the preconstruction meeting.
1. Attendees: In addition to representatives of Owner, Architect, and Contractor, historic treatment specialists and installers whose work interfaces with or affects historic treatment shall be represented at the meeting.
 2. Agenda: Discuss items of significance that could affect progress of historic treatment work, including review of the following:
 - a. Historic Treatment Subschedule: Discuss and finalize; verify availability of materials, historic treatment specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Fire-prevention plan.
 - c. Governing regulations.
 - d. Areas where existing construction is to remain and the required protection.
 - e. Hauling routes.
 - f. Sequence of historic treatment work operations.
 - g. Storage, protection, and accounting for salvaged and specially fabricated items.
 - h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
 - i. Qualifications of personnel assigned to historic treatment work and assigned duties.
 - j. Requirements for extent and quality of work, tolerances, and required clearances.
 - k. Methods and procedures related to historic treatments, including product manufacturers' written instructions and precautions regarding historic treatment procedures and their effects on materials, components, and vegetation.
 - l. Embedded work such as flashings, special details, collection of wastes, protection of occupants and the public, and condition of other construction that affect the Work or will affect the work.

3. Reporting: Architect will record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for historic treatment work at biweekly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, Architect, and Contractor, each historic treatment specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of historic treatment work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to historic treatment work.
 2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of historic treatment work. Include topics for discussion as appropriate to status of Project.
 - a. Historic Treatment Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
 - b. Schedule Updating: Revise Contractor's Historic Treatment Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each entity present, including review items listed in the "Preliminary Historic Treatment Conference" Paragraph above and the following:
 - 1) Interface requirements of historic treatment work with other Project Work.
 - 2) Status of submittals for historic treatment work.
 - 3) Access to historic treatment work.
 - 4) Effectiveness of fire-prevention plan.
 - 5) Quality and work standards of historic treatment work.
 - 6) Change Orders for historic treatment work.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

1.7 INFORMATIONAL SUBMITTALS

A. Historic Treatment Subschedule:

1. Submit historic treatment subschedule within seven (7) days of date established for commencement of historic treatment work.

B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by Contractor's historic treatment operations.

1.8 QUALITY ASSURANCE

A. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-prevention devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire?watch personnel's training, duties, and authority to enforce fire safety.

B. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.9 STORAGE AND HANDLING OF HISTORIC MATERIALS

A. Historic Materials for Reinstallation:

1. Repair and clean historic items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.

B. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

1.10 FIELD CONDITIONS

A. Size Limitations in Historic Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within historic spaces, areas, openings, including temporary protection, by 6 inches or more.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION, GENERAL

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.
 - 1. Use only proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where historic treatment work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes.
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during historic treatment work.
 - 5. Contain dust and debris generated by historic treatment work, and prevent it from reaching the public or adjacent surfaces.
 - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
 - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
 - 8. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.
- B. Temporary Protection of Historic Materials:
 - 1. Protect existing historic materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
 - 2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.
- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
 - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by historic treatment work before commencing operations.
 - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for historic treatment work.
 - 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.
 - 1. Prevent solids such as stone or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
 - 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.
- F. Existing Roofing: Prior to the start of work in an area, install roofing protection on the existing flat roof to remain.

3.2 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following:
 - 1. Comply with NFPA 241 requirements unless otherwise indicated.
 - 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
 - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
 - 3. Prohibit smoking by all persons on State property which includes the sidewalks to the curbs, The Green, the Academy and the Arsenal. The adjacent Sheriff's House is owned by the National Park Service and may be subject to Federal regulations.
- B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
 - 1. Obtain Owner's approval for operations involving use of open-flame or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
 - 2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
 - 3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
 - 4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
 - 5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 - 6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed.

Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:

- a. Train each fire watch in the proper operation of fire-control equipment and alarms.
 - b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
 - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
 - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work at each area of Project site to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
 - e. Maintain fire-watch personnel at each area of Project site until 60 minutes after conclusion of daily work.
- C. Fire Extinguishers, Fire Blankets, and Rag Buckets: Maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

3.3 GENERAL HISTORIC TREATMENT

- A. Have historic treatment work performed only by qualified historic treatment specialists.
- B. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.
- C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs. Comply with requirements in Section 013233 "Photographic Documentation."
- D. Perform surveys of Project Site as the Work progresses to detect hazards resulting from historic treatment procedures.
- E. Follow the procedures in subparagraphs below and procedures approved in historic treatment program unless otherwise indicated:
 1. Retain as much existing material as possible; repair and consolidate rather than replace.
 2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
 3. Use reversible processes wherever possible.
 4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
 5. Record existing work before each procedure (preconstruction) and progress during the work with digital preconstruction documentation photographs. Comply with requirements in Section 013233 "Photographic Documentation."

- F. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.
- G. Where missing features are indicated to be repaired or replaced, provide work with appearance based on accurate duplications rather than on conjecture, subject to approval of Architect.
- H. Where work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.
- I. Identify new and replacement materials and features with permanent marks hidden in the completed Work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on record Drawings.

END OF SECTION 013591

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SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include but are not limited to the following:
 - 1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and

completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.
- E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the

most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
 2. Description of test and inspection.
 3. Identification of applicable standards.
 4. Identification of test and inspection methods.
 5. Number of tests and inspections required.
 6. Time schedule or time span for tests and inspections.
 7. Entity responsible for performing tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee

payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- F. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
 - 1. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- G. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for commencement of the Work.
1. Distribution: Distribute schedule to Owner, Architect testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END SECTION 014000

SECTION 014200 - REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic contract definitions are included in the Conditions of the Contract.
- B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.
- C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases.
- D. "Approved": The term "approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
- E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": The term "install" describes operations at the Project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
- I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - 1. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project;

being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

2. Trades: Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
 - a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.

J. "Project site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the CSI/CSC's "MasterFormat" numbering system.

B. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Section Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

- A. **Applicability of Standards:** Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. **Publication Dates:** Comply with standards in effect as of the date of the Contract Documents.
- C. **Conflicting Requirements:** Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the Architect for a decision before proceeding.
 - 1. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.
- D. **Copies of Standards:** Each entity engaged in construction on the Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.
- E. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-producing organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

1.5 SUBMITTALS

- A. **Permits, Licenses, and Certificates:** For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to testing agencies and authorities having jurisdiction.
- B. Sewer Service: Use of the Owner's existing sanitary sewer system is available without metering and without payment charge. Provide connections and extensions of services as required for construction operations.
- C. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- D. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- E. Telephone Service: Provide temporary phone service to the site as required to contact Contractor site representatives.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

- D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste handling procedures.
 - 5. Other dust-control measures.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Comply with Federal, State and local codes and regulations as well as utility company requirements.
- C. Coordinate work with Owner's requirements.
- D. Materials: Materials must be new and adequate in capacity for the required usage. Materials must not create unsafe conditions nor violate requirements of applicable codes and standards.
- E. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.
- B. Maintain excavations free of water. Provide and operate pumping equipment. Grade site to drain water away from buildings and excavations.

- C. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
- D. Prohibit traffic and storage on waterproofed and roofed surfaces, on lawns and landscaped areas.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.
- B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete bases for supporting posts.
- C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- D. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).
- E. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- F. Lumber and Plywood: Pressure-treated dimension lumber and plywood suitable for exterior exposure.
- G. Paint: Exterior latex primer and matching topcoat.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect/Engineer and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.

2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Heating Equipment: Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

- C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Provide potable water for drinking and construction purposes.

Provide potable water for drinking and construction purposes.

1. The Contractor shall make all necessary arrangements for temporary water service for construction purposes, and furnish at his own expense all piping and accessories required.
 2. Take positive measures to preclude cross-connections and backflow.
 3. The Contractor will assume the cost of water consumed if responsible care and restraint are not exercised by the Contractor in its use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - F. Construction Aids: The General Contractor and each Subcontractor shall provide construction aids and equipment required by their personnel and to facilitate execution of their Work. Examples are scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment. Mutual use may be arranged by the Contractor where applicable.
 - G. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - H. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
 - I. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on

completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- J. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- K. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Install lighting for Project identification sign.
- L. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine in each field office.
 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.
 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 2. Maintain support facilities until Architect/Engineer schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

- B. Security: Security of persons and property in the areas under control of the Contractor shall be the Contractor's exclusive responsibility.
 - 1. The Contractor, at his own expense, shall initiate whatever programs that are necessary to execute his responsibility.
 - 2. Control of access to the area under the Contractor's control shall be maintained. Visitors shall be required to report immediately to the Contractor's Superintendent and to produce full identification which will be recorded in the Contractor's Daily Log along with the purpose of the visit.
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants and control valves.
 - 3. Provide and maintain uninterrupted vehicular access to site and within to temporary construction facilities and work areas for persons and equipment involved in the construction of Project.
 - 4. Maintain traffic areas free of excavated materials, construction equipment, products, snow, ice and debris.
- D. Traffic Regulation: Obtain all necessary permits for access to and use of public roads and streets for construction and hauling purposes. Comply with traffic control regulations applying to permit issuance.
 - 1. Provide markers, signs, lights and barriers on and near the site to safely control construction traffic and public access.
- E. Parking: Use designated areas of Owner's existing parking areas for construction personnel's private vehicles and of Contractor's light-weight vehicles.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touchup signs so they are legible at all times.
- G. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- H. Cleaning During Construction: Control accumulation of waste materials and rubbish. Periodically dispose of legally off site.
 - 1. Clean interior areas prior to the start of finish work. Maintain areas free of dust and other contaminants during finishing operations.
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- J. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
- K. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.
- L. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- M. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- N. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- O. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- P. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- Q. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion.
- R. Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

- S. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose portion of site determined sufficient to accommodate construction operations and maintain security.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish 10 sets of keys to Owner.
- T. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- U. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- V. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- W. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- X. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.

2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

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SECTION 015600 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 ENVIRONMENTAL PROTECTION

- A. Environmental protection considerations consist of, but are not limited to, the following factors:
 - 1. Natural resources including air, water, and land.
 - 2. Solid waste disposal.
 - 3. Noise.
 - 4. Control of toxic substances and hazardous materials.
 - 5. The presence of chemical, physical, and biological elements and agents that adversely affect and alter ecological balances.

1.2 GENERAL REQUIREMENTS

- A. Provide and maintain environmental protection defined herein, other Sections and as indicated in the Drawings.
- B. Comply with all Federal, State, and local laws, ordinances and regulations pertaining to environmental protection.
- C. Compliance by subcontractors with the provisions of this and various other sections of these specifications is the responsibility of the Contractor.
- D. Use of equipment from which factory-installed, anti-pollution and noise control devices are removed or rendered ineffective, either intentionally or through lack of proper maintenance is prohibited.
- E. Furnish a certificate that all materials and operating equipment installed as a part of this project, the installation thereof and all equipment used in the construction, are in compliance with all applicable local laws, ordinances, regulations and permits concerning environmental pollution control and abatement.

1.3 PROTECTION OF NATURAL RESOURCES

- A. General: It is intended that the natural resources within the project boundaries and outside the limits of permanent work performed be preserved in their existing condition, be restored to an equivalent of the existing condition or improved as indicated, as approved by the Architect/Engineer, upon completion of the work. Confine on-site construction activities to areas defined by the drawings and specifications.

1.4 TOXIC SUBSTANCES

- A. Asbestos and Hazardous Materials Procedure: In the event the Contractor, during the course of the work on the project, encounters the presence of asbestos or any materials containing asbestos, or polychlorinated biphenyl (PCB's) or any other hazardous materials as recognized by local Authorities having jurisdiction, promptly notify the Owner through the Architect/Engineer. Do not perform any work pertinent to the asbestos or hazardous material prior to receipt of special instructions from the Owner through the Architect/Engineer. Any delay in the progress of the work as a result of encountering either asbestos or hazardous materials on the project will be mitigated by the Architect/Engineer. Within 24 hours of this notification to the Owner through the Architect/Engineer of the encountering of the presence of asbestos or hazardous materials, the Contractor will meet with the Architect/Engineer to replan and work around the affected area. The Architect/Engineer will provide the special instructions without delay and upon confirmation by the local Authorities of the actions taken and authorize work to progress.
- B. Comply with all applicable provisions of the National Emission Standards for Asbestos (40 CFR 61 Subpart B).
- C. Comply with the local regulations of polychlorinated biphenyl (PCB). Since these chemicals are used in some existing insulation, existing fixed and vehicular transformers, assure proper marking, handling, and disposal of any PCB's in accordance with the regulations of 40 CFR 761.
 - 1. Do not use PCB chemical substance, mixture, equipment, container, sealant, coating, or dust-control agent except in accordance with regulations of 40 CFR 761.
 - 2. Immediately report any PCB chemical substance, mixture, equipment, container, sealant, coating or dust control agent found stored within the project area to the Architect in writing and stop work in the area.
- D. Hazardous substances may be present in the soil or groundwater at the site. Refer to the Dig Clean Safety and Land Use Advisory notices and Contaminated Material Management Plan in Appendix A and Appendix B to the Specifications.

1.5 CONTROL AND DISPOSAL OF EXCESS MATERIAL, TRASH AND DEBRIS

- A. Dispose of excess excavated material that is approved by the Architect/Engineer as clean fill onsite if an onsite soil disposal area is approved by the Architect/Engineer. If no such site is approved, dispose of the material in accordance with the provision of paragraph 1.5 (C).
- B. Pick-up trash and place in containers. Empty containers on a regular schedule. Conduct handling and disposal to prevent contamination of the site and other areas. Do not dispose of in areas of natural vegetation. On completion, leave the area clean and natural looking.
- C. Dispose of rubbish and debris as follows:

1. Transport all waste off the site and dispose of it in a manner that complies with State, and local requirements. Secure a permit or license prior to transporting any material off the site. Do not burn or bury waste materials on the site.

1.6 CONTROL AND DISPOSAL OF CHEMICAL AND SANITARY WASTES

- A. Store chemical waste in corrosion-resistant containers, remove from the project site, and dispose of as necessary, but not less frequently than monthly. Provide for disposal of chemical waste in accordance with standard established practices as approved by the Architect. Dispose of lubricants to be discarded in accordance with approved procedures meeting state, and local regulations.

1.7 DUST CONTROL

- A. Keep dust down at all times including nonworking hours, weekends, and holidays.
- B. Secure and cover transport equipment and loose materials in transit to ensure that materials do not become airborne during transit.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 015600

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include but are not limited to the following:
 - 1. Division 1 Section "References" for applicable industry standards for products specified.
 - 2. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
 - 3. Other included Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.4 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 3. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 4. Completed List: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 5. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use CSI Form 13.1A at the end of this section.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 3. Architect's/Engineer's Action: If necessary, Architect/Engineer will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect/Engineer will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of Acceptance: Change Order.
 - b. Use product specified if Architect/Engineer cannot make a decision on use of a proposed substitution within time allocated.
- C. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Architect's Action: If necessary, Architect/Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product

request. Architect/Engineer will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Division 1 Section "Submittal Procedures."
- b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.

- D. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect/Engineer will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
 2. Store materials in a manner that will not endanger Project structure.
 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 4. Store cementitious products and materials on elevated platforms.

5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 2 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's/Engineer's sample. Architect's decision will be final on whether a proposed product matches.
 - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within **30** days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect/Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 7. Requested substitution is compatible with other portions of the Work.
 8. Requested substitution has been coordinated with other portions of the Work.
 9. Requested substitution provides specified warranty.
 10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect/Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)



SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase)

Project: _____ Substitution Request Number: _____
 _____ From: _____
 To: _____ Date: _____
 _____ A/E Project Number: _____
 Re: _____ Contract For: _____

Specification Title: _____ Description: _____
 Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
 Manufacturer: _____ Phone: _____
 Address: _____
 Trade Name: _____ Model No.: _____
 Installer: _____ Phone: _____
 Address: _____

History: ☐ New product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product:

☐ Point-by-point comparative data attached — REQUIRED BY A/E

Reason for not providing specified item:

Similar Installation

Project: _____ Architect: _____
 Address: _____ Owner: _____
 _____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

Savings to Owner for accepting substitution: _____ (\$ _____)

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

**SUBSTITUTION
REQUEST****(After the Bidding/Negotiating Phase — Continued)**

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: ☐**A/E's REVIEW AND ACTION**

- ☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- ☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- ☐ Substitution rejected - Use specified materials.
- ☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E
☐ Other: _____**END OF SECTION 016000**

SECTION 01 66 10 - DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 GENERAL:

- A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work as indicated and in compliance with Contract Documents. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY:

- A. Transport and handle items in accordance with manufacturer's printed instructions.
- B. Before shipping to the Site, contact the Engineer, in writing, giving at least fourteen (14) Days prior notice to enable the Engineer or its authorized inspector to inspect the equipment if necessary. Assemble the complete unit in the factory for inspection by the Engineer or its authorized inspector. Do not ship the equipment until the Engineer has completed its inspection.
- C. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.
- D. Ship equipment, material and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.
- E. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended. All spare parts shall be cross-referenced to their applicable the Specification Section.
- F. Carefully pack and crate equipment for shipment. Protect polished and machined metal surfaces from corrosion and damage during shipment and installation. Specially pack electrical equipment to prevent damage by moisture. Cover equipment having exposed bearings and glands to exclude foreign matter. Carefully pack machines for shipment and protect electrical equipment from moisture damage. Protect bearings, seals and glands from grit and dirt.
- G. Identify each component with durable identifying labels or tags securely attached to each piece of equipment, crate or container.
- H. Finished surfaces of all exposed flanges shall be protected by fiberboard blank flanges strongly built and securely bolted thereto.

- I. Deliver spare parts at same time as pertaining equipment. Deliver spare parts to owner after completion of work.
- J. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.
- K. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.
- L. Assume responsibility for equipment material and spare parts just before unloading from carrier at site.
- M. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- N. Provide equipment and personnel to unload all items delivered to the site..
- O. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.
- P. Pay all demurrage charges if failed to promptly unload items.

1.03 STORAGE AND PROTECTION:

- A. Store and protect products and equipment in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer by him. Instructions shall be carefully followed and a written record of this kept by the Contractor for each product and pieces of equipment.
- B. Arrange storage of products and equipment to permit access for inspection. Periodically inspect to make sure products and equipment are undamaged and are maintained under specified conditions.
- C. Provide protective maintenance during storage consisting of manually exercising equipment, inspecting mechanical surfaces for signs or corrosion or other damage, lubricating, applying any coatings as recommended by the equipment manufacturer necessary for its protection and all other precautions to assure proper protection of all equipment stored and for compliance with manufacturers' requirements related to warranties. Log all protective maintenance for each piece of equipment in the written record noted above.

- D. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.
- E. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.
- F. All mechanical and electrical equipment and instruments shall be covered with canvas and stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it shall be satisfactory to the Engineer. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer and to prevent condensation on the equipment being stored.
 - 1. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.
 - 2. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Log all rotation maintenance for each piece of equipment in the written record noted above.
 - 3. Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use. Log all startup for each piece of equipment in the written record noted above.
 - 4. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.
 - 5. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01 66 10

SECTION 017300 – EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Coordination of Owner-installed products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 3. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
 - 4. Division 02 Section "Selective Demolition" for demolition and removal of selected portions of the building.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and

verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before

fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Submit requests on CSI Form 13.2A, "Request for Interpretation."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- C. Building Lines and Levels: Locate and lay out control lines and levels for foundations including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations from two or more locations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 8 feet (2.4 m) in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect/engineer.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the but are not limited to the following:
 - 1. Division 2 Section "Selective Demolition" for demolition of selected portions of the building for alterations.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
 - 1. Primary operational systems and equipment.
 - 2. Fire-protection systems.
 - 3. Control systems.
 - 4. Communication systems.
 - 5. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, which results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Piping and ductwork.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete & Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION 017329

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.

1.3 DEFINITIONS

- A. Construction, Demolition and Land Clearing (CDL) Waste: Includes all non-hazardous solid wastes resulting from construction, remodeling, alterations, repair, demolition and land clearing. Includes material that is recycled, reused, salvaged or disposed as garbage. Construction waste includes packaging.
- B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Recycle: The process of sorting, treating and reconstituting materials for the purpose of using the material in the manufacture of a new product.
- D. Reuse: Making use of a material without altering its form. Materials can be reused on-site or reused on other projects off-site. Examples include, but are not limited to the following: Crushing or grinding of concrete for use as sub-base material. Chipping of land clearing debris for use of mulch.
- E. Salvage: Recovery of materials for on-site reuse, sale or donation to a third party.

- F. Source-Separated CDL Recycling: The process of separating recyclable materials in separate containers as they are generated on the job-site. The separated materials are hauled directly to a recycling facility or transfer station.
- G. Co-mingled CDL Recycling: The process of collecting mixed recyclable materials in one container on-site. The container is taken to a material recovery facility where materials are separated for recycling.
- H. Approved Recycling Facility: Any of the following:
 - 1. A facility that can legally accept CDL waste materials for the purpose of processing the materials into an altered form for the manufacture of a new product.
 - 2. Material Recovery Facility: A general term used to describe a waste-sorting facility. Mechanical, hand-separation, or a combination of both procedures, are used to recover recyclable materials.
- I. Universal waste components (UWC) are as follows: electric motors, PCB ballasts, non PCB ballasts, capacitors, contactors, circuit breakers, elemental and liquid mercury containing articles, transformers, lead acid batteries, fluorescent light bulbs, and all HID light bulbs.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent CDL waste by weight from the landfill by one or a combination of the following activities:
 - 1. Salvage.
 - 2. Reuse.
 - 3. Source-Separated CDL Recycling.
 - 4. Co-mingled CDL Recycling.
- B. CDL waste materials that can be salvaged, reused or recycled include, but are not limited to, the following:
 - 1. Demolition Waste:
 - a. Acoustical ceiling tiles.
 - b. Asphalt paving.
 - c. Asphalt shingles.
 - d. Carpet and carpet pad.
 - e. Concrete.
 - f. Concrete reinforcing steel.
 - g. Concrete masonry units.
 - h. Doors and frames.
 - i. Door hardware.
 - j. Field office waste including office paper, cans, plastic and office cardboard.
 - k. Fluorescent lamps and ballasts.
 - l. Glazing.
 - m. Gypsum board.

- n. Insulation.
- o. Land clearing debris (vegetation, stumpage, dirt, etc.).
- p. Membrane and built-up Roofing.
- q. Metals.
- r. Metal studs.
- s. Paint (through hazardous waste outlets).
- t. Plastic film (sheeting, shrink wrap and packaging),
- u. Plywood and oriented strand board.
- v. Rough hardware.
- w. Structural and miscellaneous steel.
- x. Windows.
- y. Wood.
- z. Equipment.
- aa. Piping.
- bb. Supports and hangers.
- cc. Valves.
- dd. Sprinklers.
- ee. Mechanical equipment.
- ff. Refrigerants.
- gg. Electrical conduit.
- hh. Copper wiring.
- ii. Lighting fixtures.
- jj. Electrical devices.
- kk. Switchgear and panelboards.
- ll. Transformers.

2. Construction Waste:

- a. Acoustical ceiling tiles.
- b. Asphalt paving.
- c. Asphalt shingles.
- d. Carpet and carpet pad.
- e. Concrete.
- f. Concrete reinforcing steel.
- g. Concrete masonry units.
- h. Doors and frames.
- i. Door hardware.
- j. Field office waste including office paper, cans, plastic and office cardboard.
- k. Fluorescent lamps and ballasts.
- l. Glazing.
- m. Gypsum board.
- n. Insulation.
- o. Land clearing debris (vegetation, stumpage, dirt, etc.).
- p. Membrane and built-up Roofing.
- q. Metals.
- r. Metal studs.
- s. Paint (through hazardous waste outlets).
- t. Plastic film (sheeting, shrink wrap and packaging),
- u. Plywood and oriented strand board.

- v. Rough hardware.
- w. Structural and miscellaneous steel.
- x. Windows.
- y. Wood.
- z. Piping.
- aa. Electrical conduit.
- bb. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for the Notice of Award.
- B. Waste Management Report: Submit report with each application for payment.

1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- C. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

- D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Qualification Data: For refrigerant recovery technician.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED Accredited Professional, certified by the USGBC as waste management coordinator.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Conduct construction waste management activities in accordance with hauling and disposal regulations of all authorities having jurisdiction and all other applicable laws and ordinances.
- D. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.
 - 6. Attendees: Inform the following individuals, whose presence is required, of date and time of meeting.
 - a. Owner.
 - b. Architect/Engineer.
 - c. Contractor's superintendent.
 - d. Major subcontractors.

- e. Waste Management Coordinator.
 - f. Other concerned parties.
7. Minutes: Record discussion. Distribute meeting minutes to all participants. Note: If there is an Architectural/Engineering consultant contracted by the State of Delaware, they will perform this role.

1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. List all assumptions made for the quantities estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. The plan shall include the following information:
- 1. Types and estimated quantities, by weight, of CDL waste expected to be generated during demolition and construction.
 - 2. Proposed methods for CDL waste salvage, reuse, recycling and disposal during demolition including, but not limited to, one or more of the following:
 - a. Contracting with a deconstruction specialist to salvage materials generated,
 - b. Selective salvage as part of demolition contractor's work,
 - c. Reuse of materials on-site or sale or donation to a third party.
 - 3. Proposed methods for salvage, reuse, recycling and disposal during construction including, but not limited to, one or more of the following:
 - a. Requiring subcontractors to take their CDL waste to a recycling facility;
 - b. Contracting with a recycling hauler to haul recyclable CDL waste to an approved recycling or material recovery facility;
 - c. Processing and reusing materials on-site;
 - d. Self-hauling to a recycling or material recovery facility.
 - 4. Name of recycling or material recovery facility receiving the CDL wastes.
 - 5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on project site where materials separation will be located.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Including cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT, GENERAL

- A. Provide containers for CDL waste that is to be recycled clearly labeled as such with a list of acceptable and unacceptable materials. The list of acceptable materials must be the same as the materials recycled at the receiving material recovery facility or recycling processor.
- B. The collection containers for recyclable CDL waste must contain no more than 10% non-recyclable materials, by volume.
- C. Provide containers for CDL waste that is disposed in a landfill clearly labeled as such.
- D. Use detailed material estimates to reduce risk of unplanned and potentially wasteful cuts.
- E. To the greatest extent possible, include in material purchasing agreements a waste reduction provision requesting that materials and equipment be delivered in packaging made of recyclable material, that they reduce the amount of packaging, that packaging be taken back for reuse or recycling, and to take back all unused product. Insure that subcontractors require the same provisions in their purchase agreements.
- F. Conduct regular visual inspections of dumpsters and recycling bins to remove contaminants.

3.2 SOURCE SEPARATION

- A. General: Contractor shall separate recyclable materials from CDL waste to the maximum extent possible. Separate recyclable materials by type.
 1. Provide containers, clearly labeled, by type of separated materials or provide other storage method for managing recyclable materials until they are removed from Project site.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water and to minimize pest attraction. Cover to prevent windblown dust.
3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from weather.

3.3 CO-MINGLED RECYCLING

- A. General: Do not put CDL waste that will be disposed in a landfill into a co-mingled CDL waste recycling container.

3.4 REMOVAL OF CONSTRUCTION WASTE MATERIALS

- A. Remove CDL waste materials from project site on a regular basis. Do not allow CDL waste to accumulate on-site.
- B. Transport CDL waste materials off Owner's property and legally dispose of them.
- C. Burning of CDL waste is not permitted.

WASTE MANAGEMENT PROGRESS REPORT					
		Disposed in Municipal Solid Waste landfill	Diverted from Landfill by Recycling, Salvage or Reuse		
Material Category			Recycled	Salvaged	Reused
1.	Acoustical Ceiling Tiles				
2.	Asphalt				
3.	Asphalt Shingles				
4.	Cardboard Packaging				
5.	Carpet & Carpet Pad				
6.	Drywall				
7.	Concrete				
8.	Fluorescent Lamps and				

	Ballasts				
9.	Land Clearing Debris (Vegetation, Stumpage & dirt)				
10.	Metals				
11.	Paint (Through Hazardous Waste Outlets)				
12.	Wood				
13.	Plastic Film (Sheeting, Shrink Wrap & Packaging)				
14.	Window Glass				
15.	Field Office waste (Office Paper, Aluminum Cans, Glass, Plastic and Coffee Cardboard)				
16.	Other (Insert Description)				
17.	Other (Insert Description)				
	Total (In Weight)		(TOTAL OF ALL ABOVE VALUES – IN WEIGHT)		
Percentage of Waste Diverted			(TOTAL WASTE DIVIDED BY TOTAL DIVERTED)		

END OF SECTION 017419

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SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project Record Documents.
 - 3. Operation and maintenance manuals.
 - 4. Warranties.
 - 5. Instruction of Owner's personnel.
 - 6. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 3. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, and similar final record information.

6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Complete startup testing of systems.
8. Submit test/adjust/balance records.
9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
10. Advise Owner of changeover in heat and other utilities.
11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
12. Complete final cleaning requirements, including touchup painting.
13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect/Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect/Engineer, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's/Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect/Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.

1.6 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
- B. Record Drawings: Maintain and submit one original set of blue- or black-line white prints with two copies of Contract Drawings and Shop Drawings.
 1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 3. Mark important additional information that was either shown schematically or omitted from original Drawings.

4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
 5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.
- C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Note related Change Orders, Record Drawings, and Product Data, where applicable.
- D. Record Product Data: Submit three copies of each Product Data submittal. Mark one set to indicate the actual product installation where installation varies substantially from that indicated in Product Data.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Drawings, and Record Specifications, where applicable.
- E. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Assemble three complete sets of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:
1. Maintenance Data:
 - a. Manufacturer's information, including list of spare parts.
 - b. Name, address, and telephone number of Installer or supplier.
 - c. Maintenance procedures.
 - d. Maintenance and service schedules for preventive and routine maintenance.
 - e. Maintenance record forms.
 - f. Sources of spare parts and maintenance materials.
 - g. Copies of maintenance service agreements.
 - h. Copies of warranties and bonds.

- B. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

1.8 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in each operation and maintenance manual.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances. Provide a magnetic sweep of all areas around the building to retrieve stray nails, screws and other fasteners or metal shards.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Clean transparent materials, including glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - i. Remove labels that are not permanent.
 - j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - k. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 017823 – OPERATIONS AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing maintenance manuals, including the following:
 - 1. Maintenance documentation directory.
 - 2. Maintenance manuals for the care and maintenance of products, and materials.
- B. Related Sections include but are not limited to the following:
 - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for maintenance manuals.
 - 2. Division 1 Section "Closeout Procedures" for submitting maintenance manuals.
 - 3. Division 1 Section "Project Record Documents" for preparing Record Drawings for maintenance manuals.
 - 4. Divisions 02 through 33 Sections for specific maintenance manual requirements for the Work in those Sections.

1.3 SUBMITTALS

- A. Final Submittal: Submit 1 copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's/Engineer's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's/Engineer's comments.

1.4 COORDINATION

- A. Where maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. Table of contents.
- B. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect/Engineer.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

- a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch, 20-lb/sq. ft. white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
 1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.

5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to operation and maintenance manuals.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 1. Do not use original Project Record Documents as part of maintenance manuals.
 2. Comply with requirements of newly prepared Record Drawings in Division 1 Section "Project Record Documents."
- F. Comply with Division 1 Section "Closeout Procedures" for the schedule for submitting maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include but are not limited to the following:
 - 1. Division 1 Section "Closeout Procedures" for general closeout procedures and maintenance manual requirements.
 - 2. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Final Submittal: Submit three sets of marked-up Record Prints and one set of record transparencies. Print each Drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit three copies of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit three copies of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

- B. Record Transparencies: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected transparencies of the Contract Drawings and Shop Drawings.
1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
 2. Refer instances of uncertainty to Architect for resolution.
 3. Owner will furnish Contractor one set of transparencies of the Contract Drawings for use in recording information.
 4. Print the Contract Drawings and Shop Drawings for use as Record Transparencies. Architect will make the Contract Drawings available to Contractor's print shop.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
 3. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect/Engineer.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 5. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's/Engineer's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training videotapes.
- B. See Divisions 2 through 40 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
- B. Demonstration and Training CDs/Flash Drives: Submit two copies within seven days of end of each training module.

1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Pre-instruction Conference: Conduct conference at Project site. Review methods and procedures related to demonstration and training.
- D. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
 - 2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
 - 3. Emergencies: Include instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
 - 4. Operations: Include startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
 - 5. Adjustments: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
 - 6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
 - 7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
 - 8. Repairs: Include diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Owner will describe Owner's operational philosophy.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.2 DEMONSTRATION AND TRAINING RECORD

- A. General: Engage a qualified commercial photographer to record demonstration and training sessions. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video Format: Provide high-quality color video saved on CD's or flash drives. Save in a format acceptable to the Owner.
- C. Narration: Describe scenes on video by dubbing audio narration off-site after session is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

END OF SECTION 017900

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SECTION 02 01 20- PROTECTING EXISTING UNDERGROUND UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Protecting existing underground utilities as indicated and in compliance with Contract Documents.
 - 1. Removing and plugging abandoned lines.
 - 2. Compaction.
 - 3. Alternative support methods.
 - 4. Protecting thrust blocks.

1.02 DEFINITIONS:

- A. Concrete: Refer to Section 03 30 00.

1.03 SUBMITTALS:

- A. Submit the following shop drawings in accordance with Section 01 33 00.
 - 1. Record drawings to include record survey coordinates and elevations.
 - 2. Proposed locations for test pits.

1.04 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.

1.05 PROJECT/SITE CONDITIONS:

- A. Pipelines will be indicated on the drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing utilities.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Except as indicated, or as specifically authorized by the Engineer, where existing utilities to remain must be removed, reconstruct utilities with new material of the same size, type, and quality as that removed.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Comply with the requirements in Section 01 14 00.
- B. Notify utility owners and Engineer at least 48 hours before digging operations are scheduled to begin.
- C. Test Pits: Excavate test pits to field verify the locations, depth of bury, diameter, and pipe material of existing underground utilities at crossings and at tie-in points before ordering materials or commencing excavation. Immediately notify the Engineer if conflicts are encountered.

3.02 PREPARATION:

- A. Where utilities are parallel to or cross work, but do not conflict with work, notify the utility owner at least 48 hours in advance of construction at the crossing. Coordinate the construction schedule with the utility owner.

3.03 PROCEDURES:

- A. Protect in Place: Protect utilities in place, unless abandoned, and maintain the utility in service, unless otherwise indicated or specified.
- B. Damage to Utilities to Remain: If existing utilities to remain are damaged, immediately notify utility owner, and repair to owner's satisfaction.

3.04 COMPACTION:

- A. Protecting Existing Utilities:
 - 1. Backfill and compact under and around utilities. Compaction shall conform to Sections 31 23 00 and 31 23 33.
 - 2. Where compaction cannot adequately be performed around utility due to the presence of encroaching existing utilities, utilize concrete.

3.05 PROTECTION OF THRUST BLOCKS:

- A. Protect thrust blocks on existing waterlines or sewer force mains in place or shore to resist the thrust by a means accepted by the Engineer, and reconstruct. If the thrust blocks are exposed or rendered to be ineffective in the opinion of the Engineer, reconstruct them to bear against firm unexcavated or backfill material.

1. Provide firm support by backfilling affected portion of the trench for a distance of 2 feet on each side of the thrust block to be reconstructed from the pipe bedding to the pavement subgrade with either:
 - a. Granular fill, or
 - b. Native material compacted to a relative compaction of 95 percent. See Section 31 23 33 for compaction requirements.
2. Excavate the backfill material for construction of the thrust block.
3. Test compaction of the backfill material before pouring any concrete thrust block. Concrete shall conform to Section 03 30 00.

3.06 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 02 32 14 - VIBRATION MONITORING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide vibration monitoring as indicated and in compliance with Contract Documents.
 - 1. Furnish, install, maintain, monitor, and remove vibration monitoring equipment as specified and as indicated.
 - 2. Monitor vibrations, air blast overpressures and noise levels originating from construction operations as indicated or specified.
 - 3. Modify construction operation procedures if existing operation creates vibration, air blast overpressure, or noise exceeding specified amounts.

1.02 QUALITY ASSURANCE:

- A. Provide in accordance with Section 01 40 00.
- B. Retain the services of an independent vibration consulting firm with the following in-house personnel to conduct the following vibration monitoring requirements:
 - 1. Preparation, signing and stamping of monitoring plans and daily reports, and overseeing monitoring and interpretation of monitoring equipment shall be performed by personnel with the following qualifications:
 - a. Be a Delaware Registered Professional Engineer.
 - b. Have a minimum of five (5) years experience in the vibration consulting field.
 - c. Have successfully completed at least five (5) projects with vibration-inducing operations and noise levels equal to or more severe than those to be encountered.
 - 2. Installation, monitoring and interpretation of monitoring equipment shall be performed by personnel with the following qualifications:
 - a. Have at least three (3) years of experience in the operation of monitoring equipment proposed for use and interpretation of records produced by such equipment.
 - b. Have installed, operated, monitored and interpreted equipment and records on at least three (3) projects with vibration-inducing operations and noise levels from similar construction activities.

3. Performed and maintained calibration records on all instruments used to monitor the work

1.03 SUBMITTALS:

- A. Submit the following shop drawings in accordance with Section 01 33 00.

1. Qualifications of the independent vibration consulting firm's Professional Engineer as specified in subparagraph 1.02B.1 including the names of the five (5) successful projects with names, current addresses, and telephone numbers of persons in charge of representing the owners or the owners at the time of monitored vibration-inducing operation, air blast overpressures, and noise levels.
2. Qualifications of the vibration consulting firm's personnel to install, operate and interpret the monitoring equipment as specified in subparagraph 1.02B.2 including the name of the personnel and the names of the three (3) projects per person which they installed, operated, monitored, and interpreted monitoring equipment with names, current addresses and telephone numbers of persons in charge of representing the owners or the owners at the time of monitored vibration-inducing operations, air blast overpressures, and noise levels.
3. Two weeks prior to commencement of vibration inducing operations, submit in writing the plan for monitoring operations and equipment to be used to assure compliance with the vibration, air blast overpressure, and noise limitation. As a minimum, this plan shall provide for the following:
 - a. Recommended vibration limiting methods to meet the specified peak particle velocity limitations and locations for taking measurements.
 - b. Manufacturer's brochures and written operation instructions for seismograph recording equipment intended to be used for each vibration occurrence.
4. Daily reports, while performing vibration-inducing operations, detailing each source of vibration, location of monitoring, and the vibration records highlighting peak particle velocities. All daily reports shall be stamped and signed by the Vibration Consulting Firm's Professional Engineer.

1.04 SITE CONDITIONS:

- A. Refer to the Section 00 21 13.

PART 2 - PRODUCTS

2.01 EQUIPMENT:

- A. Provide a low frequency sensitive three-component seismic recording instrument with wave paper trace, variable trigger level setting, peak particle velocity memory operation (in inches/second) and air blast overpressure and sound level readout capability that meets the following criteria:
 - 1. Seismic Frequency Range: 2 to 200 Hz (+/- 3 dB)
 - 2. Acoustic Frequency Range: 2 to 200 Hz (+/- 1 dB)
 - 3. Velocity Range: 0.02 to 4.0 inches per second.
 - 4. Sound Range: 90 to 140 dB linear.
 - 5. Transducer: Three mutually perpendicular axes: radial, transverse, and vertical.
 - 6. Recording: Time-history of waveform capability.
- B. Manufacturers:
 - 1. Instantel, Inc., Kanata (Ottawa) Ontario, Canada.
 - 2. Slope Indicator Co., Seattle, WA.
 - 3. Thomas Instruments, Inc., Spoffard, NH.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Furnish specified instrumentation to be installed, operated and interpreted by the vibration consulting firm's personnel, as specified below and indicated.
- B. Monitor vibrations and record the entire particle velocity wave train, not just peak velocities. Obtain accurate, legible seismometer records of monitored vibrations.
- C. Perform all vibration-inducing operations so that vibrations reaching adjacent structures and facilities are within specified limits.
- D. Monitor vibrations by measuring the peak particle velocity in the vicinity of work. Peak particle velocity is defined as a maximum vector sum of three velocity components, measured concurrently in mutually perpendicular directions at any point by an instrument. The peak particle velocity as measured by the vibration consulting firm's personnel on or

at the location as specified in the submitted vibration monitoring plan, shall not exceed the limits specified below:

<u>Type of Concrete</u>	<u>Age of concrete (hrs)</u>	<u>Peak Particle Velocity in./sec</u>
Mass Concrete (footings, mats, slab-on-grade, fill concrete, etc.)	0-10	1.0
	11 and over	2.0
Concrete Structures (walls, columns, elevated slabs, etc.)	0-11	0.5
	11-24	1.0
	24 and over	2.0
Existing Structures, residences or utilities	-	0.5

- E. In the event any recordings indicate that vibration limits are being exceeded, immediately suspend all vibration-inducing operations and submit a report to the Engineer. Revise operations to reduce vibrations and submit a copy of the revised procedure to the Engineer at no additional cost to the Owner.
- F. If evidence of displacement or damage to utilities, equipment, or structures is observed or reported, immediately notify the Engineer and discontinue operations creating the vibrations. Revise operation to reduce vibrations and submit a copy of the revised procedure to the Engineer.
- G. Restore or replace utilities, equipment, or structures damaged by vibrations or air blast overpressures at no additional cost to the Owner.

3.02 CONTRACT CLOSEOUT:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 02 41 00 - DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Provide demolition of existing conditions as indicated and in compliance with Contract Documents.

1.2 REFERENCES:

- A. United States Environmental Protection Agency (USEPA):
 - 1. 832: Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 SUBMITTALS:

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Demolition Plan.
 - 2. Permits and/or notices required for demolition.
 - 3. Permits for transport and disposal of sewage and debris.

1.4 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.
- B. Demolition Plan: Provide description of sequence, methods, and equipment used for demolition (including disposal).

1.5 DELIVERY STORAGE AND HANDLING:

- A. Comply with the requirements specified in Section 01 66 10.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.1 PREPARATION:

A. Survey Markers and Monuments:

1. Provide three reference points, established by a licensed land surveyor, for each survey marker or monument temporarily removed. Record locations and designations of survey markers and monuments prior to removal.
2. Store removed markers and monuments during demolition work and replace upon completion of work. Reestablish survey markers and monuments in conformance with recorded reference points. Forward letter to Engineer, signed by a licensed land surveyor, verifying reestablishment of survey markers and monuments.

B. Burning of demolition debris is prohibited.

C. Protect existing structures, equipment, and appurtenances to remain.

D. Obtain permission from Engineer before abandoning or removing existing structures, materials, equipment and appurtenances.

E. Provide fire extinguishers in areas where demolition work is performed by use of an open flame. Exercise necessary precautions for fire prevention.

F. Maintain circulation of traffic within area at all times during demolition operations.

G. Make necessary arrangements with and perform work required by utility companies and municipal departments for discontinuance or interruption of utility services due to demolition work.

H. Confine apparatus, storage of materials, demolition work, new construction, and operations of workmen to areas that will not interfere with continued use and operation of entire facility. Provide and maintain lights, barriers, and temporary passageways for free and safe access.

I. Provide shoring or bracing where necessary to prevent settlement or displacement of existing or new structures. Do not overload floors.

3.2 DEMOLITION:

A. Demolish and remove existing construction, utilities, equipment, and appurtenances.

B. Provide maximum practicable protection from inclement weather for materials, equipment, and personnel located in partially dismantled structures.

- C. Protect persons and property throughout progress of work. Provide safe working conditions for personnel.
- D. Wet down work during demolition operations to prevent dust from arising. Minimize spread of dust and airborne particles.
- E. Complete demolition work on upper levels before disturbing supporting members on lower levels.
- F. Cap or plug with concrete or non-shrink grout for pipes and other conduits which are abandoned in place.
- G. Removed materials, equipment, and appurtenances, not designated for relocation, become property of Contractor and shall be disposed of offsite.

3.3 REPAIR/RESTORATION:

- A. Repair or remove items that are damaged. Repair and install damaged items to condition at least equal to that which existed prior to start of work.

3.4 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Provide cast-in-place concrete as indicated and in compliance with Contract Documents.

1.2 REFERENCES:

- A. American Concrete Institute (ACI):

1. 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
2. 214R: Recommended Practice for Evaluation of Strength Test Results of Concrete
3. 301: Standard Specifications for Structural Concrete
4. 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete
5. 305R: Hot Weather Concreting
6. 306R: Cold Weather Concreting
7. 308: Standard Practice for Curing Concrete
8. 309R: Guide for Consolidation of Concrete
9. 311.4R: Guide for Concrete Inspection
10. 318: Building Code Requirements for Structural Concrete

- B. ASTM International (ASTM):

1. A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2. A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
3. C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
4. C33: Standard Specification for Concrete Aggregates

5. C39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
6. C40: Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
7. C42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
8. C87: Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
9. C88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
10. C94: Standard Specification for Ready-Mixed Concrete
11. C109: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or [50-mm] Cube Specimens)
12. C123: Standard Test Method for Lightweight Particles in Aggregate
13. C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
14. C138: Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
15. C143: Standard Test Method for Slump of Hydraulic Cement Concrete
16. C150: Standard Specification for Portland Cement
17. C157: Standard Test Method for Length Change of Hardened Hydraulic Cement, Mortar and Concrete
18. C171: Standard Specification for Sheet Materials for Curing Concrete
19. C172: Standard Practice for Sampling Freshly Mixed Concrete
20. C192: Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
21. C231: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
22. C260: Standard Specification for Air-Entraining Admixtures for Concrete
23. C289: Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)

24. C295: Standard Guide for Petrographic Examination of Aggregates for Concrete
25. C309: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
26. C311: Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete
27. C494: Standard Specification for Chemical Admixtures for Concrete
28. C595: Standard Specification for Blended Hydraulic Cements
29. C618: Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
30. C881: Standard Test Method for Epoxy Resin Base Bonding Systems for Concrete
31. C882: Standard Test Method for Bond Strength of Epoxy Resin Systems Used with Concrete by Slant Shear
32. C989: Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
33. C1017: Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
34. C1064: Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete
35. C1107: Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
36. C1116: Standard Specification for Fiber Reinforced Concrete
37. C1240: Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout
38. D75: Standard Practice for Sampling Aggregates
39. E154: Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
40. E1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
41. E329: Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

1.3 SUBMITTALS:

- A. Submit the following shop drawings in accordance with Section 01 33 00.
- B. Product Data:
 - 1. Manufacturer's specifications and instructions including Material safety Data Sheets (MSDS) for admixtures and curing materials. Manufacturer's certification of compatibility of all admixtures.
- C. Material Certificates: For each of the following, signed by the manufacturer
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories
 - 5. Curing compounds
 - 6. Bonding agent
- D. Shop Drawings:
 - 1. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Indicate bar size, 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.
- E. Field Quality Control Submittals
 - 1. Provide delivery tickets for ready-mix concrete or weighmasters certificate per ASTM C94, including weights of cement and each size aggregate and amount of water added at the plant and record of pours. Record the amount of water added on the job on the delivery ticket. Water added at the plant shall account for moisture in both coarse and fine aggregate.

1.4 QUALITY ASSURANCE:

- A. Provide in accordance with Section 01 40 00.
- B. Unless otherwise indicated, materials, workmanship, and practices shall conform to the following standards:
 - 1. ACI 301, "Structural Concrete for Buildings."

2. ACI 318, "Building Code Requirements for Reinforced Concrete."
- C. Where provisions of pertinent codes and standards conflict with this specification, the more stringent provisions govern.
- D. Concrete not meeting the minimum specified 28-day design strength shall be cause for rejection and removal from the work.
- E. Perform concrete work in conformance with ACI 301 unless otherwise specified.
- F. Do not use admixtures, including calcium chloride, which will cause accelerated setting of cement in concrete.
- G. Methods of Sampling and Testing:
 1. Fresh Concrete Sampling: ASTM C172
 2. Specimen Preparation: ASTM C31
 3. Compressive Strength: ASTM C39
 4. Air Content: ASTM C231
 5. Slump: ASTM C143
 6. Temperature: ASTM C1064
 7. Unit Weight: ASTM C138
 8. Drying Shrinkage: ASTM C157
- H. Acceptance of Structure: Acceptance of completed concrete work requires conformance with dimensional tolerances, appearance and strength as indicated or specified.
- I. Hot weather concrete to conform to ACI 305R and as specified herein.
- J. Cold weather concrete to conform to ACI 306R and as specified herein.
- K. Do not place concrete in water or on frozen or uncompacted ground.
- L. Workability
 1. Concrete shall be of such consistency and composition that it can be worked readily into the forms and around the reinforcement without excessive vibrating and without permitting the materials to segregate or free water to collect on the surface.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Provide in conformance with Section 01 66 10 and as specified herein.
- B. Deliver concrete to discharge locations in watertight agitator or mixer trucks without altering the specified properties of water-cement ratio, slump, air entrainment, temperature and homogeneity.
- C. Reject concrete not conforming to specification, unsuitable for placement, exceeding the time or temperature limitations or not having a complete delivery batch ticket.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Cement:
 - 1. Portland Cement, ASTM C150, Type I/II; or blended hydraulic cement, ASTM C595, Type IP (MS).
 - 2. Use only one brand of cement in any individual structure. Use no cement that has become damaged, partially set, lumpy, or caked. Reject the entire contents of the sack or container that contains such cement. Use no salvaged or reclaimed cement.
 - 3. Maximum tricalcium aluminate shall not exceed 8 percent. The maximum percent alkalis shall not exceed 0.6 percent.
- B. Fly Ash:
 - 1. Provide fly ash conforming to the following requirements:
 - a. Class F fly ash conforming to ASTM C618 for chemical and physical properties.
 - b. Supplemental requirements in percent:
 - (1) Maximum carbon content: 3 percent
 - (2) Maximum sulfur trioxide (SO₃) content: 4 percent
 - (3) Maximum loss on ignition: 3 percent
 - (4) Maximum water requirement (as a percent of control): 100 percent
 - (5) Fineness, maximum retained on No. 325 sieve: 25 percent
- C. Ground Granulated Blast Furnace Slag (GGBF):

1. GGBF, when used, shall meet the requirements of ASTM C989, Grade 100 or better.
- D. Silica Fume: Silica fume mineral admixture shall be the dry compacted or slurry form and shall meet the requirements of ASTM C1240. Silica Fume shall be considered to be cementitious material.
- E. Fine Aggregates: Clean, sharp, natural sand conforming to requirements of ASTM C33 with a fineness modulus between 2.50 and 3.0
- F. Coarse Aggregate: Well graded crushed stone, natural rock conforming to requirements of ASTM C33.
- G. Water and Ice:
 1. Use water and ice free from injurious amounts of oil, acid, alkali, salt, organic matter or other deleterious substances and conforms to requirements of ASTM C94.
 2. Water shall not contain more than 500 mg/L of chlorides nor more than 500 mg/L of sulfate.
 4. Heat or cool water to obtain concrete temperatures specified, and in conformance with ACI 305R and ACI 306R.
- H. Concrete Admixtures:
 1. Do not use any admixture that contains chlorides or other corrosive elements in any concrete. Use admixtures in compliance with the manufacturer's printed instructions. The manufacturer shall certify the compatibility of multiple admixtures used in the same mix. Do not use admixtures in greater dosages than recommended by manufacturer.
 4. Air Entrainment: an air entrainment admixture conforming to ASTM C260.
 5. Water Reducing: a water-reducing admixture conforming to ASTM C494, Type A and compatible with the air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations
 6. Water Reducing and Retarding: a water-reducing and retarding admixture conforming to ASTM C494, Type D and compatible with the air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations.
- I. Curing Compound:

1. Liquid form, which will form impervious membrane over, exposed surface of concrete when applied to fresh concrete by means of spray gun. Compound shall not inhibit future bond of floor covering or concrete floor treatment. Use Type I-D compound with red fugitive dye, Class B, having 18 percent minimum solids conforming to ASTM C309.

2.2 MIXES:

- A. Conform to ASTM C94, except as modified by these specifications.
- B. Air content as determined by ASTM C231: 5%+/- 1% percent at point of delivery for 1-1 ½ inch nominal maximum aggregate size.
- C. Provide concrete with $f'_c = 3000$ psi compressive strengths at 28 days.
- D. Measure slump in accordance with ASTM C143: Maximum 4" (+/- 1")
- E. Maximum Water-Cementitious Materials Ratio: 0.50
- F. Aggregate:
 1. Coarse Aggregate Size: no greater than 1-1/2 inches nominal.
 2. Fine Aggregate: free of materials with deleterious reactivity to alkali in cement.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine the subgrade and the conditions under which work is to be performed and notify the Engineer in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions are corrected to comply with specified subgrade conditions in a manner acceptable to the Engineer.

3.2 MIXING AND TRANSPORTING CONCRETE:

- A. General: Conform to concreting procedures set forth in ASTM C94, ACI 304R and as specified herein.
 1. Transport concrete to discharge locations without altering the specified properties of water-cement ratio, slump, air entrainment, temperature and homogeneity.

3.3 PREPARATION AND COORDINATION:

- A. Compact the subgrade and/or bedding. Saturate the subgrade approximately eight hours before placement and sprinkle ahead of the placement of concrete in areas where vapor

barrier is not used. Remove standing water, mud, and foreign matter before concrete is deposited.

- B. When shown on contract drawings, install a granular base beneath slabs on ground. Place granular material on a compacted subgrade and compact granular base.

3.4 CONCRETE PLACEMENT:

- A. Placement shall conform to ACI 304R as modified by these specifications.
- B. Do not place concrete until free water has been removed or has been diverted by pipes or other means and carried out of the forms, clear of the work. Do not deposit concrete underwater, and do not allow free water to rise on any concrete until the concrete has attained its initial set. Do not permit free or storm water to flow over surfaces of concrete so as to injure the quality or surface finish.
- C. Do not place concrete during inclement weather. Protect concrete placed from inclement weather. Keep sufficient protective covering ready at all times for this purpose.
- D. Consolidate concrete using mechanical vibrators operated within the mass of concrete and/or on the forms conforming to procedures set forth in ACI 309R and as specified herein.
- E. Conduct vibration to produce concrete of uniform texture and appearance, free of honeycombing, streaking, cold joints or visible lift lines.

3.5 CURING AND PROTECTION:

- A. General:
 - 1. Protect concrete from premature drying, hot or cold temperatures, and mechanical injury, beginning immediately after placement and maintain concrete with minimal moisture loss at relatively constant temperature.
 - 2. Comply with curing procedures set forth in ACI 301, ACI 308 and as specified herein.
 - 3. Perform hot weather concreting in conformance with ACI 305R and as specified herein.
 - 4. Perform cold weather concreting in conformance with ACI 306R.
 - 5. Concrete required to be moist cured shall remain moist for the entire duration of the cure. Repeated wetting and drying cycles of the curing process will not be allowed.
- B. Curing Duration:

1. Start initial curing after placing and finishing concrete as soon as free moisture has disappeared from unformed concrete surfaces. Initial curing starts as soon as concrete achieves final set. Forms left tightly in place are considered as part of the curing system, provided that wooden forms are kept continuously moist. Keep continuously moist for not less than 72 hours.
2. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures for a total curing period, initial plus final, of at least 10 days.
3. Avoid rapid drying at the end of the final curing period

C. Curing Requirements:

1. Unformed Surfaces: Cover and cure entire surface of newly placed concrete immediately after completing finishing operations and water film has evaporated from surface or as soon as marring of concrete will not occur. Protect finished slabs from direct rays of the sun to prevent checking, crazing and plastic shrinkage.
2. Formed Surfaces: Minimize moisture loss for formed surfaces exposed to heating by the sun by keeping forms wet until safely removed. Keep surface continuously wet by warm water spray or warm water saturated fabric immediately following form removal.
3. Membrane Curing Compound: Apply membrane-curing compound uniformly over concrete surface by means of roller or spray at a rate recommended by the curing compound manufacturer

D. Protection from Deicing Agents: Do not apply deicing chemicals to concrete.

3.6 FIELD QUALITY CONTROL:

A. Hot Weather Requirements

1. During hot weather, give proper attention to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation in accordance with ACI 305R:
2. Take precautions when placing concrete during hot, dry weather to eliminate early setting of concrete. This includes protection of reinforcing from direct sunlight to prevent heating of reinforcing, placing concrete during cooler hours of the day, and the proper and timely application of specified curing methods.
3. There will be no additional reimbursement to the Contractor for costs incurred for placing concrete in hot weather.

B. Cold Weather Requirements

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather in accordance with ACI 306R and the following.
2. There will be no additional reimbursement made to the Contractor for costs incurred for placing concrete during cold weather.

C. Backfill Against Walls

1. Do not place backfill against walls until the concrete has obtained a compressive strength equal to the specified 28-day compressive strength. Where backfill is to be placed on both sides of the wall, place the backfill uniformly on both sides.
2. Do not backfill the walls of structures that will be laterally restrained or supported by suspended slabs or slabs on grade until the slab is poured and the concrete has reached the specified compressive strength.

D. Concrete Testing

1. The testing agency will use concrete samples provided by the Contractor at the point of agitator or mixer truck discharge to perform slump (per ASTM C143), air content (per ASTM C231), and temperature tests (per ASTM C1064) and for field control test specimens.
2. The testing agency will submit test reports of concrete field measurements specified above to the Contractor and to Engineer.
3. Provide and maintain facilities for safe storage and proper curing of concrete test specimens on the project site, as required by ASTM C31.
4. The Contractor may take field control test specimens for small quantities of concrete.
5. Concrete acceptance shall be based on the requirements of ACI 318
6. Field cured cylinders conforming to ASTM C31 will be required to determine field compressive strength of concrete. Laboratory cured cylinders for concrete quality testing shall not be used for determining field compressive strength.

3.7 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 26 05 10 – ELECTRICAL WORK - GENERAL

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 includes the following:
 - 1. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Common electrical installation requirements.

1.3 ALLOWANCES

- A. The Contractor shall provide for the supply and installation of an additional 500 feet of 3/4 inch rigid steel conduit with 3#12AWG power conductors. The application of the additional circuits shall be determined and approved by the Owner or Owner's Representative during construction.
- B. The Contractor shall provide for the supply, installation and termination of an additional 500 feet of 3/4 inch rigid steel conduit with 10#14AWG control circuits. The application of the additional circuits shall be determined and approved by the Owner or Owner's Representative during construction.
- C. The Contractor shall provide for the supply, installation and termination of an additional 500 feet of 3/4 inch rigid steel conduit with two (2) Shield Twisted Pair cable for Instrumentation circuits. The application of the additional circuits shall be determined and approved by the Owner or Owner's Representative during construction.

1.4 DEFINITIONS

- A. ATS: Acceptance Testing Specifications.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. NBR: Acrylonitrile-butadiene rubber.

1.5 SUBMITTALS

- A. Product Data: For each type of product.

1.6 QUALITY ASSURANCE

- A. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

1.7 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 2. To allow right of way for piping and conduit installed at required slope.
 - 3. To permit connecting raceways, cables, wireways, cable trays, and busways in workman like manner avoiding of obstructions as well as adhering to working space requirements of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, and other structural components as they are constructed.
- C. Coordinate electrical testing of electrical and mechanical items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

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 Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

- E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 FIELD QUALITY CONTROL

- A. Inspect installed sleeve and sleeve-seal installations for damage and faulty work.

END OF SECTION

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

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. Copper building wire rated 600 V or less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
- B. Related Requirements:
 - 1. Section 26 05 23 "Control-Voltage Electrical Power Cables".

1.3 DEFINITIONS

- A. RoHS: Restriction of Hazardous Substances.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer's authorized service representative.
- B. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Alpha Wire Company.
 - 2. Belden Inc.
 - 3. Encore Wire Corporation.
 - 4. General Cable Technologies Corporation.
 - 5. Southwire Company.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. RoHS compliant.
 - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
 - 1. Type THHN and Type THWN-2: Comply with UL 83.
 - 2. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. 3M Electrical Products.
 - 2. AFC Cable Systems; a part of Atkore International.
 - 3. Gardner Bender.
 - 4. Hubbell Power Systems, Inc.
 - 5. Ideal Industries, Inc.
 - 6. ILSCO.
 - 7. TE Connectivity Ltd.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Aluminum.
 - 2. Type: One hole with long barrels.
 - 3. Termination: Compression.

- E. Insulated Mechanical Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Type: provide openings for conductors to be terminated. Conductors shall not share openings.
 - 2. Termination: Mechanical. Torque tightened.
 - 3. Insulation: Plastisol

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway or in enclosure.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
 - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each of the following visual and electrical tests:
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - 1) A low-resistance ohmmeter.
 - 2) Calibrated torque wrench.
 - c. Inspect compression-applied connectors for correct cable match and indentation.
 - d. Inspect for correct identification.
 - e. Inspect cable jacket and condition.
 - f. Continuity test on each conductor and cable.
- B. Prepare test and inspection reports to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 26 05 23 – CONTROL-VOLTAGE ELECTRICAL POWER CABLES

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. Twisted pair cabling hardware.
 - 2. Low-voltage control cabling.
 - 3. Control-circuit conductors.
 - 4. Identification products.
- B. Related Requirements:
 - 1. Section 26 05 33, "Raceways and Boxes for Electrical Systems"
 - 2. Section 26 05 26, "Grounding and Bonding for Electrical Systems"
 - 3. Section 26 05 53, "Identification for Electrical Systems"

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.
- B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RoHS compliant.

2.2 TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. American Technology Systems Industries, Inc.
 - 2. Belden CDT Networking Division/NORDX.
 - 3. General Cable; General Cable Corporation.
- C. General Requirements for Twisted Pair Cable Hardware:
 - 1. Comply with the performance requirements of Category 6.
 - 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 - 3. Cables shall be terminated with connecting hardware of same category or higher.
- D. Source Limitations: Obtain twisted pair cable hardware from single source from single manufacturer.
 - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
 - 2. Patch cords shall have color-coded boots for circuit identification.
- E. Plugs and Plug Assemblies:
 - 1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair 100-ohm unshielded or shielded twisted pair cable.
 - 2. Comply with IEC 60603-7-1, IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, and IEC 60603-7.5.
 - 3. Marked to indicate transmission performance.
- F. Legend:
 - 1. Machine printed, in the field, using adhesive-tape label.
 - 2. Snap-in, clear-label covers and machine-printed paper inserts.

2.3 LOW-VOLTAGE CONTROL CABLE

A. Paired Cable: NFPA 70, Type CMG.

1. One or Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1685.

2.4 CONTROL-CIRCUIT CONDUCTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. General Cable; General Cable Corporation.
2. Southwire Company.

B. Digital Control Circuits: Stranded copper, Type XHHW-2, complying with UL 44 in raceway.

2.5 SOURCE QUALITY CONTROL

A. Factory test twisted pair cables according to TIA-568-C.2.

B. Cable will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Test cables on receipt at Project site.

1. Test each pair of twisted pair cable for open and short circuits.

3.2 INSTALLATION OF RACEWAYS AND BOXES

A. Comply with requirements in Section 26 05 33 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.

1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.
2. Flexible metal conduit shall not be used.

B. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.

- C. Install manufactured conduit sweeps and long-radius elbows if possible.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.

- B. Twisted Pair Cable Installation:

- 1. Comply with TIA-568-C.2.
 - 2. Do not untwist UTP cables more than 1/2 inch at the point of termination to maintain cable geometry.

- C. Installation of Control-Circuit Conductors:

- 1. Install wiring in raceways. Comply with requirements specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

- D. Separation from EMI Sources:

- 1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
 - 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inches.
 - 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inches.
 - 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inches.

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag for future use.

3.5 CONTROL-CIRCUIT CONDUCTORS

- A. Minimum Conductor Sizes:
 1. Remote-control and signal circuits; No 14 AWG.

3.6 GROUNDING

- A. For low-voltage control wiring and cabling, comply with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.7 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA-568-C.1.
 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 3. Test cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.
- C. Cabling will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION

SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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. Grounding and bonding systems
 - 2. Grounding and bonding of equipment
 - 3. Underground distribution grounding
- B. Related Requirements:
 - 1. Section 26 05 43, "Underground Ducts and Raceways for Electrical Systems"

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Ground rods.
 - 2. Ground rings.
- C. Field quality-control reports.
- D. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a qualified testing agency and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Compression Connectors: Irreversible compression type connection for below grade installations or connections permanently joined to prevent loosening of electrical connection.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 12 AWG and smaller, and stranded conductors for No. 10 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches below grade.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection,

with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

D. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors.
3. Connection to Foundation Reinforcing Steel: Welded connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.

3.3 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
1. Feeders and branch circuits.
 2. Lighting circuits.
 3. Single-phase motor and appliance branch circuits.
 4. Flexible raceway runs.

3.4 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 6 inches below finished floor or final grade unless otherwise indicated.
1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 2. Use exothermic welds or irreversible compression type for all below-grade connections.
 3. For grounding electrode system, install at least two (3) rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect

- grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
- 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
- D. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal.
 - a. Measure grounding system resistance using clamp on type grounding resistance tester. Resistant measurement exceeding 15 ohm shall require additional grounding electrodes. Grounding electrodes shall be installed until resistance measurement is acceptable.
 - 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. Conduit and cable support devices.
 - 2. Support for conductors in vertical conduit.
 - 3. Structural steel for fabricated supports and restraints.
 - 4. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
 - 5. Fabricated metal equipment support assemblies.

- B. Related Requirements

- 1. Section 26 05 33, "Raceways and Boxes for Electrical Systems"
 - 2. Section 03 30 00, "Cast-in-Place Concrete"

1.3 SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.

- 2. Include rated capacities and furnished specialties and accessories.

- B. Shop Drawings: For installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Stainless Steel/Aluminum Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. B-line, an Eaton business.
 - b. Thomas & Betts Corporation; A Member of the ABB Group.
 - c. Unistrut; Part of Atkore International.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Channel Width: Selected for applicable load criteria.
 4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 5. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Stainless-steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as

required to suit individual conductors or cables supported. Body shall be made of malleable iron.

- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Hilti, Inc.
 - 2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) B-line, an Eaton business.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti, Inc.
 - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.
 - 7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 - 1. NECA 1.
 - 2. NECA 101
- B. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or

greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base as follows:
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 26 05 33 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

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. Metal conduits and fittings.
 - 2. Nonmetallic conduits and fittings.
 - 3. Boxes, enclosures, and cabinets.
- B. Related Requirements:
 - 1. Section 26 05 43, "Underground Ducts and Raceways for Electrical Systems"
 - 2. Section 26 05 29, "Hangers and Supports for Electrical Systems"

1.3 DEFINITIONS

- A. ARC: Aluminum rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
- C. Source quality-control reports.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. Anamet Electrical, Inc.
 - c. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - d. Wheatland Tube Company.
2. **Listing and Labeling:** Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. **Aluminum Rigid Conduit:** Comply with ANSI C80.5 and UL 6A.
4. **LFMC:** Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metallic Conduit Fittings:

1. Comply with NEMA FB 1 and UL 514B.
2. **Listing and Labeling:** Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. **Fittings, General:** Listed and labeled for type of conduit, location, and use.
4. **Expansion Fittings:** Aluminum or stainless steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CANTEX INC.
 - b. Electri-Flex Company.
 - c. RACO; Hubbell.
 - d. Thomas & Betts Corporation; A Member of the ABB Group.
2. **Listing and Labeling:** Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. **RNC:** Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

B. Nonmetallic Fittings:

1. Fittings, General: Listed and labeled for type of conduit, location, and use.
2. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
3. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. APX Enclosure.
2. Hoffman; a brand of Pentair Equipment Protection.
3. Hubbell Incorporated.
4. RACO; Hubbell.
5. Thomas & Betts Corporation; A Member of the ABB Group.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

F. Device Box Dimensions: 4 inches by 2-1/8 inches by 2-1/8 inches deep.

G. Gangable boxes are prohibited.

H. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 4X with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Fiberglass.

I. Power/Controls Enclosure:

1. NEMA 250, Type 4X, thick gauge sheet aluminum alloy enclosure with removable interior panel and hinged, quad door arrangement, finished inside and out with manufacturer's standard enamel.
2. Door hinges shall be stainless steel with stainless steel hinge pin.
3. Latching mechanism shall be 3-point draw roller type with provision for pad lock.
4. Metal barriers to separate wiring of different systems and voltage.
5. Free standing.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

7. Enclosure ventilation shall be factory installed with louvers compliant with NEMA 3R standards.
8. Enclosure ventilation system shall provide 100 cfm.
9. Mounting: Pad, with provision for securing to equipment pad.

J. Power and Control Terminal Boxes:

1. NEMA 250, Type 4X enclosure.
2. Type-316L stainless steel enclosure and exterior hardware.
3. Type-316L stainless steel hinged door, clamps, hasp and stable for padlocking, and neoprene gaskets.
4. External mounting brackets.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: ARC.
2. Concealed Conduit, Aboveground: ARC.
3. Underground Conduit, Direct Buried: PVC coated GRC, Schedule 40 PVC
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X 316 stainless steel.
6. Grinder station (C1D1): RMC.

B. Minimum Raceway Size: 3/4-inch trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Support conduit within 12 inches of enclosures to which attached.
- H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- I. Coat field-cut threads on raceway with a corrosion-preventing conductive compound prior to assembly.
- J. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- K. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- L. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- N. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- O. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

- P. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service raceway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- Q. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- R. Expansion-Joint Fittings:
1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
 2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- S. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC in damp or wet locations not subject to severe physical damage.
- T. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- U. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- V. Locate boxes so that cover or plate will not span different building finishes.
- W. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- X. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Install handholes with bottom below frost line.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.
- F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.4 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

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

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. Metal conduits and fittings, including ARC.
 - 2. Rigid nonmetallic duct.
 - 3. Flexible nonmetallic duct.
- B. Related Requirements:
 - 1. Section 26 05 26, "Grounding and Bonding for Electrical Systems"
 - 2. Section 26 05 53, "Identification for Electrical Systems"

1.3 DEFINITIONS

- A. Direct Buried: Duct or a duct bank that is buried in the ground, without any additional casing materials such as concrete.
- B. Duct: A single duct or multiple ducts. Duct may be either installed singly or as component of a duct bank.
- C. Duct Bank:
 - 1. Two or more ducts installed in parallel, with or without additional casing materials.
 - 2. Multiple duct banks.
- D. GRC: Galvanized rigid (steel) conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include duct-bank materials, including spacers and miscellaneous components.
 - 2. Include duct, conduits, and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
 - 3. Include accessories for manholes, handholes, boxes, and other utility structures.

4. Include underground-line warning tape.
5. Include warning planks.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit product data for components associated with duct banks.

1.6 FIELD CONDITIONS

- A. Verify presence of existing utilities prior to excavating:

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND FITTINGS

- A. GRC: Comply with ANSI C80.1 and UL 6.
- B. Coated Steel Conduit: PVC-coated GRC.
 1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch, minimum.
- C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. Allied Tube & Conduit; a part of Atkore International.
 2. O-Z/Gedney; a brand of Emerson Industrial Automation.
 3. Thomas & Betts Corporation; A Member of the ABB Group.
 4. Western Tube and Conduit Corporation.
- D. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

2.2 RIGID NONMETALLIC DUCT

- A. Underground Plastic Utilities Duct: Type EPC-40-PVC RNC, complying with NEMA TC 2 and UL 651, with matching fittings complying with NEMA TC 3 by same manufacturer as duct.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 1. ARNCO Corp.
 2. CANTEX INC.
 3. ElecSys, Inc.
 4. National Pipe & Plastics.

- C. Listed and labeled as defined in NFPA 70, by a nationally recognized testing laboratory, and marked for intended location and application.

2.3 DUCT ACCESSORIES

- A. Underground-Line Warning Tape: Comply with requirements for underground-line warning tape specified in Section 26 05 53 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clear vegetation as required for duct bank install.

3.2 UNDERGROUND DUCT APPLICATION

- A. Duct for Electrical Branch Circuits: Type EPC-40-PVC RNC.
- B. Stub-ups: ARC with supplemental corrosion protection. Transit below grade from Schedule 40 PVC conduit to ARC with supplemental corrosion protection.

3.3 EARTHWORK

- A. Excavation and Backfill: Comply with drawing details for duct bank installation.
- B. Restore surface features at areas disturbed by excavation, and re-establish original grades unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

3.4 GROUNDING

- A. Ground underground ducts according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.5 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of duct until duct cleaner indicates that duct is clear of dirt and debris. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

END OF SECTION

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Color and legend requirements for raceways, conductors, and warning labels and signs.
 - 2. Labels.
 - 3. Bands and tubes.
 - 4. Tapes and stencils.
 - 5. Tags.
 - 6. Signs.
 - 7. Cable ties.
 - 8. Paint for identification.
 - 9. Fasteners for labels and signs.

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 electrical identification products.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1.
- B. Comply with NFPA 70.

- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.
 - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
 - 2. Colors for 120/240-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - 3. Color for Neutral: White.
 - 4. Color for Equipment Grounds: Bare copper or Green.
- C. Warning labels and signs shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
- D. Equipment Identification Labels:
 - 1. Black letters on a white field.

2.3 BANDS AND TUBES

- A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.
- B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

2.4 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches.

C. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:
 - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
 - b. For signs larger than 20 sq. in., 1/8 inch thick.
 - c. Engraved legend with white letters on a dark gray background.
 - d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
 - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 CABLE TIES

A. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- H. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- I. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- J. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "EMERGENCY POWER."
 - 2. "POWER."
- K. Vinyl Wraparound Labels:
 - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

- L. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- M. Self-Adhesive Labels:
 - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
- N. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
- O. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- P. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
 - 1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- Q. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
- R. Metal Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using general-purpose cable ties.
- S. Nonmetallic Preprinted Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using general-purpose cable ties.
- T. Baked-Enamel Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.
- U. Metal-Backed Butyrate Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.
- V. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

W. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels to identify the phase.
 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- D. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.
- E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.
- F. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with the conductor designation.
- G. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- H. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
- I. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- J. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to raceways concealed within wall.
 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- K. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- L. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- M. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.
1. Apply to exterior of door, cover, or other access.
 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
- N. Arc Flash Warning Labeling: Self-adhesive labels.
- O. Operating Instruction Signs: Self-adhesive labels.
- P. Emergency Operating Instruction Signs: Self-adhesive labels with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- Q. Equipment Identification Labels:
1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
 2. Outdoor Equipment: Laminated acrylic or melamine sign.
 3. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Emergency system boxes and enclosures.
 - d. Enclosed circuit breakers.
 - e. Push-button stations.
 - f. Power-transfer equipment.
 - g. Power-generating units.
 - h. Monitoring and control equipment.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

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. Distribution panelboards.
- B. Related requirements:
 - 1. Section 26 05 53, "Identification for Electrical Systems"

1.3 DEFINITIONS

- A. ATS: Acceptance testing specification.
- B. GFCI: Ground-fault circuit interrupter.
- C. MCCB: Molded-case circuit breaker.
- D. SPD: Surge protective device.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard.
 - 1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
 - 2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details.
 - 2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
 - 3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 - 4. Detail bus configuration, current, and voltage ratings.

5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of NRTL listing for SPD as installed in panelboard.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. Include the following:
 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
 1. Panelboard Warranty Period: 24 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.
- D. Enclosures: Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA 250, Type 4X.
 2. Height: 84 inches maximum.
 3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
 4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim lockable cover. Trims shall cover all live parts and shall have no exposed hardware.
 5. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
- E. Incoming Mains:
1. Location: Convertible between top and bottom.
 2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.
- F. Phase, Neutral, and Ground Buses:
1. Material: Tin-plated aluminum.
 - a. Plating shall run entire length of bus.
 - b. Bus shall be fully rated the entire length.
 2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
 3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
 4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
 5. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
- G. Conductor Connectors: Suitable for use with conductor material and sizes.
1. Material: Tin-plated aluminum.
 2. Terminations shall allow use of 75 deg C rated conductors without derating.
 3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
 4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.

5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
- H. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.
- I. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- J. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include label or manual with size and type of allowable upstream and branch devices listed and labeled by an NRTL for series-connected short-circuit rating.
 1. Panelboards rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
- K. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.
 1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.

2.2 PERFORMANCE REQUIREMENTS

- A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.

2.3 POWER PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Square D; by Schneider Electric.
 2. Eaton.
 3. General Electric Company; GE Energy Management - Electrical Distribution.
 4. Siemens Industry, Inc., Energy Management Division.
 5. Approved Equal.
- B. Panelboards: NEMA PB 1, distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- D. Mains: Circuit breaker.

- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Overcurrent protective devices shall be the same manufacturer as the panelboard.
- B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers:
 - a. Inverse time-current element for low-level overloads.
 - b. Instantaneous magnetic trip element for short circuits.
 - c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - 3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 - 4. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
 - 5. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - e. Application Listing: Appropriate for application; Type SWD for switching LED lighting loads.

2.5 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Computer-generated circuit directory mounted in metal frame with transparent protective cover inside panelboard door.
 - 1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.6 INTGRAL MOUNTED SURGE PROTECTION DEVICES (SPD)

- A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.
- B. Single Source: Obtain protective devices from same manufacturer of panelboards.
- C. The SPD surge current ratings shall be based on the electrical system ampacity listed in the table below:

Electrical System Ampacity @ SPD Install Point	Surge Protection (kA)	
	Per Mode	Per Phase
2500-6000A	300	600
1200-2000A	250	500
600-1000A	200	400
225-400A	150	300
125-225A	100	200

- D. The SPD shall be rated for 240/120Vac 1 Phase, 3 Wire + Ground.
- E. Modes of Protection: The SPD system shall provide surge protection in all possible modes (L-N, L-G, L-L, and N-G). Each replaceable module shall provide the uncompromising ability to deliver full surge current rating per mode.
- F. SPD modules shall be configured to isolate individual suppression component failures without causing total loss of surge protection in that mode.
- H. Protection modes and UL 1449 Voltage Protection Ratings (VPR) for 240/120-V, single-phase, three-wire circuits shall not exceed the following:
 - 1. Line to Neutral: 700 V.
 - 2. Line to Ground: 700 V.
 - 3. Neutral to Ground: 700 V.
 - 4. Line to Line: 1200 V.

2.7 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
- B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
- D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Comply with NECA 1.
- C. Install panelboards and accessories according to NEMA PB 1.1.
- D. Equipment Mounting:
 - 1. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- F. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- G. Mount panelboard cabinet plumb and rigid without distortion of box.
- H. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
 - 2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.
- I. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

- J. Install filler plates in unused spaces.
- K. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- L. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 26 05 53 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
- E. Install warning signs complying with requirements in Section 26 05 53 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 - 1. Test continuity of each circuit.
- B. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection for low-voltage air circuit breakers and low-voltage surge arrestors.
 - 2. Correct defective units on-site.
- C. Panelboards will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

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. Straight-blade convenience receptacles.
 - 2. GFCI receptacles.
 - 3. Hazardous (classified) location receptacles.
 - 4. Toggle switches.
- B. Related requirements:
 - 1. Section 26 05 53, "Identification for Electrical Systems"

1.3 DEFINITIONS

- A. Abbreviations of Manufacturers' Names:
 - 1. Cooper: Cooper Wiring Devices; Division of Cooper Industries, Inc.
 - 2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
 - 3. Leviton: Leviton Mfg. Company, Inc.
 - 4. Pass & Seymour: Pass& Seymour/Legrand.
- B. BAS: Building automation system.
- C. EMI: Electromagnetic interference.
- D. GFCI: Ground-fault circuit interrupter.
- E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.
- D. Devices for Owner-Furnished Equipment:
 - 1. Receptacles: Match plug configurations.
- E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

- A. Duplex Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Leviton Manufacturing Co., Inc.
 - c. Pass & Seymour/Legrand (Pass & Seymour).

2.3 GFCI RECEPTACLES

- A. General Description:
 - 1. 125 V, 20 A, straight blade, feed-through type and weather resistant.

2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Leviton Manufacturing Co., Inc.
 - c. Pass & Seymour/Legrand (Pass & Seymour).

2.4 WEATHER RESISTANT RECEPTACLES

A. Weather-Resistant Duplex Receptacles, 125 V, 20 A (GFCI):

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following.
 - a. Hubbell.
 - b. Cooper.
 - c. Pass & Seymour.
 - d. Leviton.
 - e. Approved equal.
2. Description: Commercial grade duplex receptacles Two pole, three wire grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.

B. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

2.5 WEATHERPROOF COVER

A. Weatherproof heavy-duty cover

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hubbell.
 - b. Cooper.
 - c. Pass & Seymour.
 - d. Leviton.
 - e. Approved equal.
2. Description: Die cast aluminum, gray, commercial grade, vertical position device mount.

2.6 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Black unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailling existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.

5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up and on horizontally mounted receptacles to the left.

F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

- A. Comply with Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

- A. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 105 to 132 V.
 2. Ground Impedance: Values of up to 2 ohms are acceptable.
 3. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 4. Using the test plug, verify that the device and its outlet box are securely mounted.
- B. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION

SECTION 26 32 13 - DIESEL EMERGENCY ENGINE GENERATORS

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 packaged diesel engine generators for emergency use with the following features:
 - 1. Diesel engine.
 - 2. Control and monitoring.
 - 3. Generator overcurrent and fault protection.
 - 4. Generator, exciter, and voltage regulator.
 - 5. Load banks.
 - 6. Outdoor engine generator enclosure.
 - 7. Remote radiator motors.
 - 8. Vibration isolation devices.
 - 9. Finishes.
- B. Related Requirements:
 - 1. Section 26 05 19, "Low-Voltage Electrical Power Conductors and Cables"
 - 2. Section 26 05 26, "Grounding and Bonding for Electrical Systems"
 - 3. Section 26 05 53, "Identification for Electrical Systems."
 - 4. Section 26 36 00, "Automatic Transfer Switches"

1.3 DEFINITIONS

- A. EPS: Emergency power supply.
- B. EPSS: Emergency power supply system.
- C. Operational Bandwidth: The total variation, from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include manufacturer and model.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. Include thermal damage curve for generator.
4. Include time-current characteristic curves for generator protective device.
5. Include fuel consumption in gallons per hour at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
6. Include generator efficiency at 0.8 power factor at 0.5, 0.75, and 1.0 times generator capacity.
7. Include airflow requirements for cooling and combustion air in cubic feet per minute at 0.8 power factor, with air-supply temperature of 95, 80, 70, and 50 deg F. Provide Drawings indicating requirements and limitations for location of air intake and exhausts.
8. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactances, and short-circuit current capability.

B. Shop Drawings:

1. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Identify fluid drain ports and clearance requirements for proper fluid drain.
4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and supported equipment. Include base weights.
6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Manufacturer.

B. Source Quality-Control Reports: Including, but not limited to, the following:

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
5. Report of sound generation.
6. Report of exhaust emissions showing compliance with applicable regulations.
7. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

- C. Field quality-control reports.
- D. Warranty: Indicate warranty period and coverage compliant with specification.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For engine generators to include in emergency, operation, and maintenance manuals.
 - 1. Include the following:
 - a. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
 - b. Operating instructions laminated and mounted adjacent to generator location.
 - c. Training plan.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Cummins Power Generation.
 - 2. Kohler Power Systems.
 - 3. Generac Power Systems, Inc.
 - 4. MTU Onsite Energy Corporation.

- B. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. B11 Compliance: Comply with B11.19.
- B. NFPA Compliance:
 - 1. Comply with NFPA 37.
 - 2. Comply with NFPA 70.
 - 3. Comply with NFPA 99.
 - 4. Comply with NFPA 110 requirements for Level 2 EPSS.
- C. UL Compliance: Comply with UL 2200.
- D. Engine Exhaust Emissions: Comply with EPA Tier 4 requirements and applicable state and local government requirements.
- E. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by engine generator, including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.
- F. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature: 5 to 104 deg F.
 - 2. Relative Humidity: Zero to 95 percent.
 - 3. Altitude: Sea level to 200 feet.

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. EPSS Class: Engine generator shall be classified as a Class 24 according to NFPA 110.
- D. Service Load: 14 kVA.
- E. Power Factor: 0.8, lagging.
- F. Frequency: 60 Hz
- G. Voltage: 240/120 Vac.

- H. Phase: Single-phase, 3-wire wye.
- I. Induction Method: Turbocharged.
- J. Governor: Adjustable isochronous, with speed sensing.
- K. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
 - 1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.
- L. Capacities and Characteristics:
 - 1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
 - 2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
- M. Engine Generator Performance:
 - 1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage, from no load to full load.
 - 2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
 - 3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency, from no load to full load.
 - 4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
 - 5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
 - 6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
 - 7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
 - 8. Start Time: Comply with NFPA 110, Type 60 system requirements.

2.4 DIESEL ENGINE

- A. Fuel: ASTM D 975 diesel fuel oil, Grade 2-D S15.
- B. Rated Engine Speed: 1800 rpm.

- C. Lubrication System: Engine or skid mounted.
1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and with UL 499.
- E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.
1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 2. Size of Radiator: Adequate to contain expansion of total system coolant, from cold start to 110 percent load condition.
 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant-system pressure for engine used. Equip with gage glass and petcock.
 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.
 - a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. Cooling System: Closed loop, liquid cooled, with remote radiator and integral engine-driven coolant pump.
1. Configuration: Horizontal air discharge.
 2. Radiator Core Tubes: Aluminum.
 3. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 4. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant-system pressure for engine used. Equip with gage glass and petcock.
 5. Fan: Driven by multiple belts from engine shaft or direct coupled with flexible disc.
 6. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 7. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

- G. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 - 1. Minimum sound attenuation of 25 dB at 500 Hz.
 - 2. Sound level measured at 7 meters from exhaust discharge after installation is complete shall be 78 dBA or less.
- H. Air-Intake Filter: Standard-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- I. Starting System: suitable for engine, with negative ground.
 - 1. Components: Sized so they are not damaged during a full engine-cranking cycle, with ambient temperature at maximum specified in "Performance Requirements" Article.
 - 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 - 3. Cranking Cycle: 60 seconds.
 - 4. Battery: Capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least twice without recharging.
 - 5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
 - 6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
 - 7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
 - 8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
 - 9. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type designed for batteries provide with generator set. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg F to 140 deg F to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense

high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

- f. Enclosure and Mounting: NEMA 250, Type 1 wall-mounted cabinet.

2.5 CONTROL AND MONITORING

- A. Automatic-Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- B. Manual-Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts engine generator. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- C. Provide minimum run time control set for 15 minutes, with override only by operation of a remote emergency-stop switch.
- D. Comply with UL 508A.
- E. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.
- F. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common wall-mounted control and monitoring panel. Panel shall be powered from the engine generator battery.
- G. Configuration: Operating and safety indications, protective devices, basic system controls, engine gages, instrument transformers, generator-disconnect switch or circuit breaker, and other indicated components shall be grouped in a combination control and power panel. Control and monitoring section of panel shall be isolated from power sections by steel barriers. Panel shall be powered from the engine generator battery. Panel features shall include the following:
1. Wall-Mounting Cabinet Construction: Rigid, self-supporting steel unit complying with NEMA ICS 6.
- H. Control and Monitoring Panel:
1. Digital controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
 2. Analog control panel with dedicated gages and indicator lights for the instruments and alarms indicated below.
 3. Instruments: Located on the control and monitoring panel and viewable during operation.

- a. Engine lubricating-oil pressure gage.
 - b. Engine-coolant temperature gage.
 - c. DC voltmeter (alternator battery charging).
 - d. Running-time meter.
 - e. AC voltmeter, for each phase.
 - f. AC ammeter, for each phase.
 - g. AC frequency meter.
 - h. Generator-voltage-adjusting rheostat.
4. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm indication as required by NFPA 110 for Level 2 system, including the following:
- a. Cranking control equipment.
 - b. Run-Off-Auto switch.
 - c. Control switch not in automatic position alarm.
 - d. Overcrank alarm.
 - e. Overcrank shutdown device.
 - f. Low water temperature alarm.
 - g. High engine temperature pre-alarm.
 - h. High engine temperature.
 - i. High engine temperature shutdown device.
 - j. Overspeed alarm.
 - k. Overspeed shutdown device.
 - l. Low-fuel main tank.
 - m. Coolant low-level alarm.
 - n. Coolant low-level shutdown device.
 - o. Coolant high-temperature pre-alarm.
 - p. Coolant high-temperature alarm.
 - q. Coolant low-temperature alarm.
 - r. Coolant high-temperature shutdown device.
 - s. EPS load indicator.
 - t. Battery high-voltage alarm.
 - u. Low-cranking voltage alarm.
 - v. Battery-charger malfunction alarm.
 - w. Battery low-voltage alarm.
 - x. Lamp test.
 - y. Contacts for local and remote common alarm.
 - z. Low-starting air pressure alarm.
 - aa. Low-starting hydraulic pressure alarm.
 - bb. Remote manual-stop shutdown device.
 - cc. Generator overcurrent-protective-device not-closed alarm.
- I. Remote Alarm Notification:
- 1. A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication. The dry contacts shall be utilized for communications with auto dialer.
- J. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator unless otherwise indicated.

- K. Emergency-Stop Switch shall easily accessible in the generator enclosure. The emergency-stop switch shall be labeled. Push button shall be protected from accidental operation.

2.6 GENERATOR OVERCURRENT PROTECTION

- A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 80 percent rated; complying with UL 489.
 - 1. Tripping Characteristic: Designed specifically for generator protection.
 - 2. Trip Rating: Matched to generator output rating.
 - 3. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.
 - 4. Mounting: Adjacent to or integrated with control and monitoring panel.
- B. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other engine generator protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:
 - 1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other engine generator malfunction alarms. Contacts shall be available for load shed functions.
 - 2. Under single- or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
 - 3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.
 - 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H or Class F.
- D. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- E. Enclosure: Drip-proof.
- F. Instrument Transformers: Mounted within generator enclosure.

- G. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
 - 1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
 - 2. Maintain voltage within 10 percent on one step, full load.
 - 3. Provide anti-hunt provision to stabilize voltage.
 - 4. Maintain frequency within 5 percent and stabilize at rated frequency.
- H. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- I. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- J. Subtransient Reactance: 12 percent, maximum.

2.8 OUTDOOR ENGINE GENERATOR ENCLOSURE

- A. Description: Vandal-resistant, sound-attenuating, weatherproof aluminum housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
 - 1. Sound Attenuation Level: 78 dBA at 7 meters.
- B. Description: Prefabricated or pre-engineered, aluminum, integral structural-aluminum-framed reach-in enclosure.
- C. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads of up to 100 mph.
- D. Hinged Doors: With integral locking provisions.
- E. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.
- F. Muffler Location: Within enclosure.
- G. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.
- H. Convenience Outlets: Factory-wired GFCI. Arrange for external electrical connection.

2.9 FINISHES

- A. Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.10 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 - 1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine generator and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
 - 1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
 - 2. Test generator, exciter, and voltage regulator as a unit.
 - 3. Full-load run.
 - 4. Maximum power.
 - 5. Voltage regulation.
 - 6. Transient and steady-state governing.
 - 7. Single-step load pickup.
 - 8. Safety shutdown.
 - 9. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
 - 10. Factory Test Result report shall be included in O&M manual at completion of the project.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.
- B. Examine roughing-in for piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 404.
- B. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.
- C. Equipment Mounting:

1. Install packaged engine generators on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 03 30 00 "Cast-in-Place Concrete."
 2. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
 3. Install packaged engine generator on concrete pad as indicated on drawings. Secure base tank to anchor bolts installed in concrete bases.
- D. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- E. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.3 CONNECTIONS

- A. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.
- C. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.4 IDENTIFICATION

- A. Identify system components according Section 260553 "Identification for Electrical Systems."
- B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections with the assistance of a factory-authorized service representative.
- C. Tests and Inspections:
1. Perform tests recommended by manufacturer and in "Visual and Mechanical Inspection" and "Electrical and Mechanical Tests" subparagraphs below, as specified in the NETA ATS. Certify compliance with test parameters.
 - a. Visual and Mechanical Inspection:

- 1) Compare equipment nameplate data with Drawings and the Specifications.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect anchorage, alignment, and grounding.
 - 4) Verify that the unit is clean.
 - b. Electrical and Mechanical Tests:
 - 1) Perform insulation-resistance tests according to IEEE 43.
 - a) Machines 200 hp or Less: Test duration shall be one minute. Calculate the dielectric-absorption ratio.
 - 2) Verify phase rotation, phasing, and synchronized operation as required by the application.
 - 3) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
 - 4) Perform vibration test for each main bearing cap.
 - 5) Verify correct functioning of the governor and regulator.
2. On-site Acceptance Test:
 - a. Provide an on-site acceptance test proving the capacity of the generator set to start and maintain the facility loads during normal operating conditions.
 - b. Provide supplemental loading, as required, to simulate normal operating conditions where the same cannot be maintained due to lack influent flow during testing period.
 - 1) Supplement loading includes, but not limited to, a load bank with the power factor approximate to facility loads.
 - 2) Provide labor for removing and installing covers, disconnecting and terminating Owner's conductors, disconnecting and terminating test cables, and equipment set up and breakdown.
 - 3) Provide materials and components required to connect to the electrical distribution system downstream of the automatic transfer switch, as required.
 - c. On-site acceptance test with connected loads shall continue for not less one (1) and thirty (30) minutes.
 - d. Diesel fuel shall be delivered prior to start-up and testing. Fuel amount shall be adequate fuel generator set during testing period.
 - e. Equipment starting time shall be compliant paragraph 2.3(M)(8) in this section.
 - f. Recording of test results shall be in accordance with the "Installation Acceptance" as indicated in NFPA 110.
3. Load Bank Test:
 - a. After successfully performing an on-site acceptance test under 3.5(C)(2), provide a 2-hour full load-bank test.
 - b. Testing shall include, but not limited to, the following:
 - 1) Load-bank equipment adequately sized to fully test capacity of generator.

- a) Generator sets which have been factory tested at rated load at the rated power factor prior to shipment shall be tested at unity power factor.
 - 2) Cables sized to serve generator under test.
 - 3) Labor for removing and installing covers, disconnecting and terminating Owner's conductors, disconnecting and terminating test cables, and equipment set up and breakdown.
 - 4) Equipment and components required to connect the load bank to the electrical distribution system. Connections is not required downstream of automatic transfer switch.
 - 5) Diesel fuel shall be delivered prior to start-up and testing. Fuel amount shall be adequate fuel generator set during testing period.
 - 6) Recording generator stats.
 - 7) Testing periods shall include: one (1) five (5) minute warm-up under no load, one (1) two (2) hour test under varying loads, and one (1) five (5) minute cool-down under no load.
- c. Testing protocol:
- 1) After warm-up
 - 2) Close circuit breaker engaging load bank
 - 3) Stage 1 – thirty (30) minutes, generator shall be loaded at not less than 30% of unit rating
 - 4) Stage 2 – thirty (30) minutes, generator shall be loaded at not less than 50% of unit rating
 - 5) Stage 3 – sixty (60) minutes, generator shall be loaded at 100% of unit rating
- a) Generator coolant temperature shall stabilize at a constant temperature 30 minutes prior to test completion.
 - 6) Allow generator to cool down prior to shutdown.
- d. Recordings:
- 1) Categories shall include:
 - a) Time
 - b) Battery Voltage (DC)
 - c) Oil Pressure (PSI)
 - d) Coolant Temperature (Degrees F)
 - e) Ambient Temperature (Degrees F)
 - f) Frequency (Hz)
 - g) Voltage (AC; Phase A (L1), Phase B (L2), Phase C (L3))
 - h) Amperage (Phase A (L1), Phase B (L2), Phase C (L3))
 - i) kW
 - j) Load percentage

- 2) Readings shall occur at the end of the five (5) minute warmup, at change of loading, and every fifteen (15) minutes.
- 3) Provide computer generated spreadsheet indicating site specific data. Handwritten recordings shall be included Load-bank test data submission with legible spreadsheet.
 - e. Testing shall note deficiencies, with corrective action.
 - f. All corrective actions, failed parts, or damaged equipment shall be addressed or replaced with new manufacturer brand products.
 - g. Generator shall be restored and ready for service after completion of testing. All setting and function shall be set full automatic, unless other required by the project or Owner.
 - h. Remove all equipment and cables.
4. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
5. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
6. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
7. Exhaust Emissions Test: Comply with applicable government test criteria.
- D. Coordinate tests with tests for transfer switches and run them concurrently.
- E. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
- F. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
- G. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
- H. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- I. Remove and replace malfunctioning units and reinspect as specified above.

- J. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.
- K. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component, indicating satisfactory completion of tests.
- L. Infrared Scanning: After Substantial Completion, but not more than 60 days after final acceptance, perform an infrared scan of each power wiring termination and each bus connection while running with maximum load. Remove all access panels, so terminations and connections are accessible to portable scanner.
 - 1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 2. Record of Infrared Scanning: Prepare a certified report that identifies terminations and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION

SECTION 26 36 00 – AUTOMATIC TRANSFER SWITCHES

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. Automatic transfer switches rated 600 V and less
- B. Related requirements:
 - 1. Section 26 05 19, "Low-Voltage Electrical Power Conductors and Cables"
 - 2. Section 26 05 33 "Raceways and Boxes for Electrical Systems"
 - 3. Section 26 05 53, "Identification for Electrical Systems"

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components, profiles, and finishes for transfer switches.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
 - 2. Include material lists for each switch specified.
 - 3. Single-Line Diagram: Show connections between transfer switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
 - 4. Riser Diagram: Show interconnection wiring between transfer switches, bypass/isolation switches, annunciators, and control panels.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1. Include the following:
 - a. Features and operating sequences, both automatic and manual.
 - b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 12 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA ICS 1.
- C. Comply with NFPA 99.
- D. Comply with NFPA 110.
- E. Comply with UL 1008 unless requirements of these Specifications are stricter.
- F. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- G. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
 2. Short-time withstand capability for three (3) cycles.
- H. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- I. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

- J. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.
- K. Neutral Terminal: Solid and fully rated unless otherwise indicated.
- L. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
- M. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
- N. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable with printed or shrinkable sleeve markers at terminations. Color-coding and wire and cable markers are specified in Section 26 05 53 "Identification for Electrical Systems."
 - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
 - 4. Accessible via front access.
- O. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2 CONTACTOR-TYPE AUTOMATIC TRANSFER SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cummins Power Generation.
 - 2. Kohler Power Systems.
 - 3. Eaton.
 - 4. MTU Onsite Energy Corporation.
 - 5. Schneider Electric, ASCO,
- B. Comply with Level 2 equipment according to NFPA 110.
- C. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are unacceptable.
 - 2. Switch Action: Double throw; mechanically held in both directions.

3. Contacts: Silver composition or silver alloy for load-current switching. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.
 4. Conductor Connectors: Suitable for use with conductor material and sizes.
 5. Material: Tin-plated aluminum.
 6. Main and Neutral Lugs: Mechanical type.
 7. Ground Lugs and Bus-Configured Terminators: Mechanical type.
 8. Ground bar.
 9. Connectors shall be marked for conductor size and type according to UL 1008.
- D. Automatic Open-Transition Transfer Switches: Interlocked to prevent the load from being closed on both sources at the same time.
1. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.
- E. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.
- F. Automatic Transfer-Switch Controller Features:
1. Controller operates through a period of loss of control power.
 2. Undervoltage Sensing for Each Phase of Normal and Alternate. Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
 3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
 4. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
 5. Test Switch: Simulate normal-source failure.
 6. Switch-Position Pilot Lights: Indicate source to which load is connected.
 7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
 - a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
 8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
 9. Transfer Override Switch: Overrides automatic retransfer control so transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
 10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

11. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.
12. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
13. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
 - a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
 - b. Push-button programming control with digital display of settings.
 - c. Integral battery operation of time switch when normal control power is unavailable.

G. Large-Motor-Load Power Transfer:

1. In-Phase Monitor: Factory-wired, internal relay controls transfer so contacts close only when the two sources are synchronized in phase and frequency. Relay shall compare phase relationship and frequency difference between normal and emergency sources and initiate transfer when both sources are within 15 electrical degrees, and only if transfer can be completed within 60 electrical degrees. Transfer shall be initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.
2. Motor Disconnect and Timing Relay Controls: Designated starters in loss of power scenario shall disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Control connection to motor starters shall be through wiring external to automatic transfer switch. Provide adjustable time delay between 1 and 60 seconds for reconnecting individual motor loads. Provide relay contacts rated for motor-control circuit inrush and for actual seal currents to be encountered.
3. Programmed Neutral Switch Position: Switch operator with programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Adjustable pause from 0.5 to 30 seconds minimum, and factory set for 0.5 second unless otherwise indicated. Time delay occurs for both transfer directions. Disable pause unless both sources are live.

2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.
- B. Prepare test and inspection reports.
 1. For each of the tests required by UL 1008, performed on representative devices, for legally required systems. Include results of test for the following conditions:

- a. Overvoltage.
- b. Undervoltage.
- c. Loss of supply voltage.
- d. Reduction of supply voltage.
- e. Alternative supply voltage or frequency is at minimum acceptable values.
- f. Temperature rise.
- g. Dielectric voltage-withstand; before and after short-circuit test.
- h. Overload.
- i. Contact opening.
- j. Endurance.
- k. Short circuit.
- l. Short-time current capability.
- m. Receptacle withstand capability.
- n. Insulating base and supports damage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Identify components according to Section 26 05 53 "Identification for Electrical Systems."
- B. Set field-adjustable intervals and delays, relays, and engine exerciser clock.
- C. Comply with NECA 1.

3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to generator set and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.
 - 1. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- D. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
- F. Connect twisted pair cable according to Section 26 05 23 "Control-Voltage Electrical Power Cables."

- G. Route and brace conductors according to manufacturer's written instructions. Do not obscure manufacturer's markings and labels.
- H. Final connections to equipment shall be made with liquidtight no more than 24 inches in length.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. After installing equipment, test for compliance with requirements according to NETA ATS.
 - 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with Drawings and Specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, grounding, and required clearances.
 - d. Verify that the unit is clean.
 - e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
 - f. Verify that manual transfer warnings are attached and visible.
 - g. Verify tightness of all control connections.
 - h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:
 - 1) Use of low-resistance ohmmeter.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.
 - i. Perform manual transfer operation.
 - j. Verify positive mechanical interlocking between normal and alternate sources.
 - k. Perform visual and mechanical inspection of surge arresters.
 - l. Inspect control power transformers.
 - 1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
 - 2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
 - 3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.
 - 3. Electrical Tests:
 - a. Perform insulation-resistance tests on all control wiring with respect to ground.
 - b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
 - c. Verify settings and operation of control devices.

- d. Calibrate and set all relays and timers.
 - e. Verify phase rotation, phasing, and synchronized operation.
 - f. Perform automatic transfer tests.
 - g. Verify correct operation and timing of the following functions:
 - 1) Normal source voltage-sensing and frequency-sensing relays.
 - 2) Engine start sequence.
 - 3) Time delay on transfer.
 - 4) Alternative source voltage-sensing and frequency-sensing relays.
 - 5) Automatic transfer operation.
 - 6) Interlocks and limit switch function.
 - 7) Time delay and retransfer on normal power restoration.
 - 8) Engine cool-down and shutdown feature.
4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
- a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.
- a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
 - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
- a. Verify grounding connections and locations and ratings of sensors.
- C. Coordinate tests with tests of generator and run them concurrently.

- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Transfer switches will be considered defective if they do not pass tests and inspections.
- F. Remove and replace malfunctioning units and retest as specified above.
- G. Prepare test and inspection reports.
- H. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.
 - 1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 2. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.4 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.
- B. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.
- C. Coordinate this training with that for generator equipment.

END OF SECTION

SECTION 31 05 19.13 - GEOTEXTILES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide geotextile indicated or in compliance with Contract Documents.

1.02 REFERENCES:

- A. American Association of State Highway and Transportation Officials (AASHTO):

- 1. M288: Standard Specification for Geotextile Specification for Highway Applications.

- B. ASTM International (ASTM):

- 1. D1683: Standard Test Method for Failure in Sewn Seams of Woven Apparel Fabrics.
- 2. D4355: Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
- 3. D4491: Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- 4. D4533: Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- 5. D4632: Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- 6. D4751: Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- 7. D4833: Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.

1.03 DEFINITIONS:

- A. Minimum Average Roll Value (MARV): All property values, with the exception of apparent opening size (AOS), represent minimum average roll values in the weakest principal direction. MARV listings for AOS represent the maximum average roll value.

1.04 SUBMITTALS:

- A. Submit the following shop drawings in accordance with Section 01 33 00.

1. Sustainable Design Submittals.
2. Manufacturer Certificates.
3. Manufacturer Installation Instructions and Details.
4. Manufacturer Catalog Data.

1.05 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.
- B. Sustainability Standards Certifications.
- C. Manufacturer Testing Certificates: Provide mill certificate or affidavit signed by a legally authorized official from the company manufacturing the fabric. The mill certificate or affidavit shall attest that the fabric meets the chemical, physical, and manufacturing requirements stated in this specification. Submit to Engineer for acceptance at least two weeks prior to shipment.
- D. Manufacturer Installation Instructions and Details: Submit to Engineer for review.

1.06 DELIVERY STORAGE AND HANDLING:

- A. Comply with the requirements specified in Section 01 66 10.
- B. Label each roll of geotextile fabric with number or symbol to identify production run.
- C. Wrap fabric in a heavy-duty protective covering until it is ready for installation. Recover previously opened rolls with a waterproof cover.
- D. Protect the fabric from direct sunlight, ultraviolet rays, temperatures greater than 140 degrees F, mud, dirt, dust, and debris at all times during shipment and storage.
- E. Store fabric on clean, dry surfaces, free of foreign substances such as grease, oil, paint, epoxy, cement, or any other substances which would have a deleterious effect on the fabric.
- F. Elevate fabric a minimum of 12 inches above ground level when stored outside.
- G. Do not use hooks, tongs, or other sharp tools and instruments when handling fabric.
- H. Unload or handle fabric in one of the following ways:
 1. By placing slings under the rolls.

2. By using a pole inserted through a hollow core, provided the pole extends 1-foot (0.30 m) minimum beyond each end of the core and lifting and handling devices are attached to only that portion of the pole located outside the ends of the core.
3. By hand.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Provide the following nonwoven geotextile fabric:
 1. FX-60HS as manufactured by Carthage Mills.
 2. Geotex 601 as manufactured by Propex.
 3. Mirafi 160N as manufactured by TenCate Geosynthetics.
 4. 150EX as manufactured by Thrace - LINQ.
- B. Provide the following woven geotextile fabric except for silt fence:
 1. FX-55 as manufactured by Carthage Mills.
 2. 200ST as manufactured by Propex.
 3. Mirafi 500X as manufactured by TenCate Geosynthetics.
 4. GTF200 as manufactured by Thrace-LINQ.
- C. Provide the following woven geotextile fabric for silt fence:
 1. FX-11 as manufactured by Carthage Mills.
 2. Geotex 2130 as manufactured by Propex.
 3. W100 as manufactured by SKAPS Industries.
 4. Beltech 940 by Belton Industries Inc.

2.02 PERFORMANCE/DESIGN CRITERIA:

- A. The average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the MARV.

2.03 MATERIALS:**A. Filter Fabric: Permeable sheet of woven or nonwoven plastic yarn.**

1. Physical Requirements: AASHTO M288.
2. Strength Property Requirements: AASHTO M288, Class 1.
3. Service Requirements: Table 31 05 19.13-1.

Table 31 05 19.13-1	
Service	Requirement
Subsurface Drainage	AASHTO M288 Table 2
Stabilization	AASHTO M288 Table 4
Permanent Erosion Control	AASHTO M288 Table 5
Temporary Silt Fence	AASHTO M288 Table 6
Paving Fabric	AASHTO M288 Table 7

B. Fabric – Foundation Preparation: Nonwoven, Table 31 05 19.13-2. Woven, Table 31 05 19.13-3 (excluding silt fence).

Table 31 05 19.13-2			
Nonwoven Property	Test Method	Units	Value (MARV)
Grab Strength	ASTM D4632	lbs (N)	150 (670)
Grab Elongation	ASTM D4632	Percent	50
Trapezoidal Tear Strength	ASTM D4533	lbs (N)	60 (270)
Puncture Strength	ASTM D4833	lbs (N)	75 (330)
Permittivity	ASTM D4491	sec ⁻¹	1.3
Apparent Opening Size (AOS or O95)	ASTM D4751	U.S. Sieve No. (mm)	70-100 (0.212-0.150 mm)
Ultraviolet Stability	ASTM D4355	Percent	70

Table 31 05 19.13-3			
Woven Property	Test Method	Units	Value (MARV)
Grab Strength	ASTM D4632	lbs (N)	200 (900)
Grab Elongation	ASTM D4632	Percent	15
Trapezoidal Tear Strength	ASTM D4533	lbs (N)	75 (300)
Puncture Strength	ASTM D4833	lbs (N)	80 (350)
Permittivity	ASTM D4491	sec ⁻¹	0.02
Apparent Opening Size (AOS or O95)	ASTM D4751	U.S. Sieve No. (mm)	30-70 (0.60-0.212 mm)
Ultraviolet Stability	ASTM D4355	Percent	70

- C. Erosion Control Silt Fence: Woven, Table 31 05 19.13-4.

Table 31 05 19.13-4			
Woven Property	Test Method	Units	Value (MARV)
Grab Strength	ASTM D4632	lbs (N)	100 (450)
Permittivity	ASTM D4491	sec ⁻¹	0.10
Apparent Opening Size (AOS or O95)	ASTM D4751	U.S. Sieve No. (mm)	20-30 (0.85-0.60 mm)
Ultraviolet Stability	ASTM D4355	Percent	70

- D. Metal Geotextile Pins:

1. Diameter: 3/16 inch (5 mm), minimum.
2. Length: 18 inches (45 cm), minimum.
3. Shape: Pointed at one end with head on other end for retaining washer.
4. Washer: Steel, with minimum outside diameter of 1-1/2 inches (38 mm).

- E. Wire Staples: 8 gage (4.3 mm) minimum.

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Prepare the surface to receive fabric to a smooth condition free of sharp objects, obstructions, depressions, debris, and soft or low-density pockets of material.

3.02 INSTALLATION:

- A. Install geotextile fabric in accordance with manufacturer's printed instructions.
- B. Place geotextile fabric on the foundation subgrade prior to placing granular material, screened gravel or crushed stone.
- C. Joints:
 - 1. Unsewn: Overlap fabric 18 inches (45 cm), minimum.
 - 2. Sewn: Overlap fabric 6 inches (15 cm), minimum.
- D. Place geotextile fabric to prevent tearing or puncturing.
- E. Lay geotextile fabric loosely but without wrinkles or creases so that placement of the backfill materials will not stretch or tear geotextile fabric. Leave sufficient slack in geotextile fabric around irregularities to allow for readjustments.
- F. Along Foundation Perimeter: Extend geotextile fabric and wrap around granular fill, screened gravel or crushed stone.

3.03 INSTALLATION – CHANNELS, SHORELINES, AND TRENCHES:

- A. Install in accordance with AASHTO M288, Appendices A1 and A3 except as modified below.
- B. Do not use fabric with defects, rips, holes, flaws, deterioration, or damage of any nature.
- C. Handle and place filter fabric in accordance with the manufacturer's recommendations. Stretch, align, and place the fabric in a wrinkle-free manner.
- D. Place fabric with the long dimension parallel to the trench and lay smooth and free of tension, stress, folds, wrinkles, or creases. Place the strips to provide a minimum width of 18 inches (45 cm) of overlap for each joint.
- E. Insert securing pins with washers through both strips of overlapped fabric at intervals not greater than 2 feet (60 cm), along a line through the midpoint of the overlap.
- F. Install additional pins regardless of location to prevent any slippage of the filter fabric. Place the fabric so that the upper strip of fabric will overlap the next lower strip. Push each securing pin through the fabric until the washer bears against the fabric and secures it firmly to the foundation.
- G. Seams: Stitch fabric seams with thread meeting the chemical requirements for plastic yarn or bond by cementing or heat. Stitch fabric with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The stitches

shall number 5 to 7 per inch (2 to 3 per cm) of seam. Attach the sheets of filter fabric at the factory or another location to form sections not less than 3 feet (1 meter) wide. Test seams in accordance with method ASTM D1683, using 1-inch (25-mm) square jaws and 12 inches per minute (3 cm per minute) constant rate of traverse. The strengths shall be not less than 90 percent of the required tensile strength of the unaged fabric in any principal direction.

3.04 INSTALLATION – TEMPORARY SILT FENCE:

- A. Install in accordance with AASHTO M288, Appendices A1 and A5.

3.05 INSTALLATION – PAVING:

- A. Install in accordance with AASHTO M288, Appendices A1 and A6.

3.06 REPAIR/RESTORATION:

- A. Protect the fabric at all times during construction from contamination by surface runoff. Remove and replace fabric so contaminated with uncontaminated fabric. Repair any damage to the fabric during its installation or during placement of bedding materials.
- B. Patch tears in geotextile fabric by placing additional section of geotextile fabric over tear with a minimum of 3 feet (90 cm) overlay.
- C. Repair fabric damaged during placing, in other than underdrain piping service, by placing a piece of fabric large enough to cover the torn or punctured area, meet the overlap requirement, and extend a minimum of 12 inches (30 cm) beyond the edge of the damaged area. Repair damaged sections of fabric used in underdrain piping by cutting out the damaged section over the full width of the spiral section and stitching a new fabric section in place for a minimum length of 18 inches (45 cm).
- D. Replace fabric that has become damaged from vehicular traffic, equipment, or repetitive operations.

3.07 PROTECTION:

- A. Prohibit construction equipment and traffic from traveling directly on geotextile fabric.
- B. Protect the geotextile during installation from clogging, tears, and other damage. Provide ballast (e.g., sand bags) to prevent uplift by wind.
- C. Do not leave the geotextile uncovered for more than 14 days after installation (excluding silt fence).
- D. Place cover soil or sand in a manner that prevents soil or sand from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents

wrinkles from folding over onto themselves. On side slopes, place soil or sand backfill from the bottom of the slope upward.

- E. Do not drop cover soil or sand onto the geotextile from a height greater than 3 feet (1 m).
- F. Do not operate equipment directly on top of the geotextile. Use equipment with ground pressures less than 7 psi (48 kPa) to place the first lift over the geotextile. Maintain a minimum of 12 inches (30 cm) of soil between full-scale construction equipment and the geotextile.
- G. Maintain a minimum of 6 inches (15 cm) of material between the fabric and Contractor's equipment, during spreading and compaction of the bedding material. Where embankment material is to be placed on the filter fabric, maintain a minimum of 18 inches (45 cm) of embankment material between the fabric and the Contractor's equipment. Do not operate or drive equipment or vehicles directly on the filter fabric.
- H. Equipment placing cover soil shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph (8 km/h).

3.08 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide site clearing as indicated and in compliance with Contract Documents.
- B. Section Includes:
 - 1. Clearing and grubbing.
 - 2. Tree and shrub protection and removal.
 - 3. Removal of debris related to clearing and grubbing operations.

1.02 DEFINITIONS:

- A. Caliper: Instrument used to measure tree diameter.
- B. Clearing: Removal and disposal of above-ground items defined herein.
- C. Grubbing: Removal and disposal of below-ground items defined herein.

1.03 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.

1.04 SITE CONDITIONS:

- A. Existing facilities, structures, and utilities are shown in accordance with available surveys and records. The indicated locations of underground utilities and structures are approximate. Other utilities may exist which are not indicated.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify survey benchmarks and intended elevations for the Work are as indicated.

- B. Verify temporary erosion and sediment control measures are installed before commencing with any other work at the site.
- C. Verify location and existence of all underground utilities and structures by contacting utility owners, as required by law. Go to “Call Before You Dig” to receive state-specific information. Access this information by dialing 811 or going to <http://call811.com/state-specific.aspx>.
- D. Provide advance notice to existing utility owners, as required by state law, prior to beginning construction.
- E. Contact utility companies and authorities to make arrangements for handling and disposal of utilities encountered during construction.

3.02 PREPARATION:

- A. Protect bench marks, survey control points, and existing structures to remain from damage or displacement.
- B. Protect trees and vegetation to remain. Do not cut or injure trees and vegetation outside easement lines and outside designated clearing areas.
- C. Protect all underground utilities and structures that are to remain. If damage occurs, immediately notify the utility owner within the hour.
- D. Protect site features to remain from damage by construction equipment and vehicular traffic.
- E. Identify waste area for stockpiling of removed materials.

3.03 RESTORATION:

- A. Existing surfaces, features, utilities, or structures that are to remain but are damaged during construction shall be restored to at least the condition in which they were found immediately before work began, unless noted otherwise.
- B. Restore damaged utilities to the satisfaction of the utility owner.
- C. Restore damaged private property to the satisfaction of the property owner.

3.04 CLEARING:

- A. Remove and dispose of off site:
 - 1. Trees, snags, brush, shrubs, downed timber, decayed wood, and other vegetative growth.

2. Rocks, tiles, lumps of concrete, trash piles, debris, refuse. Remove all evidence of their presence from the surface.
 - B. Clear ground within limits of work, unless otherwise noted.
 - C. Manual cutting of trees, stumps, and stubs during clearing shall be as close to ground surface as practicable but no higher than 6 inches above ground for small trees (8 inches or less), and not higher than 12 inches above ground for larger trees (greater than 8 inches).
 - D. Obey all federal, state and local regulations and guidance regarding the cutting, burning, and disposal of diseased trees and vegetation.
- 3.05 CLEARING IN WOODED AREAS:
- A. Chip and stockpile cleared wood at location directed by Owner.
 - B. Chip and spread cleared wood within clearing limits and cover as indicated.
- 3.06 GRUBBING:
- A. Remove and dispose of all stumps, buried logs, matted roots, roots larger than 2 inches, and organic materials off site.
 - B. Roots larger than 2 inches in diameter shall be removed to a depth of 12 inches, and roots larger than 1/2-inches in diameter to a depth of 6 inches.
 - C. Areas designated to receive pavement or structures shall be grubbed a depth of 18 inches. Measure depths of cut from existing ground surface or proposed finished grade, whichever is lower.
 - D. Apply herbicide to remaining roots and vegetation to inhibit growth.
 - E. Depressions made by grubbing shall be filled with suitable material and compacted to conform to original adjacent grade.
 - F. Do not grub areas within drip line of trees to remain to avoid damage to roots.
- 3.07 TREE AND SHRUB REMOVAL:
- A. Remove trees and shrubs within permanent and temporary easement by felling or cutting individual vegetation.
- 3.08 TREE AND SHRUB PROTECTION:
- A. Protect designated trees and shrubs within the clearing limits.

3.09 BURNING:

- A. Burning is not permitted on site.

3.10 CLEANING:

- A. Promptly dispose of excess and unsuitable material off site.
- B. Remove debris, junk, and trash from site.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris before entering public or private property, adjacent to site.

3.11 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 31 22 00 - GRADING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide grading as indicated and in compliance with Contract Documents.
- B. Section Includes:
 - 1. Rough grading.
 - 2. Finish grading.
 - 3. Stockpiling of topsoil and subsoil.
 - 4. Disposal of unsuitable and excess materials.

1.02 DEFINITIONS:

- A. Unsuitable Material: Defined in Section 31 23 00.

1.03 SUBMITTALS:

- A. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.

1.05 SITE CONDITIONS:

- A. Existing Conditions:
 - 1. See Section 01 14 00 for additional requirements.
 - 2. Existing facilities, structures, and utilities are shown in accordance with available surveys and records. The indicated locations of underground utilities and structures are approximate. Other utilities may exist which are not indicated.
 - 3. Verify location of existing underground utilities and structures by contacting utility owners, as required by law. Go to “Call Before You Dig” to receive state-specific information. Access this information by dialing 811 or going to <http://call811.com/>.
- B. Geotechnical Report: The report is for information only and is not part of the Contract Documents. Logs of borings are included in the report and indicate conditions encountered only at test boring locations. Nothing in the contract documents shall be

construed as guarantee that other materials will not be encountered or that proportion of materials will not vary from proportions shown on the logs of test borings.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify survey benchmarks and intended elevations for the work are as indicated.
- B. Verify temporary erosion and sediment control measures are installed before commencing with any other work at the site.
- C. Immediately notify the Engineer if suspected hazardous materials are encountered during excavation. Discontinue affected work in area until notified to resume work.
- D. Identify areas loosened by frost action, softened by flooding or weather, or containing unsuitable material.

3.02 PREPARATION:

- A. Remove material loosened by frost action, softened by flooding or weather, or containing unsuitable material. Replace and compact to same requirements as for specified fill in Section 31 23 00.
- B. Identify required lines, levels, grades, and datum.
- C. Stake and flag locations of known utilities.
- D. Locate, identify, and protect from damage all above- and below-ground utilities to remain.
- E. Notify utility owner prior to removal or relocation of utility. See Section 02 01 20 for notification requirements.
- F. When necessary to excavate through roots of trees or vegetation to remain – perform work by hand and cut roots with sharp axe.

3.03 ROUGH GRADING:

- A. Topsoil removal and stockpiling:
 - 1. Strip topsoil from areas that are to be excavated, landscaped, or graded.

2. Separate organic matter (e.g. root zones) from topsoil. Dispose of organic material off site.
 3. Do not strip topsoil while wet.
 4. Stockpile excavated topsoil on site. Do not mix topsoil with foreign materials.
- B. Subsoil removal and stockpiling:
1. Remove subsoil from areas that are to be excavated, landscaped, or graded.
 2. Do not remove wet subsoil unless it is subsequently processed to obtain optimum moisture content.
 3. Stockpile suitable subsoil on-site.
- C. Provide for free drainage of construction site.
- D. Benching Slopes: Horizontally bench existing slopes greater than 4H:1V to key fill material to slope for firm bearing.
- E. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill in Section 31 23 00.
- F. Disc level surfaces.
- G. Rough grade site to achieve lines and grades indicated with allowances for imported fill thicknesses.
- H. Provide positive drainage away from buildings and structures by sloping minimum of 3 inches over 10 feet
- 3.04 FINISH GRADING:
- A. Before finish grading:
1. Verify subgrade is contoured and compacted.
 2. Verify backfill has been inspected.
- B. Fine grade to eliminate uneven areas and depressions. Follow profiles and contours of subgrade and bring to finish grade as indicated.
- 3.05 STOCKPILING:
- A. Location: As indicated or directed. Do not locate stockpiles over existing or new utilities unless directed.

- B. Height: 8 feet maximum.
- C. Slope: 2H:1V, maximum
- D. Drainage: Grade to prevent standing water.
- E. Provide erosion and sediment control around downhill-side of stockpile perimeter.
- F. Immediately stabilize dormant stockpiles within 7 days. Stockpiles and portions of stockpiles that will not be actively used for at least 30 days shall be considered dormant.

3.06 EXCESS MATERIAL:

- A. Excess grading material, suitable for backfilling or site grading, that is not necessary to complete the work at the project site belongs to the Owner and shall be delivered to an off-site designated location.
- B. Dispose off site, unsuitable materials and excess materials not received by Owner.

3.07 TOLERANCES:

- A. Subgrade:
 - 1. Elevation: 2 inches from required elevation.
 - 2. Grade: 1 inch per 10 feet.
- B. Finish Grade:
 - 1. Elevation: 1/2 inch (13 mm), from required elevation.

3.08 FIELD QUALITY CONTROL:

- A. See Section 31 23 00 for compaction and testing requirements.

3.09 CLEANING:

- A. See Sections 01 73 00 and 01 77 00 for additional requirements.
- B. Remove unused stockpiles, grade area to prevent standing water, protect from erosion, and stabilize.
- C. Leave site clean and raked, ready to receive landscaping.

3.10 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

- B. Submit existing utility location information as part of record drawings. Include ticket numbers and original information from utility owners.

END OF SECTION

SECTION 31 23 00 – EXCAVATION AND FILL

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide excavation and fill as indicated and in compliance with Contract Documents.
- B. Section includes:
 - 1. Excavation and fill for: Foundations, structures, and pavement; site drainage, structures, and features.
 - 2. Refer to Section 31 23 23 for all utility trenching and backfill.
 - 3. Embankments.
 - 4. Dewatering excavations.
 - 5. Controlled fill using materials from imported and on-site sources.
 - 6. Soil and aggregate materials.
 - 7. Compaction and testing.

1.02 REFERENCES:

- A. American Association of State and Highway Transportation Officials (AASHTO):
 - 1. M147: Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.
- B. ASTM International (ASTM):
 - 1. C33: Specification for Concrete Aggregates.
 - 2. C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - 3. D421: Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants.
 - 4. D1556: Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 5. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft³ (600 kN-m/m³)).

6. D2167: Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
7. D2487: Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
8. D2940: Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
9. D4318: Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
10. D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
11. D6938: Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

C. Occupational Safety and Health Administration (OSHA) Standards and Regulations:

1. 29 CFR 1926, Subpart P: Safety and Health Regulations for Construction, Excavations.

D. State Department of Transportation (DOT):

1. DelDOT Specifications: Delaware Department of Transportation, Standard Specifications for Road and Bridge Construction, most recent edition.

1.03 CLASSIFICATION OF EXCAVATION:

- A. Excavation is part of the lump sum contract prices for the project. Excavation is not classified, except where rock excavation is authorized outside specified or indicated limits of excavation.

1.04 DEFINITIONS

- A. Percent Compaction or Compaction Density: The field dry density of compacted material, expressed as a percentage of the maximum dry density.
- B. Field Dry Density or Field Density: In-place density as determined by ASTM D1556 (Sand Cone Method), ASTM D2167 (Rubber Balloon Method), or ASTM D6938 (Nuclear Method).
- C. Maximum Dry Density: Laboratory density as determined by ASTM D1557 (Modified Proctor) and occurring at the optimum moisture content of the material being tested.
- D. Proof Roll: Single pass of a drum roller capable of imparting a total applied force (static plus dynamic) of at least 500 pounds per inch of drum width.

1.05 SUBMITTALS:

A. Submit the following in accordance with Section 01 33 00.

1. Temporary excavation and shoring drawings for worker protection in accordance with the General Conditions.
2. Gradation analysis.
3. Materials Sources: Name of source, location, date of sample, sieve analysis, and laboratory compaction characteristics.
4. Test and Evaluation Reports:
 - a. Field density testing reports: Provide results from field density testing of prepared subgrade and compacted fill.
 - b. Grain-size analysis.
 - c. Laboratory compaction characteristics of soils.
 - d. Water content.

1.06 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.
- B. Testing will be provided by the Owner as specified. Contractor shall be responsible for cost of testing and inspection conducted as a result of non-conforming work.
- C. Protect excavations by shoring, bracing, sheet piling, underpinning or other methods required to prevent cave-in of loose soil. Protection shall be in accordance with OSHA 29 CFR 1926, Subpart P.

1.07 DELIVERY STORAGE AND HANDLING:

- A. Comply with the requirements specified in Section 01 66 10.

1.08 SITE CONDITIONS:

- A. Existing Conditions:
 1. Geotechnical Report: The report is for information only and is not part of the contract documents. Logs of borings are included in the report and indicate conditions encountered only at test boring locations. Nothing in the contract documents shall be construed as guarantee that other materials will not be encountered or that proportion of materials will not vary from proportions shown on the logs of test borings.

PART 2 - PRODUCTS

2.01 FILL MATERIALS:

- A. Suitable Material: Material from on-site excavation or permitted off-site sources that meets all of the specified requirements for its intended use and is not unsuitable. Wet subgrade material which meets other requirements for suitable material is suitable.
- B. Unsuitable Material: Material that fails to meet requirements for suitable materials; or contains any of the following:
 - 1. Organic clay, organic silt, or peat; as defined in ASTM D2487 and visually determined in ASTM D2488.
 - 2. Vegetation, wood, roots, leaves, and organic, degradable material.
 - 3. Stones or rock fragments over 6 inches in any dimension.
 - 4. Porous biodegradable matter, excavated pavement, construction debris, rubbish, or refuse.
 - 5. Ice, snow, frost, or frozen soil particles.
- C. General Fill: Suitable, unclassified material.
- D. Structural Fill: Suitable material that is classified by the Unified Soil Classification System (USCS) in accordance with ASTM D2487 as GW, GP, GM, GC, SW, SP, SM, SC, CL. Verify that the largest particles in the fill are no greater in dimension than one-half the thickness of the compacted lift thickness.
- E. Embankment Fill: Same as Structural Fill specified above.
- F. Concrete Fill: Section 03 30 00.
- G. Granular Fill:
 - 1. Open Graded: ASTM C33, coarse aggregate, No. 57.
- H. Sand: Fine aggregate resulting from natural or manufactured processes within the gradation limits of DelDOT Standard Specifications Section 1003.
- I. Select Borrow:
 - 1. Well-graded, coarse-grained soil; classified in accordance with ASTM D2487 as GW, GW-GM, GW-GC, SW, SW-SM, or SW-SC.
 - 2. Soil particles: ASTM C33, physical property requirements.

3. Gradation: Table 31 23 00-2.

Table 31 23 00-2	
Sieve Designation (Square Mesh)	Percentage Passing (By Weight)
3 inches (75 mm)	100
1-1/2 inches (37.5 mm)	70-100
3/4 inches (19.0 mm)	50-85
No. 4 (4.75 mm)	30-60
No. 50 (300 micrometers)	10-25
No. 200 (75 micrometers)	0-5

2.02 EQUIPMENT:

- A. Compaction equipment shall be capable of consistently achieving the specified compaction requirements.

2.03 ACCESSORIES:

- A. Geotextile: Section 31 05 19.13.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify that dewatering support systems are in place before commencing with excavation.
- B. Verify that excavation safety and support systems meeting the requirements of OSHA 29 CFR 1926, Subpart P are in place before commencing with excavation.
- C. Verify that fill materials submittals have been accepted by Engineer before commencing with work requiring the use of these materials.
- D. Verify that erosion and sediment control measures are in place and functioning properly.
- E. Immediately notify the Engineer if unexpected subsurface facilities or suspected hazardous materials are encountered during excavation. Discontinue affected work in area until notified to resume work.
- F. Test Pits:
 - 1. Comply with the requirements in Section 01 14 00.

2. Excavate test pits to field verify the locations, depth of bury, diameter, and pipe material of existing underground utilities at crossings and at tie-in points before ordering materials or commencing excavation. Immediately notify the Engineer if conflicts are encountered.
3. Notify utility owners and Engineer at least 72 hours before digging operations are scheduled to begin.

3.02 PREPARATION:

- A. Underpin adjacent structures that could be damaged by excavation work.
- B. Cut pavement with saw or pneumatic tools to prevent damage to remaining pavement. Dispose of large pieces of demolished pavement before proceeding with excavation.
- C. Remove subsurface structures and related obstructions as necessary to complete the Work.
- D. Remove boulders within excavation limits.

3.03 PROTECTION OF IN-PLACE CONDITIONS:

- A. Comply with the requirements specified in Section 01 14 00.
- B. Support and protect from damage – existing pipes, poles, wires, fences, curbs, property line markers, and other features or structures which must be preserved in place to avoid being temporarily or permanently relocated.
- C. Excavation Near Existing Structures:
 1. Discontinue digging by machinery when excavation approaches pipes, conduits, or other underground structures. Continue excavation by use of hand tools. Include such manual excavation in work to be done when incidental to normal excavation and under items involving normal excavation.
 2. Excavate test pits near, or at intersection with, existing utilities or underground structures to determine the exact location of existing features.

3.04 RESTORATION:

- A. Restore private property and structures promptly. Begin restoration work within 24 hours of when damage occurred.
- B. Existing surfaces, features, or utilities that are to remain but are damaged during construction shall be repaired or replaced to at least the condition in which they were found immediately before work began, unless noted otherwise.

- C. Damaged Trees To Remain: Cut all damaged branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint. Replace damaged trees which subsequently die, or continue to show lack of growth due to damage, within 1 year after substantial completion.
- D. Cultivated Vegetation: Includes, but is not limited to: hedges, shrubs, and plants. Vegetation that is damaged shall be replaced with equal kind and of at least the quality before work began.

3.05 EXCAVATION:

- A. Excavate to accommodate new structures and construction operations.
- B. Excavate to lines and grades necessary to provide finish grades.
- C. Excavations that are not shored and deeper than 4 feet shall have banks laid back to a minimum stable slope matching the angle of repose of the excavated material.
- D. Workers shall have an adequate means of exit from excavations that are 4 feet or greater in depth. The means of exit shall not require more than 25 feet of lateral travel.
- E. Establish limits of excavation to allow adequate working space for installing forms and for safety of personnel.
- F. Carry out program of excavation, dewatering, and excavation support systems to eliminate possibility of undermining or disturbing foundations of existing structures or the work.
- G. Provide dewatering system in accordance with Section 31 23 19.
- H. Provide sheeting and shoring in accordance with Section 31 50 00.
- I. Preserve material below and beyond the lines of excavations.
- J. Locate stockpiled excavated material at least 3 feet from edge of excavations to prevent cave-ins or bank slides.
- K. Excavate for depressed mat foundations so that adjacent sections of foundation mat will rest on undisturbed ground.

3.06 SUBGRADE PREPARATION:

- A. The exposed surface shall be examined by an engineering geologist or soils engineer to determine that the proper bearing material has been exposed.
- B. Materials which are determined to be unsuitable by visual inspection shall be over-excavated below the foundation subgrade and backfilled with structural fill.

- C. Backfill with compacted open-graded granular fill wrapped with nonwoven geotextile fabric. In no case shall the aggregate be placed directly on the exposed subgrade prior to placing the geotextile fabric.
- D. Compact subgrade and proof roll to identify soft spots or other deficiencies prior to filling operations or placing foundations. Correct deficiencies as specified for AUTHORIZED OVER-EXCAVATION and repeat proof roll procedure until successful.
- E. When subgrade is below controlled fill, scarify subgrade to bond with subsequent material lifts.
- F. Proof roll foundation subgrade prior to filling operation or placing foundation concrete. Continue until successful proof test is attained.

3.07 AUTHORIZED OVER-EXCAVATION:

- A. If proof roll test fails then remove unsuitable material plus an additional 6 inches, and backfill with structural fill.

3.08 UNAUTHORIZED EXCAVATION:

- A. Contractor is responsible for backfilling unauthorized excavations with structural fill.

3.09 FILL:

- A. Fill to lines and grades necessary to provide finish grades.
- B. Use a placement method that does not disturb or damage other work or existing features.
- C. Maintain fill materials within 3 percent of optimum moisture, to attain required compaction density.
- D. Place and compact material in equal continuous layers.
- E. General fill may be used in open areas, over lot fill, and areas which are not load bearing.
- F. Use structural fill beneath and adjacent to buildings and structures, and beneath pavements.
- G. Use concrete fill where footing bearing surfaces are over-excavated or footing is otherwise not bearing on undisturbed soil.
- H. Maximum compacted depth is 6 inches for aggregate materials and 8 inches for soil materials, unless noted otherwise.
- I. Do not backfill against or on concrete structures until testing is completed. See Section 03 05 10 for leakage testing requirements of concrete containment structures. Conduct

hydrostatic testing as soon as practicable after structures are constructed and other necessary work has been done. Start backfilling promptly after completion of tests.

- J. Deposit material evenly around structure to avoid unequal soil pressure.
- K. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage.

3.10 COMPACTION:

- A. Compact to density specified and indicated for various types of material. Control moisture content of material being placed as specified, or if not specified - at a level slightly lower than optimum.
- B. Compaction Density: Provide densities in Table 31 23 00-3. The values listed are minimum percentages, unless noted otherwise.

Table 31 23 00-3	
Area	Percentage of Maximum Dry Density as defined by ASTM D1557 (Modified Proctor)
Scarified subgrades	90
Under pavement, slabs	95
Under structures or within 25 feet of structures	95
Stormwater Management (SWM) basin embankment	98
Under exterior concrete slab and sidewalks	90
Open or grassed areas	85
Topsoil	85 (maximum)

3.11 EMBANKMENT FILL AND COMPACTION:

- A. Begin filling in lowest section of work area. Grade surface of fill approximately horizontal but provide with sufficient longitudinal and transverse slope to allow for runoff of surface water from every point.
- B. Install temporary dewatering sumps in low areas during filling operation where excessive amounts of rain runoff collect.
- C. Reduce moisture content of fill material, if necessary, in source area by aerating it over during warm and dry atmospheric conditions. A large disc harrow with two to three foot diameter disks may be required for working soil in a drying operation.

- D. Compact uniformly throughout. Keep fill surfaces sufficiently smooth and free from humps and hollows to allow for proper and uniform compaction. Do not permit hauling equipment to follow a single track on the same layer but direct equipment to spread out to prevent over compaction in localized areas. Take care in obtaining thorough compaction at edges of fill.
- E. Slightly slope surface of fill to ensure drainage during periods of wet weather. Do not place fill while rain is falling or after a rain-storm until the Engineer considers conditions satisfactory. During such periods and upon suspension of filling operations for periods in excess of 12 hours, roll smooth the surface of fill using a smooth wheel static roller to prevent excessive absorption of rainfall and surface moisture. Prior to resuming compaction operations, remove muddy material off surface to expose firm, compacted material, as determined by the Engineer.
- F. When fill is placed against an earlier fill or against in-situ material under and around structures, including around piping beneath structures or embankments, slope junction between two sections of fill at 1.5 to 1 (horizontal to vertical). Bench edge of existing fill 24 inches to form a serrated edge of compact stable material against which to place the new fill. Ensure that rolling extends over junction between fills.
- G. Clean debris, remove loose material, and proof roll previously placed fill which has had time to become desiccated or littered with debris.
- H. After spreading each loose lift to the required thickness and adjusting its moisture content, roll with sufficient number of passes to obtain the required compaction. One pass is defined as the required number of successive trips which by means of sufficient overlap will insure complete coverage and uniform compaction of an entire lift. Do not make additional passes until previous pass has been completed.
- I. Fill surface shall be firm and hard when rolled. Reduce moisture content when fill material sinks and weaves under rollers and equipment. Spread out rolling operations over the maximum practicable area to minimize condition of sinking and weaving. Suspend fill operations on portions of embankment where inundations produce surface cracks.
- J. Remove material which fails testing requirements and replace work.

3.12 GEOTEXTILE:

- A. Install geotextile fabric in accordance with manufacturer's printed instructions and Section 31 05 19.13.
- B. Place geotextile fabric on the foundation subgrade prior to placing aggregate material.
- C. Overlap geotextile fabric 18 inches minimum for unsewn lap joint. Overlap fabric 6 inches at seam for sewn joint.
- D. Do not permit traffic or construction equipment to travel directly on geotextile fabric.

- E. Place geotextile fabric in relatively smooth condition to prevent tearing or puncturing. Lay geotextile fabric loosely but without wrinkles or creases so that placement of the backfill materials will not stretch or tear geotextile fabric. Leave sufficient slack in geotextile fabric around irregularities to allow for readjustments.
- F. Patch all tears in geotextile fabric by placing additional section of geotextile fabric over tear with a minimum of 3 feet overlay.
- G. Extend the geotextile fabric and wrap around aggregate material along the perimeter of the foundation.

3.13 FIELD QUALITY CONTROL:

- A. See Section 01 40 00 for general requirements for field inspection and testing.
- B. Perform inspection at least once daily to confirm lift thickness and compaction effort for entire fill area.
- C. Perform particle size distribution and gradation analyses using ASTM D6913 and following standard practices in ASTM D421. Perform 1 test for every source and submit results to Engineer for acceptance. Repeat the moisture density test for every 5,000 cubic yards of material used.
- D. Perform field density testing in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- E. Evaluate field density test results in relation to maximum dry density as determined by testing material in accordance with ASTM D1557 (Modified Proctor).
- F. Perform tests in accordance with ASTM D4318 to determine Liquid Limit, Plastic Limit and Plasticity Index and submit test results to Engineer for acceptance. Minimum of one test per 5,000 cubic yard of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.
- G. Location of field density tests shall be as recommended by the Engineer.
- H. In the event compacted material does not meet specified in-place density, re-compact material and re-test area until specified results are obtained.
- I. Frequency of field density tests:

Table 31 23 00-4	
Area	Frequency
Roadways	1 per lift for each 250 linear feet of fill placed
Paved Areas	1 per lift for each 10,000 square feet of fill placed
Open Areas	1 per lift for each 25,000 square feet of fill placed
Isolated Footing Perimeter	1 per alternate lift for each 25 linear feet
Footing and Wall Backfill	1 per alternate lift for each 50 linear feet (both sides of wall)
Embankment Fills	1 per lift for each 5,000 square feet of fill placed
Regardless of the minimum testing frequency specified, field density tests shall be performed by the Contractor in sufficient number for the Contractor's quality control purposes to ensure that specified density is obtained.	

3.14 ADJUSTING:

A. Shrinkage:

1. Build embankments or backfill to a height above finished grade which will, in the opinion of the Engineer, allow for the shrinkage or consolidation of material. Initially, provide at all points, an excess of at least one percent of total height of backfill measured from stripped surface to top of finished surface.
2. Supply specified materials to build up low places when embankment or backfill settles below the finished grade at any time before substantial completion.

3.15 TOLERANCES:

- A. Construct finished surfaces to plus or minus 1 inch of the elevations indicated.
- B. Grade areas of cut and fill to plus or minus 0.20 foot of the grades indicated.
- C. Complete embankment edges to plus or minus 6 inches of the slope lines indicated.
- D. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

3.16 PROTECTION:

- A. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.

3.17 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 31 23 16 - ROCK EXCAVATION AND DISPOSAL

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide rock excavation and disposal as indicated and in compliance with Contract Documents.
- B. Remove and dispose of rock, and furnish acceptable material for backfill in place of excavated rock as indicated.
- C. Rock excavation shall be performed by any of the following methods typically used in the construction industry:
 - 1. Expansive agents or tools.
 - 2. Mechanical means.
 - 3. Combinations of the above.

1.02 DEFINITIONS:

- A. Rock: Solid mineral material that cannot be removed by a hydraulic excavator with a minimum manufacturer's operating weight of 41,000 pounds, 118 flywheel horsepower at 1800 rpm (Caterpillar E200 B EL equivalent or larger) and 2-foot wide heavy duty bucket with rock teeth.

1.03 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.
- B. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, backfill excess excavation, whether resulting from overbreakage or other causes, at no additional compensation and as specified in Part 3 - EXECUTION.

1.04 SITE CONDITIONS:

- A. Protect structures, underground utilities, and other construction from damaged caused by pile driving.
- B. Geotechnical Report: The report is for information only and is not part of the contract documents. Logs of borings are included in the report and indicate conditions encountered only at test boring locations. Nothing in the contract documents shall be construed as a guarantee that other materials will not be encountered or that proportion of materials will not vary from proportions shown on the logs of test borings.

PART 2 - PRODUCTS

2.01 EXPLOSIVE PRODUCTS:

- A. Not permitted.

2.02 CONCRETE:

- A. Section 03 30 00.

2.03 GRANULAR FILL:

- A. Sections 31 23 00 and 31 23 33.

PART 3 - EXECUTION

3.01 ROCK REMOVAL – MECHANICAL METHODS:

- A. Excavate and remove rock by the mechanical methods.
 - 1. Drill holes and utilize expansive agents, tools or wedges, mechanical disintegration compound to fracture rock.
- B. Cut away rock at bottom of excavation to form level bearing.
- C. Remove shaled layers to provide sound and unshattered base for footings and foundations.
- D. In utility trenches, excavate to 6 inch below invert elevation of pipe and 24 inch wider than pipe diameter.
- E. Remove excavated materials from site and reuse for site landscaping.
- F. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Sections 31 23 00 and 31 23 33 with lean concrete fill in accordance with Section 03 30 00 as specified.

3.02 PROCEDURE:

- A. Excavate rock in pipe trenches to no less than 6 inches below the proposed invert of the pipe. Backfill trench, before pipe is laid, to correct subgrade elevation. Use compacted, specified material indicated on drawings, or the material specified for bedding pipe to backfill excess excavation. Furnish and place at no additional compensation.
- B. Fill excess excavation below elevation of the top of bedding, cradle, or envelope when in pipe trenches with material of same type and placed and compacted in same manner as specified for bedding, cradle, or envelope.

- C. At option of Contractor, fill excess excavation in rock beneath foundations with concrete in accordance with Section 03 30 00.
- D. Remove shattered rock. If rock below normal depth is shattered due to operations of Contractor, and Engineer considers such shattered rock to be unfit for foundations, remove it and backfill excavation with concrete as specified, except that in pipe trenches, use granular fill for backfill. Do such removal and backfilling at no additional compensation.
- E. Remove dirt and loose rock, as directed, from designated areas and clean surface of rock using steam to melt snow and ice, if necessary. Remove water in depressions, so that whole surface of designated area can be inspected to determine whether seams or other defects exist.
- F. Roughen surfaces of rock foundations sufficiently, cut into benches or steps to bond well with masonry and embankments to be built thereon.
- G. Remove from the rock surface to remain all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Use picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means to accomplish this cleaning, and remove free water left on the surface of rock. Perform all of above before any masonry or embankment is built on or against rock.
- H. Remove piles of boulders or loose rock encountered within limits of earth embankments for disposal.
- I. Use excavated rock in backfilling trenches subject to following limitations:
 - 1. Do not use pieces of rock larger than permitted under subsection "Backfilling Pipe Trenches" of Section 31 23 33.
 - 2. Do not allow rock quantities used in backfill in any location to result in formation of voids.
 - 3. Do not place rock backfill within 16 inches of surface of finish grade.
- J. Backfill with material obtained from outside sources at no additional compensation, when material specified for backfilling is not available in sufficient quantity from other excavations.

3.03 CONTRACT CLOSEOUT:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide dewatering as indicated and in compliance with Contract Documents.
- B. Design, furnish, operate, maintain, and remove temporary dewatering systems to control groundwater and surface water to maintain stable, undisturbed subgrades, and permit work to be performed under dry and stable conditions. Work to be done as part of dewatering includes, but is not limited to:
 - 1. Lower the groundwater level.
 - 2. Lower hydrostatic pressure.
 - 3. Prevent surface water from entering the excavation during construction.
 - 4. Implement erosion control measures for disposing of discharge water.
- C. Groundwater within the excavation area shall be lowered to at least 2 feet below the lowest excavation levels as specified and as indicated.
- D. Common dewatering methods include, but are not limited to, sump pumping, deep wells, well points, vacuum well points, or combinations thereof.
- E. The Contractor shall obtain the required permits for discharge from the Contractor's dewatering systems in accordance with 40 CFR Part 122. The discharge location shall be in accordance with permit requirements.

1.02 REFERENCES:

- A. Code of Federal Regulations, Title 40 – Protection of Environment (CFR):
 - 1. 40 CFR Part 122: EPA Administered Permit Programs: The National Pollutant Discharge Elimination System.

1.03 SUBMITTALS:

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Qualification of the Contractor's dewatering specialist's or firm's qualifications a minimum of 4 weeks prior to dewatering work. The submittal shall include, but not be limited to:
 - a. Qualifications of specialist's or firm's Registered Professional Engineer.

- b. Qualifications of specialist's or firm's field representative who will oversee the installation, operation and maintenance of the dewatering system.
 2. Submit a dewatering plan at least 2 weeks prior to start of dewatering work. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:
 - a. Dewatering plan and details stamped and signed by a Registered Professional Engineer registered in the state where the project resides.
 - b. Certificate of Design: Refer to Section 01 30 00.
 - c. A list of equipment including, but not limited to, pumps, prime movers, and standby equipment.
 - d. Detailed description of dewatering, maintenance, and system removal procedures.
 - e. Erosion and sedimentation control measures, and methods for disposal of pumped water.
 - f. List of all applicable laws, regulations, rules, and codes to which dewatering design conforms.
 - g. List of assumptions for design of dewatering systems, including but not limited to groundwater levels, soil profile, permeabilities, and duration of pumping and or recharge.
 3. A modified dewatering plan if, within 24 hours, open pumping from sumps and ditches results in boils, loss of fines or softening of the ground.

1.04 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.
- B. Employ the services of a dewatering specialist or firm having the following qualifications:
 1. Have completed at least 5 successful dewatering projects of equal size and complexity and with equal systems within the last 5 years.
 2. Retain the services of a Registered Professional Engineer (in the state where the project is located) having a minimum of 5 years experience in the design of sump pumping, well points, deep wells, vacuum well points, or equal systems.

3. Retain the services of a field representative having a minimum of 5 years experience in installation of sump pumping, well points, deep wells, vacuum well points, or equal systems.
 - C. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Engineer, stabilize the subgrade, and modify system to perform as specified.
 - D. Notify the Engineer immediately if settlement or movement is detected on structures. If the settlement or movement is deemed by the Engineer to be related to the dewatering, take actions to protect the adjacent structures and submit a modified dewatering plan to the Engineer within 24 hours. Implement the modified plan and repair damage incurred to adjacent structures.
 - E. Immediately notify the Engineer if oil or other hazardous materials are encountered after dewatering begins.
- 1.05 HYDRAULIC UPLIFT OF STRUCTURES:
- A. The Contractor shall be responsible for the protection of all structures against hydraulic uplift until such structures have been accepted finally by the Owner.
 - B. In this regard, the Contractor is advised that all tanks when completed are designed to resist hydraulic uplift from groundwater up to the elevation indicated on the structural drawings when the structure is completed. The concrete slab bottoms shall be placed in the dry, with the use of well points or other dewatering means to keep the water elevation sufficiently low to carry on the work.
 - C. Buildings with basements are designed to resist hydraulic uplift from groundwater up to the elevation indicated on the structural drawings against the weight of the completed structure, including all masonry, structural steel frames and cladding.
- 1.06 PRECAUTIONS AGAINST HYDROSTATIC UPLIFT DURING CONSTRUCTION:
- A. The Contractor shall maintain a low groundwater elevation in the vicinity of the structures until they are complete. In case of extremely high water during construction of the structures, it may be necessary to flood the structures to maintain stable conditions.
- 1.07 DELIVERY STORAGE AND HANDLING:
- A. Comply with the requirements specified in Section 01 66 10.
- 1.08 SITE CONDITIONS:
- A. Existing Conditions:

1. Geotechnical Report: The report is for information only and is not part of the contract documents. Logs of borings are included in the report and indicate conditions encountered only at test boring locations. Nothing in the contract documents shall be construed as guarantee that other materials will not be encountered or that proportion of materials will not vary from proportions shown on the logs of test borings.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Provide settlement markers, piezometers and other geotechnical instruments in accordance with the submitted dewatering plan or as specified.
- B. Provide casings, well screens, piping, fittings, pumps, power and other items required for dewatering system.
- C. Provide sand and gravel filter around the well screen. Wrapping geotextile fabric directly around the well screen shall not be allowed.
- D. When deep wells, well points, or vacuum well points are used, provide pumping units capable of maintaining high vacuum and handling large volumes of air and water at the same time.
- E. Provide auxiliary dewatering equipment in the event of breakdown. Equipment shall consist of pumps and hoses and be stored on site. Provide at least 1 pump for every 5 pumps used.
- F. Provide and maintain erosion and sedimentation control devices as indicated or specified and in accordance with the dewatering plan.
- G. Provide temporary pipes, hoses, flumes, or channels for the transport of discharge water to the discharge location.
- H. Provide cement grout having a water cement ratio of 1 to 1 by volume.

3.01 INSTALLATION:

- A. Execution of earth excavation, installing earth retention systems, and dewatering shall not commence until the related submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed.
- B. Provide and maintain dewatering system in accordance with the dewatering plan.
- C. Carry out dewatering program in such a manner as to prevent undermining or disturbing foundations of existing structures or of work ongoing or previously completed.

- D. Do not excavate until the dewatering system is operational.
- E. Unless otherwise specified, continue dewatering uninterrupted until all structures, pipes, and appurtenances below groundwater level have been completed such that they will not be floated or otherwise damaged by an increase in groundwater elevation.
- F. Discontinue open pumping from sumps and ditches when such pumping results in boils, loss of fines, softening of the ground, or instability of the slopes. Modify dewatering plan and submit revised plan to the Engineer for approval.
- G. Where subgrade materials are disturbed or become unstable due to dewatering operations, remove and replace the materials in accordance with Section 31 23 00.
- H. Dewatering Discharge:
 - 1. Install and monitor systems in accordance with the submitted dewatering plan.
 - 2. Install sand and gravel filters in conjunction with well points and deep wells to prevent the migration of fines from the existing soil during the dewatering operation.
 - 3. Transport pumped or drained water to discharge location without interference to other work, damage to pavement, other surfaces, or property.
 - 4. Provide separately controllable pumping lines.
 - 5. The Engineer reserves the right to sample discharge water at any time.
 - 6. Immediately notify the Engineer if suspected contaminated groundwater is encountered. Do not pump water found to be contaminated with oil or other hazardous material to the discharge locations.
- I. Install and maintain erosion/sedimentation control devices at the point of discharge as indicated or specified and in accordance with the dewatering plan.
- J. Removal:
 - 1. Do not remove dewatering system without written acceptance from the Engineer.
 - 2. Backfill and compact sumps or ditches with granular fill wrapped with geotextile fabric in accordance with Section 31 23 00.
 - 3. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

3.02 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 31 23 33 - TRENCHING AND BACKFILL

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide trenching and backfill as indicated and in compliance with Contract Documents.
- B. Section includes:
 - 1. Trench excavation width and safety.
 - 2. Backfill materials and placement.
 - 3. Utility identification using marking tape and trace wire
 - 4. Soil and aggregate materials.
 - 5. Compaction and testing.

1.02 REFERENCES:

- A. American Association of State and Highway Transportation Officials (AASHTO) Publications:
 - 1. M147: Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.
- B. American Public Works Association (APWA):
 - 1. Public Works Management Practices Manual; latest edition.
- C. ASTM International (ASTM):
 - 1. C33: Specification for Concrete Aggregates.
 - 2. C150: Standard Specification for Portland Cement.
 - 3. D75: Standard Practice for Sampling Aggregates.
 - 6. D421: Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants.
 - 7. D1556: Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

8. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft³ (600 kN-m/m³)).
 9. D2167: Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 10. D2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
 11. D2419: Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 12. D2434: Standard Test Method for Permeability of Granular Soils (Constant Head).
 13. D2487: Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 14. D2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).
 15. D2940: Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
 16. D4318: Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
 17. D4832: Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
 18. D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
 19. D6938: Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- G. State Department of Transportation (DOT):
1. DelDOT Specifications: Delaware Department of Transportation, Standard Specifications for Road and Bridge Construction, most recent edition.
- H. Occupational Safety and Health Administration (OSHA) Standards and Regulations:
1. 29 CFR 1926, Subpart P: Safety and Health Regulations for Construction, Excavations.

1.03 CLASSIFICATION OF EXCAVATION:

- A. Excavation is part of the lump sum contract prices for the project. Excavation is not classified, except where rock excavation is authorized outside specified or indicated limits of excavation.

1.04 DEFINITIONS:

- A. Percent Compaction or Compaction Density: The field dry density of compacted material, expressed as a percentage of the maximum dry density.
- B. Field Dry Density or Field Density: In-place density as determined by ASTM D1556 (Sand Cone Method), ASTM D2167 (Rubber Balloon Method), or ASTM D6938 (Nuclear Method).
- C. Maximum Dry Density: Laboratory density as determined by ASTM D1557 (Modified Proctor) and occurring at the optimum moisture content of the soil being tested.
- D. Pipe Embedment: Comprised of the following or combination thereof:
 - 1. Foundation: Required only when the native trench bottom does not provide a firm working platform or the necessary uniform and stable support for the install pipe.
 - 2. Bedding: Placed directly underneath the pipe and brings the trench bottom to grade. Provides a firm, stable, and uniform support of the pipe.
 - 3. Haunching: From bottom of pipe to springline.
 - 4. Initial Backfill: From top of bedding to 6 inches above top of pipe, unless noted otherwise.
 - 5. Final Backfill: Above the initial backfill to the original or finish grade or to a level below that required for the trench restoration area.
 - 6. Backfill: Includes initial and final backfill.

1.05 SUBMITTALS:

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Temporary excavation and shoring drawings for worker protection in accordance with the General Conditions.
 - 2. Gradation analysis.
 - 3. Materials Sources: Name of source, location, date of sample, sieve analysis, and laboratory compaction characteristics.

4. Test and Evaluation Reports:

- a. Field density testing reports: Provide results from field density testing of prepared subgrade and compacted fill.
- b. Grain-size analysis.
- c. Laboratory compaction characteristics of soils.
- d. Water content.

1.06 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.
- B. Sample backfill materials in accordance with ASTM D75.
- C. Testing will be provided by the Owner as specified. Contractor shall be responsible for cost of testing and inspection conducted as a result of non-conforming work.
- D. Provide testing in accordance with Part 3 of this section.
 1. Employ an independent testing laboratory with the following qualifications: Accreditation by the American Associates of State Highway and Transportation Officials (AASHTO) Accreditation Program.
 2. Minimum of three years experience in sampling, testing and analysis of soil and aggregates, and monitoring field compaction operations. Minimum of three references from previous work.
- E. Protect excavations by shoring, bracing, sheet piling, underpinning or other methods required to prevent cave-in of loose soil. Protection shall be in accordance with OSHA 29 CFR 1926, Subpart P.

1.07 DELIVERY STORAGE AND HANDLING:

- A. Comply with the requirements specified in Section 01 66 10.

1.08 SITE CONDITIONS:

- A. Existing Conditions:
 1. Geotechnical Report: The report is for information only and is not part of the contract documents. Logs of borings are included in the report and indicate conditions encountered only at test boring locations. Nothing in the contract documents shall be construed as guarantee that other materials will not be encountered or that proportion of materials will not vary from proportions shown on the logs of test borings.

PART 2 - PRODUCTS**2.01 BACKFILL MATERIALS:**

- A. Suitable Material: Material from on-site excavation or permitted off-site sources that meets all of the specified requirements for its intended use and is not unsuitable. Wet subgrade material which meets other requirements for suitable material is suitable.
- B. Unsuitable Material: Material that fails to meet requirements for suitable materials; or contains any of the following:
 - 1. Organic clay, organic silt, or peat; as defined in ASTM D2487 and visually determined in ASTM D2488.
 - 2. Vegetation, wood, roots, leaves, and organic, degradable material.
 - 3. Stones or rock fragments over 6 inches in any dimension.
 - 4. Porous biodegradable matter, excavated pavement, construction debris, rubbish, or refuse.
 - 5. Ice, snow, frost, or frozen soil particles.
- C. Bedding: ASTM C33, coarse aggregate, No. 7; depth of 4 inches minimum, 6 inches maximum.
- D. Initial Backfill: ASTM C33, coarse aggregate, No. 7.
- E. Final Backfill:
 - 1. More than 3'-0" from Edge of Roadway/Paving: Suitable, unclassified material excavated from trench; free of rocks with dimensions greater than 1/2 the compacted lift; and rocks provide less than 50 percent of the final backfill volume.
 - 2. Under Roadway/Paving: Type C per DelDOT Standard Specifications Section 1001.
- F. Granular Fill:
 - 1. Open Graded: ASTM C33, coarse aggregate, No. 57.
- G. Sand: Fine aggregate resulting from natural or manufactured processes within the gradation limits of DelDOT Standard Specifications Section 1003.
- H. Select Borrow:
 - 1. Well-graded, coarse-grained soil; classified in accordance with ASTM D2487 as GW, GW-GM, GW-GC, SW, SW-SM, or SW-SC.

2. Soil particles: ASTM C33, physical property requirements.
3. Gradation: Table 31 23 33-2.

Table 31 23 33-2	
Sieve Designation (Square Mesh)	Percentage Passing (By Weight)
3 inches (75 mm)	100
1-1/2 inches (37.5 mm)	70-100
3/4 inches (19.0 mm)	50-85
No. 4 (4.75 mm)	30-60
No. 50 (300 micrometers)	10-25
No. 200 (75 micrometers)	0-5

2.02 EQUIPMENT:

- A. Compaction equipment shall be capable of consistently achieving the specified compaction requirements.

2.03 UTILITY IDENTIFICATION:

- A. Trace Wire: Continuous, single-strand copper wire, insulated, maximum 12 AWG. Clear plastic covering, imprinted with inscription describing specific utility in large letters.
- B. Marking Tape: Use type specifically manufactured for marking and locating underground utilities. Acid- and alkali-resistant polyethylene film, 6 inches (150 mm) wide with minimum thickness of 0.004 inch, minimum strength of 1,750 psi lengthwise and 1,500 psi crosswise. Provide tape manufactured with foil core at least 0.35-mil thick to enable detection by metal detection when tape is buried up to 3 feet deep. Tape shall bear continuous printed inscription describing specific utility. Tape color shall follow APWA Color Codes.

2.04 GEOTEXTILE:

- A. In accordance with Section 31 05 19.13.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify that dewatering support systems are in place before commencing with excavation.

- B. Verify that excavation safety and support systems meeting the requirements of OSHA 29 CFR 1926, Subpart P are in place before commencing with excavation.
- C. Verify that fill materials submittals have been accepted by Engineer before commencing with work requiring the use of these materials.
- D. Verify that erosion and sediment control measures are in place and functioning properly.
- E. Immediately notify the Engineer if unexpected subsurface facilities or suspected hazardous materials are encountered during excavation. Discontinue affected work in area until notified to resume work.
- F. Test Pits:
 - 1. Comply with the requirements in Section 01 14 00.
 - 2. Excavate test pits to field verify the locations of existing underground utilities at crossings and at tie-in points before ordering materials or commencing excavation. Immediately notify the Engineer if conflicts are encountered.
 - 3. Notify utility owners and Engineer at least 72 hours before digging operations are scheduled to begin.

3.02 PREPARATION:

- A. Underpin adjacent structures that could be damaged by excavation work.
- B. Cut pavement with saw or pneumatic tools to prevent damage to remaining pavement. Dispose of large pieces of demolished pavement before proceeding with excavation.
- C. Remove subsurface structures and related obstructions as necessary to complete the Work.
- D. Remove boulders within excavation limits.

3.03 PROTECTION OF IN-PLACE CONDITIONS:

- A. Comply with the requirements specified in Section 01 14 00.
- B. Support and protect from damage – existing pipes, poles, wires, fences, curbs, property line markers, and other features or structures which must be preserved in place to avoid being temporarily or permanently relocated.
- C. Excavation Near Existing Structures:
 - 1. Discontinue digging by machinery when excavation approaches pipes, conduits, or other underground structures. Continue excavation by use of hand tools. Include such manual excavation in work to be done when incidental to normal excavation and under items involving normal excavation.

2. Excavate test pits near, or at intersection with, existing utilities or underground structures to determine the exact location of existing features.

3.04 RESTORATION:

- A. Restore private property and structures promptly. Begin restoration work within 24 hours of when damage occurred.
- B. Existing surfaces, features, or utilities that are to remain but are damaged during construction shall be repaired or replaced to at least the condition in which they were found immediately before work began, unless noted otherwise.
- C. Damaged Trees To Remain: Cut all damaged branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint. Replace damaged trees which subsequently die or continue to show lack of growth due to damage, within one year after substantial completion.
- D. Cultivated Vegetation: Includes, but is not limited to: hedges, shrubs, and plants. Vegetation that is damaged shall be replaced with equal kind and of at least the quality before work began.

3.05 TRENCH EXCAVATION:

- A. Provide dewatering system to allow for working conditions in dry, stable soil. Properly dispose of water to avoid damage to property and in accordance with laws and regulations. Lower groundwater table prior to excavation and keep a minimum of 24 inches below lowest excavation subgrade until structure has sufficient strength to withstand soil and water pressures.
- B. Preserve material below and beyond the lines of excavations.
- C. Locate stockpiled excavated material at least 3 feet from edge of excavations to prevent cave-ins or bank slides.

3.06 AUTHORIZED OVER-EXCAVATION:

- A. Remove rock for a depth of 6 inches and backfill with bedding material.

3.07 UNAUTHORIZED EXCAVATION:

- A. Contractor is responsible for backfilling unauthorized excavations with bedding material.

3.08 BACKFILL:

- A. Fill to lines and grades necessary to provide finish grades.

- B. Use a placement method that does not disturb or damage other work or existing features.
- C. Maintain fill materials within 3 percent of optimum moisture, to attain required compaction density.
- D. Place and compact material in equal continuous layers.
- E. Maximum compacted depth is 6 inches for aggregate materials and 8 inches for soil materials, unless noted otherwise.

3.09 COMPACTION:

- A. Compact to density specified and indicated for various types of material. Control moisture content of material being placed as specified, or if not specified - at a level slightly lower than optimum.
- B. Compaction Density: Provide trench backfill densities according to Table 31 23 33-3. The values listed are minimum percentages, unless noted otherwise.

Table 31 23 33-3	
Area	Percentage of Maximum Dry Density as defined by ASTM D1557 (Modified Proctor)
Trench Backfill (under pavement, slabs)	95
Trench Backfill (under structures or within 25 feet (7.5 m) of structures)	95
Trench Backfill (through embankment)	98
Trench Backfill (under exterior concrete slab and sidewalks)	90
Trench Backfill (in open or grassed areas)	85

3.10 UTILITY IDENTIFICATION:

- A. Install marking tape over all site utilities, 12 inches below finish grade.
- B. Install trace wire at top center; pull wire taut to remove any slack.
- C. Extend trace wire to utility boxes, manholes and junctions to allow for connection to subsurface location equipment.

3.11 FIELD QUALITY CONTROL:

- A. See Section 01 40 00 for general requirements for field inspection and testing.

- B. Compaction shall be deemed to comply with the specifications when no more than 1 test falls below the specified relative compaction. The Contractor shall pay the costs for any retesting or additional testing of work not conforming to the specifications.
- C. Where compaction tests indicate a failure to meet the specified compaction, the Owner will take additional tests every 25 feet (7.5 m) in each direction until the extent of the failing area is identified. Rework the entire failed area until the specified compaction has been achieved.
- D. Perform particle size distribution and gradation analyses using ASTM D6913 and following standard practices in ASTM D421. Perform 1 test for every source and submit results to Engineer for acceptance. Repeat the moisture density test for every 5,000 cubic yard of material used.
- E. Perform field density testing in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- F. Evaluate field density test results in relation to maximum dry density as determined by testing material in accordance with ASTM D1557 (Modified Proctor).
- G. Perform tests in accordance with ASTM D4318 to determine Liquid Limit, Plastic Limit and Plasticity Index and submit test results to Engineer for acceptance. Minimum of one test per 5,000 cubic yards of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.
- H. Location of field density tests shall be as recommended by the Engineer.
- I. Frequency of field density tests:

Table 31 23 33-4	
Area	Frequency
Trench (Structural Areas)	1 per lift for each 250 linear feet of trench
Trench (Non-Structural Areas)	1 per lift for each 500 linear feet of trench
Regardless of the minimum testing frequency specified, field density tests shall be performed by the Contractor in sufficient number for the Contractor's quality control purposes to ensure that specified density is obtained.	

- J. Owner may retain the services of an independent testing laboratory to conduct confirmatory testing and inspection.

3.12 ADJUSTING:

- A. Shrinkage:

1. Backfill to a height above finished grade which will allow for the shrinkage or consolidation of material. Initially, provide at all points, an excess of at least one percent of total height of backfill measured from stripped surface to top of finished surface.
2. Supply specified materials and build up low places, without additional cost if embankment or backfilling settles so as to be below the indicated level for proposed finished surface at any time before final acceptance of the work.

3.13 PROTECTION:

- A. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.

3.14 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 31 50 00 – EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide excavation support systems as indicated and in compliance with Contract Documents.
- B. Design, furnish and install excavation support systems to maintain lateral support, prevent loss of ground, limit soil movements to acceptable limits and protect from damage existing and proposed improvements including pipelines, utilities, structures, roadways, railroads and other facilities.
- C. The requirement of specified excavation support systems in areas indicated on the drawings does not relieve the Contractor from the responsibility of furnishing and installing proper temporary excavation support systems in other areas.
- D. Common types of excavation support system include, but are not limited to; singular or multiple stages comprised of cantilevered or internally braced soldier piles and lagging, steel sheetpile wall, timber sheetpile wall, trench box, or combinations thereof. Trench box temporary excavation support system is only acceptable for pipe or utility trench excavations approved by the Engineer. Temporary unsupported open cut excavation with stable sloping sides is allowed where applicable.
- E. Extraction of steel sheetpile wall, timber sheetpile wall, or soldier piles are not permitted unless otherwise indicated, specified or approved by the Engineer.
- F. Wherever the word "sheeting" is used in this section or on the contract drawings, it shall be in reference to any type of excavation support system specified except trench box.
- G. Construction of the excavation support systems shall not disturb the existing structures or the completed proposed structures. Damage to such structures shall be repaired at Contractor's expense.
- H. Adjacent structures are those that are bear upon soils above the proposed excavation depth and within a distance equal to twice the total depth of the excavation away from the closest edge of the excavation. Monitor and protect adjacent structures as specified and indicated.
- I. Vibration monitoring for excavation support systems shall be performed as specified in Section 02 32 14.
- J. Construction operations not to exceed specified noise limits in accordance with Section 22.02.008 of the New Castle County Code.

- K. Bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval or cave-ins as a result of improper installation, maintenance or design of the excavation support systems. Pay for all claims, costs and damages that arise as a result of the Work performed at Contractor's expense.

1.02 REFERENCES:

- A. American Concrete Institute (ACI):

- 1. 304: Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

- B. ASTM International (ASTM):

- 1. A36: Standard Specification for Structural Steel.
 - 2. A416: Standard Specification for Strand Steel, Uncoated Seven Wire for Prestressed Concrete.
 - 3. A572: Standard Specification for High-Strength Low Alloy Columbium-Vanadium Structural Steel.
 - 4. A615: Standard Specifications for Deformed and Plain Billet Steel Bars for Concrete Reinforcement
 - 5. A722: Specification for Uncoated High Strength Steel Bar for Prestressing Concrete

- C. American Wood-Preserves Association (AWPA) Standards.

- 1. P23-10: Standard for Chromated Copper Arsenate Type C (CCA-C).
 - 2. P50-10: Standard for Fire Retardant FR-2 (FR-2).

- D. American Welding Society (AWS)

- 1. D1.1: Structural Welding Code.

- E. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29: Part 1926 Subpart P - Excavations.

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00.

- 1. Submit the following qualifications four (4) weeks prior to the construction:
 - a. Qualifications of Contractor's excavation support system designer as specified in Paragraph 1.04.G.

- b. Qualifications of Contractor's excavation support system installer as specified in Paragraph 1.04.H.
 - c. Qualifications of Contractor's independent tieback testing laboratory as specified in Paragraph 1.04.I, if a tieback system is utilized.
 - d. Qualifications of Contractor's excavation support system installation supervisor as specified in Paragraph 1.04.J.
 - e. Qualifications of vacuum excavation subcontractor as specified in Paragraph 1.04.F, if DMPs for utilities are utilized.
2. Submit an excavation support plan stamped and signed by a Registered Professional Engineer at least two weeks prior to start of the construction. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor remains responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include the following items as a minimum:
- a. Proposed excavation support system(s), details, location, layout, depths, extent of different types of support relative to existing features and the permanent structures to be constructed, and methods and sequence of installation and removal.
 - b. Certificate of Design: Refer to Section 01 33 00.
 - c. A list of all design assumptions, including safety factors used for the excavation support system(s) and all lateral pressures used for each system.
 - d. If utilizing a tieback system, include tieback installation procedures and criteria for acceptance of tiebacks for performance and proof tests. Submit the tieback testing results to the Engineer for information only.
 - e. Requirements of dewatering during the construction.
 - f. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.
 - g. List of equipment used for installing the excavation support systems.
 - h. Monitoring schedule, installation procedures and location plans for vibration/noise monitoring, geotechnical instrumentation (deformation monitoring points and inclinometers) and observation wells/piezometers to monitor ground, excavation support system, adjacent structures and groundwater fluctuation during the entire construction period.

3. Submit a Construction Contingency Plan specifying the methods and procedures to maintain excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.
4. Monitoring data within one (1) day of data collection from vibration and noise recording equipment, observation wells, deformation monitoring points and offset lines. Data shall include:
 - a. Horizontal and vertical movements of geotechnical instruments and groundwater readings.
 - b. New movements since the initial readings of the geotechnical instruments.
 - c. Weekly summary in tabular and graphic form at the end of each week.
 - d. A schematic plan of excavation and/or relevant construction activities at the time of monitoring.
5. For excavation support systems left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:
 - a. Survey locations of the excavation support systems, including coordinates of the ends and points of change in direction.
 - b. Type of the excavation support system.
 - c. Elevations of top and bottom of the excavation support systems left in place.

1.04 QUALITY ASSURANCE:

- A. Provide in accordance with Section 01 40 00.
- B. Conform to the requirements of the OSHA Standards and Regulations: "Part 1926 Subpart P - Excavations".
- C. Construction operations to conform to noise regulations provided in the Noise Control Plan and this Section.
- D. Retain the services of an independent vibration consulting firm meeting the requirements as specified in Section 02 32 14.
- E. The peak particle velocity for pile driving, or other vibration-inducing operations, shall meet the requirements as specified in Section 02 32 14.
- F. If utilizing deformation monitoring points (DMPs) for utilities, vacuum excavation shall be performed by subcontractor having five (5) years of experience in non-destructive vacuum excavation methods for utilities.

- G. Prepare design, including calculations and drawings, under the direction of a Professional Engineer registered in the state where the project is located and having the following qualifications:
 - 1. Not less than ten (10) years experience in the design of specific excavation support systems to be used.
 - 2. Completed not less than five (5) successful excavation support system projects of equal type, size, and complexity within the last five (5) years.
- H. Excavation Support System Installer's Qualifications:
 - 1. Not less than three (3) year experience in the installation of similar types and equal complexity as the proposed system.
 - 2. Completed not less than three (3) successful excavation support systems of similar type and equal complexity as the proposed system.
- I. If utilizing a tieback system, employ an independent testing laboratory to test the tieback system with the following qualifications:
 - 1. Be accredited by the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program.
 - 2. Employ personnel conducting testing who are trained in the methods and procedures to test and monitor tieback systems of similar type and equal complexity, as the proposed system.
 - 3. Have not less than five (5) years experience in testing of tieback systems of similar type and equal complexity as the proposed system.
 - 4. Have successfully tested at least three (3) tieback systems of similar type and equal complexity as the proposed system.
- J. Install all excavation support systems under the supervision of a supervisor having the following qualifications:
 - 1. Not less than five (5) years experience in installation of systems of similar type and equal complexity as the proposed system.
 - 2. Completed at least five (5) successful excavation support systems of similar type and equal complexity as the proposed system.
- K. All welding shall be performed in accordance with AWS D1.1.

1.05 DESIGN CRITERIA:

- A. Design of excavation support systems shall meet the following minimum requirements:
 - 1. Support systems shall be designed for earth pressures, hydrostatic pressure, equipment, temporary stockpiles, construction loads, roadways, railroads, and other surcharge loads.
 - 2. Design a bracing system to provide sufficient reaction to maintain stability.
 - 3. Limit movement of ground adjacent to the excavation support system to be within the allowable ground deformation as specified.
 - 4. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of braced temporary excavation support systems shall not be less than 5 feet below the bottom of the excavation.
 - 5. Design excavation support systems to withstand an additional 2 feet of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.
 - 6. Maximum width of pipe trench excavation shall be as indicated on the drawings.
 - 7. Do not cast permanent structure walls directly against excavation support walls.
 - 8. The design location of the excavation support wall shall be determined such that the installed wall and bracing system components are all located outside the limits of the permanent structure. Construction tolerances (e.g. wall verticality) shall be considered in determining the plan location.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Provide in accordance with Sections 01 66 10 and as specified.
- B. Store sheeting and bracing materials to prevent sagging which would produce permanent deformation. Keep concentrated loads which occur during stacking or lifting below the level which would produce permanent deformation of the material.

1.07 SITE CONDITIONS:

- A. Existing Conditions:
 - 1. Geotechnical Report: The report is for information only and is not part of the contract documents. Logs of borings are included in the report and indicate conditions encountered only at test boring locations. Nothing in the contract documents shall be construed as guarantee that other materials will not be

encountered or that proportion of materials will not vary from proportions shown on the logs of test borings.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop and accessory steel shapes shall conform to ASTM A36.
- B. Steel Sheet Piling: ASTM A572, continuous interlocking type.
- C. Timber Lagging Left in Place: Pressured treated per AWWA standards.
- D. Tieback Tendons: Tieback tendons shall be high strength steel wire strand cables conforming to ASTM A416, or bars conforming to ASTM A722. Splicing of individual cables shall not be permitted.
- E. Raker Ties: ASTM A615 Grade 60.
- F. Cement Grout Materials And Admixtures For Tieback Anchorages: Grout cube strength shall be a minimum 3500 psi at 7 days and 5000 psi at 28 days.
- G. Concrete: Section 03 30 00.
- H. Tamping tools adapted for backfilling voids after removal of the excavation support system.
- I. Provide specific trench box sizes for each pipe and utility excavation with structural capacity of retaining soil types as described in OSHA's 29 CFR Part 1926 Subpart P.

2.02 EQUIPMENT:

- A. A vibratory hammer shall be utilized for driving the sheet piling providing that such operations do not exceed vibration/noise requirements of the specifications. Impact hammer shall be utilized when vibratory hammer is unable to drive sheet piling to required depth and/or unable to meet vibration requirements. Impact hammer shall also meet noise requirement.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Installation of the excavation support systems shall not commence until the related earth excavation and dewatering submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed.

- B. Install excavation support systems in accordance with the excavation support plan.
- C. If utilizing a tieback system, all performance and proof tests shall be conducted in the presence of the Engineer. Testing performed without the Engineer present is considered invalid. Repeat testing in the Engineer's presence at Contractor's expense.
- D. Do not drive sheeting within 100 feet of concrete less than seven (7) days old.
- E. Carry out program of excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures of Work ongoing or previously completed.
- F. Bottom of the trench box excavation support system shall be above the pipe invert prior to installing the pipe.
- G. Install and read geotechnical instrumentation in accordance with the excavation support plan. Notify the Engineer immediately if any geotechnical instrumentation is damaged. Repair or replace damaged geotechnical instrumentation at the sole option of the Engineer and at Contractor's expense.
- H. Continuously monitor movements of the ground adjacent to excavation support systems and adjacent structures. In events of the measured movements approaching or exceeding the allowable movements, take immediate steps to arrest further movement by revising procedures such as providing supplementary bracing, filling voids behind the trench box, supporting utilities or other measures (Construction Contingency Plan).
- I. Notify utility owners if existing utilities interfere with the excavation support system. Modify the existing utility with the utility owner's permission or have the utility owner make the modifications at Contractor's expense.

3.02 GROUND DEFORMATION ADJACENT TO EXCAVATION SUPPORT SYSTEMS:

- A. Allowable Vertical (heave/settlement) and Lateral Movements: 2 inches maximum for the trench box excavation support system, and 1 inch maximum for other types of excavation support systems at any location behind the excavation support system.
- B. Monitoring personnel shall use a procedure for reading and recording geotechnical instrumentation data which compares the current reading to the last reading during data collection to eliminate spurious readings.
- C. Plot the observed ground deformation readings versus time. Annotate the plots with construction loading and excavation events having an impact on the readings. Evaluate plots by means of secondary rate-of-change plots to provide early warning of accelerating ground movements.
- D. Notify the Engineer when the allowable ground deformation is exceeded.

- E. Implement Construction Contingency Plan under direction of the temporary excavation support system designer and the Engineer.

3.03 REMOVAL OF EXCAVATION SUPPORT SYSTEMS:

- A. Sheet piling shall be left in place unless otherwise indicated.
- B. When indicated, remove the excavation support system without endangering the constructed or adjacent structures, utilities, or property. Immediately backfill all voids left or caused by withdrawal of excavation support systems with bank-run gravel, screened gravel or select borrow by tamping with tools specifically adapted for that purpose.
- C. When tiebacks are used, release tension in tiebacks as the excavation is backfilled. Do not leave tensioned tieback in place at the completion of the Work.
- D. The excavation support system left-in-place shall be cut-off a minimum of 2 feet below the bottom of the next higher foundation level or a minimum of 5 feet below finished grade.
- E. Conduct survey of the locations and final cut-off elevations of the excavation support systems left in place.

3.04 CONTRACT CLOSEOUT:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 32 12 00 - FLEXIBLE PAVING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide flexible paving as indicated and in compliance with Contract Documents.

1. Scope includes:

- a. Aggregate base course.
- b. Asphalt concrete pavement.

1.02 REFERENCES:

- A. American Association of State Highway and Transportation Officials (AASHTO):

1. M147: Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses.
2. M226: Standard Specification for Viscosity-Graded Asphalt Cement.
3. M320: Standard Specification for Performance-Graded Asphalt Binder.
4. T89: Standard Method of Test for Determining the Liquid Limit of Soils.
5. T90: Standard Method of Test for Determining the Plastic Limit and Plasticity Index of Soils.
6. T99: Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop.
7. T104: Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

- B. ASTM International (ASTM):

1. C125: Standard Terminology Relating to Concrete and Concrete Aggregates.
2. D242: Standard Specification for Mineral Filler For Bituminous Paving Mixtures.
3. D946: Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
4. D977: Standard Specification for Emulsified Asphalt.
5. D2027: Standard Specification for Cutback Asphalt (Medium-Curing Type).

6. D3381: Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

7. D6373: Standard Specification for Performance Graded Asphalt Binder.

C. State Department of Transportation (DOT):

1. DelDOT Specifications: Delaware Department of Transportation, Standard Specifications for Road and Bridge Construction, current edition.

1.03 DEFINITIONS:

A. Gravel: Coarse aggregate resulting from natural disintegration and abrasion of rock or processing of weakly bound conglomerate.

B. Crushed Gravel: The product resulting from the artificial crushing of gravel with substantially all fragments having at least one face resulting from fracture.

C. Crushed Stone: The product resulting from the artificial crushing of rocks, boulders, or large cobblestones, substantially all faces of which have resulted from the crushing operation.

1.04 SUBMITTALS:

A. Submit the following shop drawings in accordance with Section 01 33 00.

1. Sustainable Design Submittals.

B. Test Results:

1. Base course testing results.

C. Submit haul route, procedures, and schedule of operation times.

1.05 QUALITY ASSURANCE:

A. Comply with the requirements specified in Section 01 40 00.

B. Sustainability Standards Certifications.

C. Codes and Standards: Comply with the latest edition of State highway or transportation department standard specifications and with local governing regulations.

1.06 DELIVERY STORAGE AND HANDLING:

A. Comply with the requirements specified in Section 01 66 10.

B. Transport bituminous mixtures in covered trucks whenever:

1. Rainy weather, or
 2. Air temperature is less than 60 degrees F (16 degrees C).
- C. Adjust weight, type, capacity, haul routes, and method of operation of hauling vehicles so that:
1. No damage results to existing streets, subgrade or base course, and
 2. Noise and air pollution levels are not noticeably increased along selected haul route.
- D. Haul routes through residential areas shall be avoided.
- E. Submit haul route, procedures for transport, and schedule of operation times to Owner for acceptance.
- 1.07 PROJECT CONDITIONS:
- A. Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 degrees F (10 degrees C), and when temperature has not been below 35 degrees F (1 degrees C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
- B. Place asphalt concrete surface course when atmospheric temperature is above 40 degrees F (4 degrees C), and when base is dry. Place binder course when air temperature is above 30 degrees F (-1 degrees C), and rising.

PART 2 - PRODUCTS

2.01 AGGREGATE MATERIALS:

- A. According to AASHTO M147, unless noted otherwise.
- B. Aggregate, including blended filler, shall have:
1. Liquid limit (LL) of not more than 25 as determined by AASHTO T89.
 2. Plasticity index (PI) of not more than 6 as determined by AASHTO T90.
- C. At least 45 percent, by count, of number of particles of aggregate retained on No. 4 (4.75 mm) sieve shall have at least one fractured face.
- D. Remove oversized material by screening or crushing to required sizes.
- E. Soundness: AASHTO T104, 5 cycles: No greater than 18 percent weight loss.
- F. Filler for Blending:

1. Use filler for meeting gradation requirements or for satisfactory binding of material. Uniformly blend with base course material at screening plant [or on road].
2. Obtain material from sources accepted by Engineer.
3. Material shall be free of agglomerations or lumps, and contain no more than 15 percent of material retained on No. 4 (4.75 mm) sieve.

2.02 AGGREGATE BASE COURSE:

- A. Gradation: Within limits of DelDOT Specifications, Section 1005 Type B.

2.03 PAVEMENT MATERIALS

- A. Asphaltic Materials:

1. Asphalt Cement:
 - a. Performance Grade: AASHTO M320, ASTM D6373
(1) PG 64-22
2. Tack Coat: DelDOT Standard Specifications Section 1011.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Check subgrade as to soundness, outline, and contour.

3.02 SUBGRADE PREPARATION:

- A. Scrape down subgrade bumps and irregularities to obtain smooth, even surface.
- B. Proof roll as specified in Section 31 23 00.
- C. Remove and replace soft or spongy areas as specified in Section 31 23 00.

3.03 PAVEMENT PREPARATION:

- A. Remove loose material from compacted base course immediately before applying herbicide treatment or prime coat.
- B. If base course becomes rutted, loose or uneven due delays in placing subsequent courses then proof roll prepared surface to check for unstable areas. Provide additional compaction or remove unstable areas, backfill and compact. Do not begin paving work until deficient areas have been re-graded and corrected and are ready to receive paving.

- C. Tack Coat: Apply tack coat in accordance with DelDOT Standard Specifications, Section 401.

3.04 BASE COURSE INSTALLATION:

- A. Place materials when surface is dry and atmospheric temperature is above 40 degrees F (4.4 degrees C).
- B. Construct in two or more layers of approximate equal lifts; maximum compacted lift is 6 inches (15 cm).
- C. Layers placed upon loose sand subgrade, prone to displacement while compacting, shall be placed in a single compacted lift of 8 inches (20 cm).
- D. Deposit material on foundation or previously placed layer to minimize segregation and facilitate spreading to uniform layer.
- E. If blending of materials is done on roadway, inter-mix aggregate and blending material by blade graders, discs, harrows or other equipment to produce uniform distribution or gradation throughout finished mixture. Avoid excessive manipulation or mixing which will cause segregation between coarse and fine materials.
- F. Place and spread each layer to thickness, width, and contour.
- G. Compact each layer before proceeding to subsequent layers. Refer to Section 31 23 00 for required compaction and testing requirements.
- H. Prior to and during compaction shape material and maintain to dimensions and contour. Keep surface of each layer true and smooth.

3.05 PLACING MIX:

- A. Place asphalt pavement in accordance with DelDOT Standard Specifications, Section 401.

3.06 ROLLING:

- A. General: Begin rolling when mixture will bear roller weight without excessive displacement. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.
- C. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

- D. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
- E. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

3.07 FIELD QUALITY CONTROL:

A. Base Course Testing:

- 1. Optimum Moisture Content and Maximum Density: Comply with AASHTO T99, Method C, with replacement of fraction of aggregate retained on 3/4 inch (19 mm) sieve. Replace with No. 4 (4.75 mm) to 3/4 inch (19 mm) material.

B. Pavement Testing:

- 1. General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving.
- 2. Thickness Tolerances: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:
 - a. Base Course Thickness: Less than 1/4-inches (6 mm), plus or minus.
 - b. Surface Course Thickness: Less than 1/4-inches (6 mm), plus or minus.
- 3. Surface Smoothness Tolerances: Test finished surface of each asphalt concrete course for smoothness, using 10-foot (3-meter) straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding following tolerances for smoothness.
 - a. Binder Course: 1/4-inches (6 mm).
 - b. Surface Course: 1/8-inches (3 mm).
 - c. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template, 1/4 inches (6 mm).
 - d. Profile and Section: Variation from true shall not exceed +/- 3/8-inches (9.5 mm).

3.08 PROTECTION:

A. After final rolling:

1. Do not permit vehicular traffic on pavement until it has cooled and hardened.
2. Protect paving from traffic until mixture has cooled enough not to become marked.

3.09 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 32 90 10 - PLANTING

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide for establishment of permanent vegetation.
- B. Provide topsoiling, fertilizing, seeding, planting and related work as indicated and specified.
- C. Trees, shrubs, ground cover, and perennials.
- D. Repairing existing areas damaged by Work.

1.02 REFERENCES:

- A. Comply with local landscaping ordinance or state standard.
- B. Comply with American National Standards Institute (ANSI) Z60.1-2004 American Standard for Nursery Stock.
- C. ASTM International (ASTM):
 - 1. D5268: Standard Specification for Topsoil Used for Landscaping Purposes.
 - 2. D5435: Standard Test Method for Plant Growth and Food Chain Protection.

1.03 SUBMITTALS:

- A. Product Data:
 - 1. Provide data on all seed mixes with certified statement of weight, composition, mixture, percentage of purity, and germination as verification that the proper materials and volumes have been used. Include seed list naming seeds, pounds per acre, and supplier's name, address and phone number.
 - 2. Product Data, rates of application, and anticipated uses of pesticides, herbicides, and fumigants.
 - 3. Certificates concerning seed mixture, purity, germinating value, and crop year identification.
- B. Certify invoice for each shipment free of disease, mold, and insect pests. Submit certificates to Engineer.
- C. Samples:

1. When specified, submit samples and certified analyses by recognized laboratory approved by Engineer for topsoil, humus, fertilizer, fungicide, insecticide, tree paint, and anti-desiccant before delivery. Manufacturer's analysis for standard products will be acceptable.
2. When specified submit samples of soil separation matting, erosion control matting, natural fiber material, and/or geosynthetic liners.
3. Approval shall not be construed as final acceptance. Engineer may take samples of materials delivered to site and analyze them for compliance with Specifications.

D. Miscellaneous:

1. Prior to end of maintenance period, furnish 2 copies of typed maintenance instructions recommending procedures to be established by Owner for maintenance of landscape Work for one year.
2. Inspection certificates required by federal, state or other governing agency shall accompany each shipment.
3. Shop drawings showing locations and depths of agronomic soil samples collected.

E. Submit in accordance with Section 01 33 00.

1.04 QUALITY ASSURANCE:

A. Qualifications:

1. Subcontractor shall have specialized equipment and experience for hydroseeding. Hydroseeding will be warranted by the Contractor for a period of 1 year. Maintenance will occur every 6 months at a minimum.

B. Source Quality Control:

1. Plant material shall comply with State of Delaware and federal laws with respect to inspection for plant diseases and insect infestation.
2. When specified, provide analyses and tests of topsoil, fertilizer and humus in accordance with requirements of Association of Official Agricultural Chemists. USDA Service Center Locator. Analyze appropriate soil samples for nutrients (nitrogen, phosphorous, potassium), pH, and appropriate parameters as recommended by the local USDA NRCS extension office. Apply soil amendments in accordance with agronomic soil results, experience, and local conditions. Report shall include a fertility and plant suitability analysis with written recommendations for organic soil amendments, fertilizers, soil conditioners, and their respective application rates for soil treatment and plant maintenance. The soils report recommendations shall take precedence over the minimum amendment, fertilizer,

and conditioner application rates specified herein only when they exceed specified minimums. Agronomic test results shall include nitrogen, phosphorous, potassium, pH, or other soil mineral content as applicable.

3. Contractor will furnish two copies of written maintenance, instructions for maintenance and care of installed lawn areas.
4. Notify Engineer at least 48 hours in advance of all planned planting operations and identify specific material and its location. Plant material must not be dried out and must free of mold, fungus, or other pests.
5. Furnish suitable quantities of water, hose and appurtenances.
6. Provide topsoil that complies with ASTM 5268 – Standard Specification for Topsoil Used for Landscaping Purposes.
7. Begin maintenance immediately after planting. Continue maintenance for one (1) year.
8. Repair or replace seeded areas which, in judgment of Engineer, have not survived and grown in a satisfactory manner, for a period of one (1) year after date of acceptance.
9. Provide as specified seedings or plantings replacements of the same type and size as specified.

1.05 DELIVERY STORAGE AND HANDLING:

A. Delivery:

1. Schedule shipping to minimize on-site storage of materials.
2. Fertilizer: Deliver fertilizer to site in original, unopened containers bearing weight, manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to state law.
3. Notify Engineer 48 hrs before delivery of plant material.
4. Each shipment shall be accompanied by invoice showing sizes and varieties included.
 - a. Provide copy of invoice to Engineer upon delivery of plant material.
5. Deliver topsoil in an unfrozen and non-muddy condition

1.06 PROJECT/SITE CONDITIONS:

A. Inspection:

1. Prior to beginning Work, Contractor shall examine and verify acceptability of Site for conditions under which Work will be performed. Do not proceed with Work until unsatisfactory conditions have been corrected.
2. Starting Work constitutes acceptance of conditions under which Work is to be performed. After such acceptances, Contractor shall be responsible for correcting unsatisfactory and defective Work resulting from such unsatisfactory conditions.
3. It is the intent of this specification that existing trees within grading and seeding limits, not be disturbed by building operations and be saved and protected, except where specified to be removed. Clear trees required to be removed only after approval by Engineer. Engineer directs variations required in grading on the job. Jurisdictional wetland and/or stream banks shall be protected in accordance with local, state, and federal Clean Water Act (CWA) permits.

B. Utilities:

1. Locate underground utilities by servicing agencies.
2. On-site sources of water will be provided by Owner.

C. Planting Seasons:

1. Spring Planting: From time soil becomes workable to June 15. Consider current and forecasted weather conditions.
2. Fall Planting: September 1 to November 15.
3. Summer Season: Planting shall be considered unseasonable and requires approval by Engineer.
4. If special conditions exist which warrant installation outside normal planting seasons, Contractor shall submit written request to Engineer describing conditions and stating proposed variance. Approval to plant under such conditions shall in no way relieve Contractor from warranty.

D. Plant when weather and soil conditions are suitable in accordance with industry practices.

E. Protection:

1. Protect seeded and planted areas against damage by trespass and other Work (for example heavy equipment) until substantial completion.

2. Replace, repair, or replant lawn which is damaged.
3. If planting after lawn installation, protect lawn areas, and repair damage resulting from planting operations.
4. Where planting occurs in close proximity to other site improvements, protect features prior to commencing Work. Any items damaged due to planting operations shall be repaired to their original condition.

1.07 WARRANTY:

- A. During 1 year correction period replace plants which have died, or are in dying condition, or which has failed to flourish so its usefulness or appearance has been impaired.
 1. Replacement and Damages:
 - a. Decisions of Engineer and Owner for required replacements are final and binding upon Contractor.
 - b. Contractor is responsible for repairing damage to property caused by defective workmanship and materials.
 2. Exclusions:
 - a. Contractor is not liable for replacement cost of plants damaged by deicing compounds, fertilizers, pesticides or other materials not specified in Contract Documents or not applied by Contractor, by relocating or removal by others, by acts of God, or by vandalism, and losses due to curtailment of water by local authorities.
 3. Inspection of Maintenance:
 - a. During correction period, Contractor shall, periodically inspect watering, cultivation, and other maintenance operations by Owner, and notify Owner of methods, practices or operations considered unsatisfactory and not in accordance with good horticultural practices.
 - b. Failure of Contractor to inspect or report shall be construed as acceptance of Owner's maintenance operations, and Contractor shall not claim or assert defects which may later develop are result of such methods or practices or operations.
 - c. Owner will notify Contractor when maintenance is to be performed so Contractor may observe maintenance procedures.

PART 2 - PRODUCTS**2.01 PLANTS:****A. Grass**

1. Provide seed mixes clean, high in germinating value and latest year's crop mixture as follows:

Name	Minimum Proportion by Weight	Percent Purity	Percent Germination
Kentucky bluegrass	20 percent	87 percent	85 percent
Merion Kentucky bluegrass	20 percent	87 percent	85 percent
Red Chewings Fescue	45 percent	98 percent	85 percent
Manhattan Rye	15 percent	98 percent	90 percent

2. Turf grass seed, outside perimeter fence, clean high in germinating value and of the latest year's crop mixed as follows:

Name	Minimum Proportion by Weight
Creeping Red Fescue	50 percent
Domestic Ryegrass	20 percent
Redtop	5 percent
Kentucky Bluegrass	25 percent

3. Weeds shall not exceed 0.25 percent.

2.02 PLANTING MATERIALS:**A. Topsoil:**

1. Obtained from natural well drained areas, and be fertile, friable soil, clean of undesirable materials such as plants, weeds, roots, stalks, stones, and other debris.
2. Existing topsoil may be used if Engineer determines soil is suitable and of sufficient quantity. Topsoil must meet ASTM D5268 Standard Specification for Topsoil Used for Landscaping Purposes.
3. Acidity range of pH 5.0 and pH 7.0 and shall contain no less than 4 percent organic matter as determined by loss on ignition of moisture free samples dried at 212 degrees F.

B. Soil Amendments:

1. Peat:

- a. Natural, domestic, or Canadian product, free of stones, taken from freshwater site.
 - b. Not less than 80 percent decomposed organic matter by weight on oven-dried basis.
 - c. Deliver peat in workable condition, free from lumps.
2. Manure:
 - a. 2 to 3 yrs old, well rotted stable or cattle manure, free from shavings, sawdust, refuse, and other materials harmful to plant growth.
3. Super-phosphate: Finely ground phosphate rock, agricultural grade, containing not less than 20 percent available phosphoric acid.
4. Granular Fertilizer:
 - a. Commercial type, uniform in composition, free flowing, conforming to state and federal laws, and suitable for application with equipment designed for that purpose.
 - b. Contain minimum basis percentage by weight:
 - (1) Nitrogen: 6 percent, 1/4 of nitrogen shall be in form of nitrates, 1/4-inch form of ammonia salts, and 1/2-inch form of organic nitrogen.
 - (2) Phosphorus: 24 percent, available phosphoric acid shall be derived from super phosphate having minimum analysis of 20 percent available phosphate.
 - (3) Potash: 24 percent, potash shall be in form of sulphate or potash.
 - (4) Balance of fertilizer shall be materials usually present in such products, free from dust, sticks, sand, stone, and other debris.
 - (5) Ground agricultural limestone containing not less than 85 percent total carbonates.
 - c. Coordinate N-P-K requirements with agronomic soil testing lab recommendations.
5. pH Adjusters:
 - a. Lime: Ground dolomite limestone, containing not less than 85 percent calcium and magnesium carbonates, 50 percent passing through 100 mesh screen, 98 percent passing 20 mesh screen.

- b. Elemental sulphur: Finely ground horticultural grade material containing at least 95 percent purity.
- C. Mulch and Binder:
 - 1. Dry oat or wheat straw, free from weeds and foreign matter detrimental to plant life. Hay is not acceptable.
 - 2. Synthetic binder for mulch shall be non-asphaltic emulsion.
- D. Water:
 - 1. Obtain from fresh water sources and free from injurious chemical or other toxic substances harmful to plant life.
 - 2. No water which is brackish may be used.

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Do not install plantings where depth of soil over underground construction, obstructions or rock is insufficient to accommodate roots or where pockets in rock or impervious soil require drainage.
 - 1. Where such conditions are encountered in excavation planting areas and where stone, boulders or other obstruction cannot be broken or removed by hand methods and where trees to be planted are under overhead wires, alternate locations for planting may be designated by Engineer.
 - 2. Where locations cannot be changed as determined by Engineer, submit cost required to remove obstructions to depth of not less than 6 inches below required pit depth. Proceed with Work after approval of Engineer.
 - 3. Dispose of excavated material not suitable for backfilling off-site.
 - 4. If drainage problems are encountered detrimental to growth of specified plant material, notify Engineer of conditions before proceeding with Work.
- B. Remove rock or other underground construction and drain planting areas only when approved by Engineer. Payment for extra work shall be based on in-place volume required to provide normal requirements for plantings.

3.02 INSTALLATION:

- A. Topsoil/Finish Grading:

1. Do not place or work topsoil in frozen or muddy condition.
2. Finish grade is established final grade. Grades not otherwise indicated are uniform levels or slopes between points where elevations given or between such points and existing finished grades.
3. Where Drawings show existing grades of landscaped areas are not to be changed or if new grade is less than 4 inches above existing grades, remove enough material to allow placement of 4 inches new topsoil, unless existing topsoil to required depth is undisturbed and of equal or better quality than topsoil specified. In latter case, existing topsoil may be left in-place, using enough new topsoil to bring these areas up to grade.

B. Preparation:

1. Planting Season: Conform to planting seasons.
2. Preparation of Planting Areas: Cover surrounding turf (if existing) to protect turfed areas that are to be trucked or hauled over and upon which soil is to be temporarily stocked.

C. Watering:

1. Water immediately after installation.
2. Water during period of temporary maintenance.
3. Provide hose and other equipment for watering.

3.03 CLEAN UP AND PROTECTION

- A. Remove excess and waste material daily.
- B. Remove soil or similar material brought onto paved areas, keeping areas broom clean.
- C. Upon completion of planting, remove excess soil, stones, and debris and dispose of off-site.
- D. Damage to existing landscape, pavements, or other site features as result of Work shall be repaired to its original condition.
- E. Protect landscape Work and materials from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods.

3.04 MAINTENANCE

A. Temporary Maintenance:

1. Maintain plant material until substantial completion as defined in section 3.06. Acceptance of this specification.
2. Temporary maintenance begins immediately after seeding and mulching and shall include watering, mowing, weeding, disease and insect pest control, and other procedures consistent with good horticultural practice necessary to ensure normal, vigorous, and healthy growth of grass.
3. Reseed dead and bare spots as their condition become apparent.
4. Upon substantial completion, Owner assumes responsibility for plant maintenance.

3.05 ACCEPTANCE:

A. Preliminary Planting Acceptance:

1. Notify Engineer at conclusion of planting operations so Engineer can determine substantial completion by field inspection.
2. Substantial completion requires:
 - a. An even stand of grass, after mowing, at least 3" tall with at least 85% germination.

B. Final Planting Acceptance:

1. Final planting acceptance shall be granted after completion of repair/replacement operations required to fulfill guarantee.
2. Final inspection of planting or phase of planting will be made by Owner, Contractor, and Engineer.
3. On or about expiration of 1 yr correction period, follow-up inspection will be made to determine replacements required to be made by Contractor in accordance with provisions of these Specifications. Engineer will document findings in field report, and forward copies to Owner and Contractor. Items identified for repair/replacement will be tagged during inspection.
4. Upon completion of repair/replacement program, Engineer will inspect to determine acceptability of required replacements. If acceptable, Engineer shall notify Contractor and Owner, in writing, of final acceptance of Work.

3.06 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 33 01 30.16 - SANITARY SEWER TELEVISION INSPECTION

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide all the equipment, labor, and materials necessary to perform all work for television inspection of sewer lines as indicated and in compliance with Contract Documents. All new gravity sewer installations shall be inspected by CCTV prior to being put into service.

1.02 REFERENCES:

- A. National Association of Sewer Service Companies (NASSCO):
 - 1. Pipeline Assessment and Certification Program (PACP) Reference Manual
 - 2. Recommended Specifications for Sewer Collection System Rehabilitation Standard (2006).

1.03 DEFINITIONS:

- A. Television Inspection: Operation necessary to complete a true-color audio-visual inspection for verification of existing internal sewer line conditions. Furnish labor, materials, equipment, tools, and other incidental services for CCTV inspection.
- B. MPEG: MPEG, which stands for Moving Pictures Expert Group, is the nickname given to a family of international standards fused for coding audio-visual information in a digital compressed format. For the purposes of this specification, digital audio-visual coding has a resolution of 352 pixels (x) by 240 pixels (y) and an interlaced frame rate of 30 frames per second. MPEG coding shall be named using the .mpg as the file extension.
- C. Digital Video Disk (DVD): For the purposes of this specification, DVD shall be written or "burned" in accordance with the ISO-9660 Level 2 Specifications.

1.04 MEASUREMENT AND PAYMENT:

- A. Television inspection shall be measured by the linear foot of sewer line from center of the upstream manhole to center of the downstream manhole. Payment will be full compensation for furnishing labor, tools, and equipment necessary to perform the work. Payment shall be made for television inspection when a sanitary sewer is scheduled for television inspection, regardless of whether additional work is added. Payment for television inspection shall be made under: main line television inspection, pipe diameter (size), per linear foot.

1.05 SUBMITTALS:

- A. Submit the following shop drawings in accordance with Section 01 33 00.
- B. Submit a written description of procedures to be used to the Owner, including product literature for all digital video equipment including, but not limited to cabling, camera, monitor, footage counter, digital video titling device, and recorder.
- D. Submit a written/printed copy of television inspection logs to the Owner. Logs shall record defects according to NASSCO's Pipeline Assessment and Certification Program (PACP).
- E. Submit two (2) copies of visual and audio recording to the Engineer. The Engineer will review the inspections, not for accuracy of content, but to make sure that the required information is provided and the recording is of acceptable quality. If the Engineer determines that the recording is defective or not of adequate quality, the Contractor shall TV inspect again at the Contractor's expense.

1.06 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.
- B. Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.
- C. The television inspection shall be performed one section of line at a time.
- D. Inspection shall be performed in accordance with NASSCO's Pipeline Assessment and Certification Program (PACP).

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Furnish the television inspection studio, television camera, audio-visual digital encoding equipment/software, and other necessary equipment, materials, electricity, labor, technicians, as may be needed to perform the television inspection.

2.02 TELEVISION INSPECTION EQUIPMENT:

- A. The television inspection equipment shall be capable of inspecting a minimum of 1,500 feet of sewer line, when entry into the sewer can be accessed from the upstream and downstream manholes. When entry is at one end only, the inspection equipment shall be capable of inspecting 750 feet by a self-propelled unit. The inspection equipment shall be capable of clearly televising the interior of a 6-inch diameter sewer and larger sizes.

- B. Transport the television equipment in a stable condition through the sewer line to be inspected. Throughout the inspection, position the camera equipment with the camera directed along the longitudinal axis of the sewer. When the television equipment is towed by winch and bond through the sewer line, the winches shall be stable with either locking or ratcheting drums. Winches shall be inherently stable under loaded conditions. The bonds shall be steel or of an equally non-elastic material to ensure the smooth and steady progress of the camera extension or traction through the sewer conduit. Prevent damage to the sewer conduit during the television inspection. In the case where the Contractor, for any reason, causes damage such as would be caused by incorrect deployment of bonds or retrieval of lodged equipment, the cost of repair or remedy shall be borne by the Contractor.

2.03 TELEVISION CAMERA:

- A. Use a television camera specifically designed and constructed for sewer pipeline inspection. The camera shall be waterproof and shall be able to operate in any conditions that may be encountered in the inspection environment. Provide a color pan and tilt camera to facilitate the inspection of service laterals and sewer line and manhole defects. The television camera shall be capable of 360-degree rotational scan indicating salient defects. The tilt arc shall not be less than 225 degrees unless otherwise approved by the Engineer. The adjustment of focus and iris shall provide a minimum focal range of 3 inches in front of the camera's lens.
- B. The distance along the sewer in focus from the initial point of observation shall be a minimum of twice the vertical height of the sewer.
- C. The illumination shall be such as to allow an even distribution of the light shadowing.
 - 1. The view seen by the television camera shall be transmitted to a monitor of not less than 11 inches in size. The television camera shall be capable of receiving and transmitting a picture having not less than a resolution 352(x) by 240(y). The travel speed of the television inspection camera (through the sewer) shall be uniform and shall not exceed the maximum speed directed by the Engineer or 6 inches per second under normal conditions.
- D. Test the television inspection equipment to verify the picture quality. Use the Macroni Regulation Chart No. 1 or the equipment manufacturer's recommendation to clearly differentiate between the following colors: white, yellow, cyan, green, magenta, red, blue, and black.
- E. The television inspection equipment shall be of such quality as to enable the following to be achieved:

1. Color: With the monitor adjusted for correct saturation, the six colors plus black and white shall be clearly resolved with the primary and complementary colors in order of decreasing luminance.
2. Linearity: The background grid shall show squares of equal size, without convergence/divergence over the whole of picture. The center circle shall appear round and have the correct height/width relationship (+/- 5 percent).
3. Resolution: The live picture must be displayed on a digital or analog monitor capable of providing a clear, stable image free of electrical interference with minimum horizontal resolution not less than 352(x) by 240(y) lines.
4. Color Consistency: To ensure that the camera shall provide similar results when used with its own illumination source, the lighting shall be fixed in intensity prior to commencing the survey. In order to ensure color consistency, no variation illumination shall take place during the inspection.
5. The Engineer may periodically check both the live and video picture color consistency against the color bar. Any differences will necessitate resurvey of the new length or lengths affected, at the Contractor's expense.
6. The CCTV monitor display shall incorporate an automatically updated record in feet and tenths of a foot of the distance along the line from the cable calibration point to the center point of the camera or center point of the transducer, whichever unit is being used. The relative positions of the two center points should also be noted. Use a metering device that enables the cable length to be accurately measured; this shall be accurate +/- 1 percent or 6 inches whichever is greater. Demonstrate that the tolerance is being achieved by tape measurement between manholes on the surface. This taped measurement must be included on each television log both written and digital.
7. If the Contractor fails to meet the required standard of accuracy, the Engineer will instruct the Contractor to provide a new device to measure the footage. The Engineer may, at his discretion, instruct the Contractor in writing, to resurvey those lengths of sewer first inspected with the original measuring device using the new measuring device.
8. Audio-visual recordings and collected data made during the television inspection shall become the property of the Owner. Submit to the Owner immediately upon completion of the television inspection.

2.04 TELEVISION STUDIO:

- A. The television studio shall be large enough to accommodate four (4) people for the purpose of viewing the television monitor while the inspection is in progress. The

television studio shall be insulated against noise and extremes in temperature and shall be provided with means of controlling external and internal sources of light in a manner capable of ensuring that the monitor screen display is in accordance with the requirements of this specification. The Engineer shall have access to view the television screen at all times. Locate the central control panel and television camera control in the mobile television studio. Mount the television studio on a mobile vehicle (truck or trailer), which allows safe and orderly movement of the inspection equipment throughout the jobsite.

PART 3 - EXECUTION

3.01 DIVERSION OF WASTEWATER FLOW:

- A. Divert wastewater flow in accordance with Section 33 01 34.

3.02 TELEVISION INSPECTION:

- A. Inspect sewer pipelines with pan and tilt conventional television imagery so as to record relevant features and defects of the pipeline under inspection. Inspection of pipelines shall be carried out in a format reviewed by the Engineer. Perform cleaning in accordance with the requirements of the contract documents. A skilled technician or supervisor who shall be located at the control panel in the mobile television studio shall control the operation of the television equipment.
- B. If television inspection of an entire section cannot be successfully performed from one manhole, perform a reverse setup to obtain a complete television inspection. No additional payment will be made for a reverse setup.
- C. Provide a complete television inspection of both the upstream and downstream manholes beginning at the top of each manhole and panning down to inspect the entire manhole.
- D. Whenever prevailing conditions allow, position the camera head to reduce the risk of picture distortion. In circular sewers, position the camera lens centrally (i.e., in prime position) within the sewer. In noncircular sewers, picture orientation shall be taken at mid-height, unless otherwise agreed, and centered horizontally. Direct the camera lens along the longitudinal axis of the sewer when in prime position. A positioning tolerance of +/- 10 percent of the vertical sewer dimension shall be allowed when the camera is in prime position.
- E. Perform television inspections during low flow conditions. The Engineer will reject any television inspection that, because of high flow conditions or for any other reason, does not produce an effective survey of the sewer pipe. If the water level is greater than 25 percent of the pipe diameter, conventional television inspection shall not be attempted.

without prior approval from the Engineer. In addition, if it is determined that effective conventional television inspection cannot be performed, notify the Engineer.

- F. Do not pull a cleaning device in front of the television inspection camera during the taping of the sewer line.

3.03 DIGITAL AUDIO/VISUAL RECORDING:

- A. Take continuous digital video recordings of the inspection view as it appears on the television monitor. It is intended that a digital video recording will be made of the complete television inspection of the sewer lines constructed as part of this project. The recording shall also be used as a permanent record of defects. The recording shall be MPEG file format. The digital video encoding shall include both sound and video information that can be reproduced with a video image equal or very close to the quality of the original picture on the television monitor. The replay of the recorded video information, when reviewed by Windows Media Player™, shall be free of electrical interference and shall produce a clear, stable image. The audio portion of the composite digital coding shall be sufficiently free of electrical interference background noise to produce an oral report that is clear and completely and easily discernible.
- B. The audio portion of the inspection report shall include the location or identification of the section, the manhole-to-manhole direction of travel, and the distance traveled on the specific run encountered. The inspection camera equipment shall be on the specific run encountered. Continuously connect the inspection camera equipment to the television inspection or monitoring equipment. The recording and monitoring equipment shall have the built-in capability to allow the Engineer to instantly review both the audio and video quality of the recordings during the television survey. Playback speed shall be continuously adjustable from one-third normal speed for slow-motion viewing to normal playback speed.
- C. Create separate MPEG files for each sewer line segment. In case of a reverse setup, store such inspection in a separate MPEG file. MPEG files shall be written to DVD media for delivery to the Engineer. Multiple MPEGs may exist on each DVD. Each DVD shall be labeled, at a minimum, with the following information: Owner, Engineering Firm, Project Name, Date of Creation, ID number, Sewer Line Sections, and TV Inspection Contractor's firm name.
- D. Name the MPEG files according to the following file specification: Start Manhole Number_End Manhole Number_Month_Day_Year.mpg
- E. The Engineer reserves the right to refuse an MPEG on the basis of poor image quality, excessive bit rates, inconsistent frame rates, or any other characteristics that may affect usability by the Engineer.

3.04 TELEVISION INSPECTION REPORTS:

- A. Prepare a television inspection report covering the television inspection work and the information acquired. Prior to beginning work, submit a sample hardcopy television inspection report to the Engineer for review.
- B. Report sewer defects in accordance with the National Association of Sewer Service Companies (NASSCO) program known as Pipeline Assessment and Certification Program (PACP). The Engineer reserves the right to refuse any inspection report that does not comply with the PACP program.
- C. Prior to beginning work, submit to the Engineer [certification in NASSCO's PACP certification. Do not commence work until such certification is provided.

3.05 QUALITY CONTROL:

- A. Operate a quality control system that will effectively gauge the accuracy of inspection reports produced by the operator.
- B. The Engineer shall be entitled to audit the control system and be present when assessments of the sewer integrity are being determined. When requested by the Engineer in writing, forward to the Engineer sufficient details and information for such audit assessment. Should any report fail to achieve a margin that the Engineer deems satisfactory, the Contractor, without any additional compensation, shall recode and resubmit any data or reports that the Engineer deems necessary.

3.06 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 33 01 34 - SEWER AND MANHOLE WASTEWATER BYPASS PUMPING**PART 1 - GENERAL****1.01 DESCRIPTION**

This section includes materials, equipment, and operational requirements for temporarily bypassing wastewater around a manhole or wastewater piping section in which work is to be performed.

1.02 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01 33 00.
- B. Submit a written plan describing discharge location and type of pump(s) or pumping and transporting vehicles to be used for bypass pumping before starting the Work of this Section.
- C. Provide description of procedures and list of equipment for flow control to ensure wastewater overflow prevention.
- D. Submit contingency plan for containment and cleanup of sewage spills.

PART 2 - MATERIALS**2.01 PUMPS AND OTHER EQUIPMENT**

- A. Any sump pumps, bypass pumps, trash pumps, or other type of pump which pumps sewage/water or any type of material out of the manhole or wastewater main shall discharge this material into another manhole or appropriate vehicle or container. Under no circumstances shall this material be discharged, stored, or deposited on the ground, swale, or open environment.
- B. Provide the necessary pumps, conduits, and other equipment to divert the flow of sewage around the pipe section in which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flows plus additional flow that might occur during periods of rainstorms.
- C. Furnish the necessary labor and supervision to set up and operate the pumping and bypassing system. A "setup" consists of the necessary pumps, conduits, and other equipment to divert the flow of wastewater around a pipe section, from the start to finish of work performed in the section. Pumps and equipment shall be continuously monitored by a Contractor-supplied equipment maintenance person capable of starting, stopping, refueling, and maintaining these pumps during the bypass operation.

- D. Engines and pumps shall be sound insulated and placed on elastic skids, pads, or tires to absorb ground vibrations.

PART 3 - EXECUTION

3.01 METHOD

- A. Bypass the wastewater around pipe section (between two manholes) being repaired. Plug each end of the sewer being isolated and pump wastewater flow into the downstream manhole or to an appropriate vehicle (pumper or vacuum truck) or container. Provide a pumper/vacuum truck ready to operate during bypassing. Provide pumps, piping, and other equipment to accomplish this task.
- B. Obtain all permits.
- C. Perform complete restoration of existing facilities to equal or better condition.

3.02 SURCHARGING WASTEWATER MAINS

- A. Insert a plug into the sewer line at a manhole upstream of the section being bypassed. Design and construct the plug so that all or any portion of the operation flows can be released. During work, the flows shall be shut off or pumped/bypassed, as acceptable to the Owner. After the work tasks have been completed, flows shall be restored to normal.
- B. Make arrangements with the Owner a minimum of 48 hours in advance to shut down pumps at lift stations as some systems may be surcharged.
- C. Where the raw sewage flow is blocked or plugged, take sufficient precautions to protect the public health. Protect the existing wastewater mains and sewers from damage. The following occurrences will not be allowed:
 - 1. No sewage shall be allowed to back up into any homes or buildings.
 - 2. No sewage shall overflow any manholes, cleanouts, or any other access to the wastewater mains.
 - 3. Users upstream of the repair area shall be able to use all plumbing facilities without interruption.
- D. If any of the above occur or are expected to occur, the Contractor shall bypass pump to alleviate one or all of the conditions. Additionally, the Contractor is required to observe the conditions upstream of the plug and be prepared to immediately start bypass pumping, if needed.

3.03 TRAFFIC CONTROL

- A. Ensure that pumps, piping, and hoses that carry raw sewage are protected from traffic. Traffic control shall be performed in accordance with Delaware Manual on Uniform Traffic Control Devices (DE MUTCD).

3.04 SEWAGE SPILLS

- A. In the event, during any form of sewage flow control, that raw sewage is spilled, discharged, leaked, or otherwise deposited in the open environment due to the Contractor's work, the Contractor shall clean up solids and disinfect the area affected. This work shall be performed at the Contractor's expense at no additional cost to the Owner. Notify the Owner's maintenance personnel immediately regardless of the quantity of spill. Comply with regulatory requirements regarding the quantity of spill at no additional cost to the Owner.

END OF SECTION

SECTION 33 05 23.13 - HORIZONTAL DIRECTIONAL DRILLING**PART 1 - GENERAL****1.01 DESCRIPTION:**

- A. This Specification covers the installation of pipe by horizontal directional drilling (HDD) as indicated and in compliance with Contract Documents. Horizontal directional drilling is a trenchless excavation method which is accomplished in two phases. The first phase consists of drilling a pilot hole along a designed directional path. The second phase consists of pulling the pipe into the pilot hole. Horizontal directional drilling is accomplished using a specialized horizontal drilling rig with ancillary tools and equipment.
- B. The proposed HDD crossing will be below the Red Clay Creek. The Contractor shall exercise caution to ensure that there is no impact to the creek.
- C. The proposed HDD crossing will be part of a new wastewater force main system.

1.02 SCOPE OF WORK:

- A. The Work shall consist of the installation of 3-inch diameter carrier pipe by horizontal directional drilling. The drilling work may be performed in soil, rock, or both, and also may be partially or totally below the seasonal groundwater table. The Contractor shall anticipate encountering these conditions during construction and prepare accordingly.
- B. The work shall be performed in accordance with the Contract Documents and shall include all labor, equipment, materials and consumables necessary to accomplish, but not limited to, the following tasks:
 - 1. Transportation of all equipment, labor, consumables and material to and from the jobsite.
 - 2. Erection of horizontal drilling rig, and other ancillary equipment at the site as defined on the drawings.
 - 3. Drilling the pilot hole along the alignment as defined on the drawings. Using a downhole guidance system, maintain survey control along the entire alignment to ensure compliance with specified tolerances. Survey control shall be by inclination and azimuth of drill bit. In addition a separate tracking system shall be constantly monitoring the depth, location, pitch and roll of the drill bit throughout the full depth and length of the alignment.
 - 4. Reaming the pilot hole (if needed) to a diameter suitable for installation of the fabricated carrier pipe pull section(s).

5. Joining pipe sections in accordance with Specification Section 33 30 00.
6. Installation of the pipe section(s) including any necessary tie-in welds/connections.
7. Mandrel and hydrostatic testing of the installed pipeline as specified herein.
8. Transportation and proper offsite disposal of all excess drilling fluid.
9. Clean-up and restoration of all work areas.

1.03 REFERENCES:

A. American Petroleum Institute (API):

1. Recommended Practice 13D. Rheology and Hydraulics of Oil-Well Drilling Fluids.
2. Recommended Practice 13B-1. Field Testing Water-Based Drilling Fluids, latest edition.
3. Specification 13A. Specification for Drilling Fluids Materials, latest edition.

B. International Association of Drilling Contractors (IADC):

1. Drilling Manual, latest edition.

C. Horizontal Directional Drilling Consortium (HDD):

1. Good Practices Guidelines Manual, latest edition.

1.04 TEMPORARY WORKSPACE AND ACCESS:

- A. Workspace and access are defined on the Drawings.

1.05 QUALITY ASSURANCE:

- A. Horizontal Direction Drilling Firm shall have been performing this specialty work for a minimum of 5 years and completed 5 project of similar complexity successfully in that 5-year period.
- B. Horizontal directional drilling operations shall be performed under the full-time supervision of a drill rig superintendent having following minimum requirements:
1. Not less than five (5) years experience in HDD projects of similar type and equal complexity as the proposed HDD project.
 2. Successfully installed a total of at least 10,000 linear feet of pipe 8-inches in diameter or greater specifically by HDD.

- C. Horizontal directional drilling shall be conducted in accordance with these specifications and the standards of care for the industry. Refer to the IADC Drilling Manual and Horizontal Directional Drilling Good Practice Guidelines.
- D. The Contractor shall not disturb soils above the crossing.

1.06 SUBMITTALS:

- A. Shop Drawings: Submit the following in accordance with Section 01 33 00:
 - 1. The following information shall be submitted with the proposal:
 - a. Qualifications of HDD firm.
 - b. Qualifications of the HDD Contractor's proposed drill rig superintendent qualifications.
 - 2. All procedures and material descriptions shall be submitted not less than 2 weeks prior to commencing any horizontal directional drilling activities at the site. These include but are not limited to:
 - a. A detailed schedule and description of procedures for pipe delivery, welding and fusion operations; pilot hole drilling, reaming, testing and pull back.
 - b. Description of pilot hole location instrumentation systems.
 - c. Description of the drill rig and its pullback and torque capacities.
 - d. Description of proposed buoyancy control procedures.
 - e. Method, permits required, and location for disposal of all drilled spoils.
 - f. Layout drawings showing: placement of pipe adjacent to streets; location of temporary pipe supports; and location and size of bending radius for any curves along the alignment, above ground as well as below.
 - g. Layout and locations of topside equipment within the rig side workspace and pipe side work.
 - h. Drilling fluid composition and any additional lubrication or coatings which may be applied to the outside of the product pipe.
 - 3. Record survey of the pilot hole shall be submitted within 24 hours of completion of pilot hole.
 - 4. During the HDD operations the Contractor shall submit daily progress reports to the Engineer. The report shall include the work performed, potential conflicts with

other aspects of the project, and the as drilled location of the bit at the end of the day.

5. A Construction Contingency Plan specifying the methods and procedures to overcome construction hazards, such as, but not limited to, damage to all adjacent utilities (i.e., water, drainage), encountering subsurface obstructions during pilot hole drilling and pipeline pull-back, pipeline misalignment (horizontal/vertical), drilling mud loss, hole collapse, pipe collapse, sinkholes in the overburden soils.

1.07 SITE CONDITIONS:

- A. See boring logs in the Geotechnical Data Report in an Appendix to the Specifications.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Provide 3-inch HDPE pipe in accordance with Section 33 30 00.
- B. Tracer wire shall be a minimum of #12 CCS, extra high strength hard drawn 1150# steel copper wire as manufactured by Copperhead Industries, Pro-Line Safety Products, or approved equal, specifically for the directional drilling industry. The wire outer jacket color shall be green for sewer.
- C. All other materials required for construction shall also be supplied by Contractor.

2.02 WATER:

- A. The Contractor shall be responsible for obtaining any water required.

2.03 INSTRUMENTATION:

- A. Contractor shall at all times provide and maintain a tracking system which will accurately locate the pilot hole, measure drill string axial and torsional loads, and measure drilling fluid discharge rate and pressure. The Engineer will have access to these instruments and their readings at all times.

PART 3 - EXECUTION

3.01 PROTECTION OF UNDERGROUND UTILITIES:

- A. Contractor shall undertake the following steps prior to commencing drilling operations in a location which may contain underground facilities.
 1. Contact the utility notification service as specified under Section 02 01 20.

2. Positively locate and stake all existing lines, cables, or other underground utilities including exposing any facilities which are located within 10 feet of the designed drilled path.
 3. Modify drilling practices and downhole assemblies to prevent damage to existing utilities.
- B. The Contractor shall, at no additional cost to the Owner, be responsible for repairing any utility which is damaged during construction activities.
- 3.02 PILOT HOLE:
- A. Conduct drilling operations in accordance with IADC Drilling Manual and Horizontal Directional Drilling Good Practices Guidelines.
 - B. Record Drawing: During pilot hole drilling, Contractor shall provide a drawing and a tabulation of coordinates, referenced to the drilled entry point, which accurately describes and documents the location of the pilot hole. Upon completion of the pilot hole, the Contractor shall provide the Engineer with a “record” drawing accurately depicting the pilot hole location, both horizontally and vertically with the proposed alignment to verify compliance with tolerances. Pull back or reaming operations shall not commence until the Engineer has reviewed the pilot hole record information.
- 3.03 PULL BACK:
- A. Pull Back: The pipe shall be pulled back in a continuous non-stop operation in order to prevent the pipe from seizing.
 - B. Pulling Loads: The maximum allowable tensile load imposed on the pipe pull section shall be equal to 50 percent of the specified minimum yield strength of the pipe.
 - C. Torsional Stress: A swivel shall be used to connect the pull section(s) to the reaming assembly to minimize torsional stress imposed on the section(s).
 - D. Pull Section Support: The pull section(s) shall be supported throughout the entire pull back procedure so that the pull section(s) move freely above and below ground such that the pipe is not damaged.
 - E. External Collapse Pressure: The pull section shall be installed in the reamed hole in such a manner that external pressures are minimized. Any damage to the pipe resulting from external pressure during installation shall be the responsibility of Contractor. To confirm no damage to the pipe, upon completion of insertion and pull back, the Contractor shall perform a mandrel deflection test as specified here.

3.04 DRILLING FLUIDS:

- A. Composition: The composition of all drilling fluids proposed for use shall be in accordance with API Specification 13A, API Recommended Practice 13B-1, API Recommended Practice 13D, and as submitted. No fluid shall be utilized that does not comply with permit requirements and environmental regulations.
- B. Water: Contractor shall be responsible for obtaining, transporting and storing any water required for drilling fluids.
- C. Recirculation: May be used at the Contractor's discretion, but is not required.
- D. Disposal: Disposal of cuttings and excess drilling fluids shall be the responsibility of Contractor and shall be conducted in compliance with all environmental regulations, right-of-way and workspace agreements, and permit requirements. Procedures for the disposal of cuttings and drilling fluids shall be submitted to the Engineer for review.
- E. Inadvertent Returns: Contractor shall employ his best efforts to maintain full annular circulation of drilling fluids. Drilling fluid returns at locations other than the entry and exit points shall be minimized. In the event that annular circulation is lost, Contractor shall take steps to restore circulation. Inadvertent surface returns of drilling fluids shall be immediately contained with hand placed barriers (i.e. hay bales, sands bags, silt fences, etc.) and collected using pumps as practical. If the amount of the surface return is not great enough to allow practical collection, the affected area shall be diluted with fresh water and the fluid will be allowed to dry and dissipate naturally.
- F. If the amount of the surface return exceeds that which can be contained with hand placed barriers, small collection sumps less than 5 cubic yards may be used. If the amount of the surface return exceeds that which may be contained and collected using small sumps, drilling operations shall be suspended until surface return volumes can be brought under control.
- G. Inadvertent Depressions, Sinkholes, Loss of Ground or Support for Adjacent Utilities: Contractor shall be responsible for backfilling all lost ground and adjacent streets such that emergency vehicle access is maintained 24-hours a day. Utilities shall be supported to maintain their function.

3.05 MANDREL TEST:

- A. The pipe shall be subject to a mandrel test after installation.
- B. Perform the mandrel test once the pipe has had sufficient time to recover after pull back.
- C. A mandrel, which is capable of allowing water to pass through it, complete with a pulling cable on either side, shall be pulled through the entire length of the pipeline. If the pipe cannot pass the mandrel, it shall be considered collapsed and damaged. If pipe is

considered collapsed or damaged, Contractor shall take action in accordance with the Construction Contingency Plan submitted under Paragraph 1.06 A.5.

3.06 HYDROSTATIC LEAKAGE TEST:

- A. Upon the completion of the mandrel test, conduct a hydrostatic leakage test in accordance with pipe manufacturer's recommendations and specified herein.
- B. Furnish all water required for testing.
- C. Furnish and install temporary testing plugs or caps; pressure pumps, pipe connections, meters, gages, and other equipment required to perform the tests.
- D. Fill section of pipe with water and expel air. After all the air has been expelled, the test pressure shall be applied.
- E. Gradually raise the water pressure (based on elevation of lowest point of section under test and corrected to gage location) to 100 psi.
- F. Once the test pressure has been reached, maintain the test pressure for at least three (3) hours. During this time, the pipe may expand slightly. Add additional water in order to maintain the test pressure.
- G. After a minimum of three (3) hours, reduce the test pressure by 10 psi, and stop adding makeup water.
- H. If the test pressure remains steady (within 5 percent of the target value) for one (1) hour, the section shall be deemed to have passed the test.
- I. Keep detailed records.
- J. If the section fails the leakage test, repair or replace the defective pipe and/or joint, at no additional expense and without time extension. Conduct additional tests and repairs until section passes test.
- K. If, in the judgment of the Engineer, it is impractical to follow the foregoing procedures exactly for any reason, modifications in the procedure shall be made. Modified test procedures must be accepted by the Engineer. In any event, the Contractor shall be responsible for the ultimate integrity of the piping within the above requirements.

3.07 CONTRACT CLOSEOUT:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 33 30 00 - SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. Provide gravity sanitary sewers and sanitary force mains beyond 5 feet from buildings as indicated to municipal sewers or other discharge system as indicated and in compliance with Contract Documents.
- B. Section includes: Precast concrete manholes, and cast-iron frames and covers.

1.02 REFERENCES:

- A. ASTM International (ASTM):

- 1. C443: Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
- 2. C478: Precast Reinforced Concrete Manhole Sections.
- 3. C923: Resilient Connectors Between Reinforced Concrete Manhole Structures.
- 4. D2241: Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- 5. D2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
- 6. D3034: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- 7. D3035: Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
- 8. D3139: Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
- 9. D3212: Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- 10. D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- 11. F477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

- B. American Water Works Association (AWWA):

- 1. C605: Underground Installation of PVC Pressure Pipe and Fittings for Water.

2. C901: Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service.

C. Occupational Safety and Health Administration (OSHA) Standards and Regulations:

1. 29 CFR 1926, Subpart P: Safety and Health Regulations for Construction, Excavations.

D. UNI-BELL (UNI):

1. B-6: Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe; UNI-Bell PVC Pipe Association.

1.03 DEFINITIONS:

- A. Appurtenances: Additional piping items to provide a complete piping system suitable to convey wastewater as specified and intended. These items may or may not be specified, but are necessary to complete the piping system.
- B. Standard & Specifications: Standard & Specifications of New Castle County Department of Public Works.

1.04 SUBMITTALS:

- A. Submit the following in accordance with Section 01 33 00.
 1. Pipe materials.
 2. Precast manholes.
 3. Manhole frame and covers.
 4. Pipe fittings.
 5. Pipe couplings.
 6. Pipe thrust restraint.
 7. Valves.
 8. Accessories.
 9. Appurtenances.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

- C. Instructions: Provide manufacturer's installation instructions for pipe, valves, and appurtenances.
- D. Field Test Reports: Provide results for all testing performed as indicated in Subparagraph – Field Testing.
- E. Project Record Documents: Provide marked-up set of drawings showing actual locations of piping, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY ASSURANCE:

- A. Comply with the requirements specified in Section 01 40 00.
- B. Perform Work in accordance with Contract Documents and New Castle County standards.
- C. Valves: Manufacturer's name, UL/FM, and pressure rating marked on valve body.

1.06 DELIVERY STORAGE AND HANDLING:

- A. Comply with the requirements specified in Section 01 66 10.
- B. Deliver and store valves in shipping containers with labeling in place.

1.07 WARRANTY:

- A. Provide standard product warranties for all sanitary sewerage utility materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Sanitary Sewer Pipe:
 - 1. J-M Eagle
 - 2. North American Pipe Corporation
- B. Precast Concrete Manhole Structures:
 - 1. Oldcastle Precast, Inc.
 - 2. A.C. Miller Concrete Products, Inc.
 - 3. Atlantic Concrete Products, Inc.
 - 4. Terre Hill Concrete Products

C. Manhole Frames and Covers:

1. East Jordan Ironworks
2. Neenah Foundry
3. Campbell Foundry

D. Valves – Provide valves manufactured by the following:

1. Ball Valves:

1. Jamesbury
2. KF
3. Inline
4. Kitz
5. Nibco

2. Air Release/Vacuum Valves:

1. Val-Matic
2. Crispin
3. DeZurik-APCO
4. Golden Anderson

E. Mechanical Joint Restraint:

1. EBAA Iron
2. Ford Meter Box Company, Inc.
3. Romac Industries

F. Cast Couplings:

1. Romac Industries
2. Smith Blair
3. Viking Johnson

4. Dresser

2.02 GRAVITY SANITARY SEWER PIPE:

- A. Polyvinyl Chloride (PVC) Pipe: ASTM D3034, SDR 35, Poly(vinyl chloride) (PVC) material; integral bell elastomeric gasketed joint. Pipe shall be made of PVC compound meeting ASTM D1784, cell class 12454 or 12364. Joint design shall meet requirements of ASTM D3212 and gaskets shall conform to ASTM F477.

2.03 FORCE MAIN (PRESSURE) SANITARY SEWER PIPE (NON-METALLIC):

- A. Force Main (Pressure) Sewer Pipe Less Than 4 Inches in Diameter.
 - 1. HDPE Pipe and Fittings (Open Cut): Material designation PE4710 in accordance with ASTM D3035, DR 11 (200 psi). Joints shall be heat fusion butt weld.
 - 2. HDPE Pipe and Fittings (HDD): Material designation PE4710 in accordance with ASTM D3035, DR 11 (200 psi) unless Contractor's HDD design computations indicate a thicker wall is required. Joints shall be heat fusion butt weld.

2.04 STAINLESS STEEL PIPE AND FITTINGS 1/2-INCH TO 2-INCH:

- A. Provide Pressfit, grooved or a socket welded system.
 - 1. Provide a sufficient number of unions for Vic-Press and socket welded systems to allow removal of all valves and inline devices.
 - 2. Provide threaded connections only where required.
- B. Vic-Press Schedule 10S System:
 - 1. Vic-Press system, 1/2-inch through 2-inch Schedule 10S comprised of stainless steel Vic-Press fittings, couplings and pipe.
 - 2. Type 316 stainless steel Pressfit couplings and fittings and Type 316 stainless steel Pressfit pipe UL classified to ANSI/NSF 61 for cold +86 degrees F and hot +180 degrees F potable water service.
 - 1. Maximum working pressure of 500 psi for water, oil, gas, chemical, air and vacuum services.
 - 3. Couplings, Fittings: Pressfit products formed of Type 316/316L stainless steel tubing including a self-contained o-ring seals molded of synthetic HNBR rubber suitable for water operating temperatures to +210 degrees F.
 - 4. Valves 1/2-inch through 2-inch ball valves with Type 316 stainless steel plain ends for Pressfit assembly. Victaulic Series 569.

1. Pressure Rating: 300 PSI.
2. CF8M stainless steel body and ball
3. Type 316 stainless steel stem
4. PTFE seats.
5. Pipe: Type 316/316L ASTM A312 stainless steel
 1. Schedule 10S.

C. Socket Welded System:

1. Schedule 40 Type 316L stainless steel pipe and fittings with socket welded connections.

D. Grooved System:

1. Schedule 10S type 316L stainless steel pipe and fittings with Type 316 stainless steel grooved end connections and couplings.
2. Fittings: ASTM A403 or be factory fabricated from ASTM A312 stainless steel pipe.
3. Provide couplings consisting of ductile iron or stainless steel housings, with pressure responsive elastomer gasket.
 1. Rigid Type: Victaulic Style 489 (SS) or equal.
 2. Flexible Type: Victaulic Style 77S (SS) or equal.
 3. Installation-Ready, for sizes through 4 inches, with ductile iron housings. Victaulic Style 107H (rigid) and Style 177 (flexible) or equal.

2.05 PRECAST CONCRETE MANHOLES:

- A. Provide precast base sections that extend above pipe top and form portion of barrel. Barrel sections constructed of manhole risers topped with tapered sections or flat tops as indicated. Conform manhole sections to ASTM C478; resilient connectors to ASTM C923.
- B. Plastic Coated Manhole Steps:
 1. Provide steps 13 inches minimum width projecting 5 inches minimum from the wall surface. Steps to be driven into preformed holes.

2. Provide steps with copolymer polypropylene coating conforming to ASTM D4101 and 1/2-inch diameter steel reinforcing rod conforming to ASTM A615 Grade 60.
 3. Test steps to resist a pull out load of 1,500 pounds without loosening or being damaged.
- C. Joints: O-Ring rubber-gasket joints conforming to ASTM C443, confined as indicated.
- D. Pipe Connections: Flexible Joints for Sanitary Sewer Pipes 42 Inches and Smaller in Diameter.
1. Conform to ASTM C923.
 2. Rubber gasket held in place by 304 stainless steel sleeve and clamps, or
 3. Rubber gasket integrally cast in manhole.
- E. Precast Inverts: Conform to invert channels specified in Part 3 of this Specification Section.
- F. Bituminous Waterproofing Material (Exterior):
1. Tnemec Company, Inc.; Series 46-465 H.B. Tnemecol.
 2. PPG Industries; Amercoat 78HB.
 3. Carboline; Bitumastic 300M.
- 2.06 MANHOLE FRAME AND COVERS:
- A. Provide cast-iron frames and covers conforming to ASTM A48, Class 35B.
 - B. Provide frames and covers suitable for AASHTO HS 20-44 live load. Combined weight of 355 pounds minimum, 225-pound minimum frame, and 130-pound minimum cover weight.
 - C. Provide factory-coated with asphalt varnish.
 - D. Provide frames with 24-inch nominal diameter clear openings.
 - E. Provide removable, interchangeable covers to seat in frames without rocking.
 - F. Identify covers with cast marking as directed by Owner or "SANITARY SEWER" and include the name and location of manufacturer on frame and cover castings.
 - G. Provide castings free of blowholes, splits, cracks, blisters, mold-pull, and other imperfections affecting strength or serviceability.

H. Provide External or Internal Seals as required by Owner.

2.07 VALVES:

A. Ball Valves, Up to 2 Inches (Ball Valves greater than 2 inches are unacceptable.):

1. Materials:

- a. Body and End Cap: Three piece, ASTM A351 Grade CF8M.
- b. Body Seal: PTFE.
- c. Seat: RTFE.
- d. Ball: Type 316 stainless steel.
- e. Stem: Type 316 stainless steel.

2. Pressure Rating:

- a. 1/2-inch through 2-inch: 1000 psi at 100 degrees F.

3. Ends:

- a. 2-inch and Smaller: Screwed or flanged.

4. Actuators: Manual lever.

B. Combination Air-Vacuum Valves – Wastewater Service:

- 1. AWWA C512. 150 psi working pressure. Factory-test to hydraulic pressure of 300 psi. Air-intake, air-release threaded type for preventing vacuum and for venting air.
- 2. Incorporate two stainless steel floats connected by stainless steel float guide to maintain air gap between bottom and top shutoff float. Air gap shall retard waste solids from fouling or clogging top shutoff float. Make internals easily removable through top cover without removing valve. Furnish valve with inlet ball valve, blowoff valve, and shutoff valve with quick-disconnect coupling for flushing.
- 3. Valve Size: 2 inches.
- 4. Air Release Valve Orifice Size: 1 inch.
- 5. Heavy-duty, cast-iron single body (short), stainless steel float, guided.

2.08 BEDDING AND COVER MATERIALS:

- A. As specified in Section 31 23 00.

2.09 THRUST RESTRAINT:

- A. Mechanical Joint Restraint: Wedge action restrained joint retainer gland devices. Mechanical joint restraint incorporated into the design of the follower gland.
- B. Thrust Blocks: Dimensions as indicated on the Drawings. Concrete type for thrust blocks as specified in Section 03 30 00.
- C. Pipe Clamps and Tie Rods: ANSI/NFPA 24.
- D. Push-On Restrained Joint Pipe: Provide joint restraint and conforming joint to AWWA C111/21.11, fabricated to be easily disassembled. Provide assembly and disassembly kits.

2.10 ACCESSORIES:

- A. Flexible Couplings: Sleeve type elastomeric polyvinyl chloride held firmly to pipe ends by screw-tightened bands. Bands and screws Type 304 stainless steel.
- B. Cast Couplings (Sleeve Type, 12-inch and smaller):
 - 1. Provide couplings meeting AWWA C219.
 - 2. End rings and center rings: ASTM A536 ductile iron, fusion bonded epoxy coated.
 - 3. Gaskets: Buna-N, NSF 61 approved.
 - 4. Hardware: Type 316 stainless steel.
 - 5. Bridles and tierods: Minimum 3/4-inch diameter, except where tierods replace flange bolts of smaller size, in which case fit with nut on each side of pair of flanges.
- C. HDPE Pipe End Stiffeners: Provide Type 316 stainless steel stiffening inserts designed for use with mechanical couplings to transition HDPE pipe to other pipe materials.
- D. Carrier Pipe Supports: Casing Spacers for support and isolation of carrier pipe within the encasement pipe: 14 gauge bands and 10 gauge risers shall be of Type 304 stainless steel or approved equal; all fasteners and exposed metal shall be stainless steel; bands shall have insulating liners; runners shall be reinforced plastic. For pipe up to 12-inch diameter, spacers shall be 8-inch long with 1-inch width runners. Maximum height of the runner above metal band or riser shall be 1.5-inches. Spacing along the carrier pipe between casing spacers shall be in accordance with the manufacturer's product specifications, however, a minimum of 3 spacer per length of pipe or one spacer per every 6 to 7 feet.

- E. Casing End Seals: Seals shall be standard wrap around end seals, made of synthetic rubber, with self-curing rubber sealing strips and provided Type 316 stainless steel bands and clamps.

2.11 APPURTENANCES:

- A. Provide all necessary appurtenances for a full and complete piping system suitable for operation, and in conformance with Project Documents.

2.12 SHOP PAINTING/COATINGS:

- A. Unless otherwise specified or indicated, provide standard manufacturer paint and coatings for all piping and valves to prevent corrosion for the life of the component.

2.13 SHOP TESTING:

- A. Test all pipes and valves per manufacturer requirements, and as required by pertinent Standards.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Verify that trench cut or excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated for sanitary sewer pipe. Verify excavation for manholes to proper depth and proper placement of bedding material.

3.02 PREPARATION:

- A. Sanitary sewer pipe: Hand trim excavations to required elevations. Correct over-excavation with bedding material. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.
- B. Manholes: Coordinate placement of inlet and outlet pipe sleeves. Seal exterior surface of sanitary sewer manholes with minimum 16-mil-thick coal tar epoxy coating.

3.03 SANITARY SEWER PIPE INSTALLATION:

- A. Maintain separation of sanitary sewers pipe and water mains as follows:
 - 1. Parallel Installation:
 - a. At least 10 feet horizontally from a sewer or sewer manhole. The distance shall be measured edge-to-edge.

- b. Under unusual conditions when local conditions prevent a horizontal separation of 10 feet (3 m) the sewer or sewer manhole may be laid closer, provided that:
 - c. The top (crown) of the sewer shall be at least 18 inches (45 cm) above the bottom (invert) of the water main;
 - d. Where this vertical separation cannot be obtained, the sewer shall be constructed of AWWA approved water pipe, pressure tested in place without leakage prior to backfilling; and
 - e. The sewer manhole shall be of watertight construction and tested in place.
2. Crossing:
- a. At least 18 inches between the bottom of the water line and the top of the sewer whenever possible. The distance shall be measured edge-to-edge.
 - b. Under unusual conditions when local conditions prevent a vertical separation described, the following construction shall be used:
 - c. Sewers passing over or under water mains shall be constructed of AWWA approved water pipe, pressure tested in place without leakage prior to backfilling;
 - d. Water lines passing under sewers shall, in addition, be protected by providing:
 - e. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line;
 - f. Adequate structural support for the sewers to prevent excessive deflection of the joints and the settling on and breaking of the waterline; and
 - g. That the length of the sewer line be centered at the point of the crossing so that joints shall equidistant and as far as possible from the water line.
 - h. No water pipes shall pass through or come in contact with any part of a sewer manhole.
- B. Install pipe, fittings, and accessories in accordance with ASTM D2321, AWWA C605, and manufacturer's instructions. Seal joints watertight.
- C. Lay pipe to slope indicated; with maximum variation from true slope of 1/8-inch in 10 feet. Lay pipe upgrade, with spigot ends pointing in direction of flow. Lay pipe to form a close concentric joint with adjoining section and to prevent sudden offsets in flow line.
- D. Install bedding to depths and dimensions as indicated.

- E. Backfill each section of pipe as it is laid, as specified in Section 31 23 33 and as indicated at least up to centerline, before next joint is made. Do not completely conceal or bury pipe prior to being tested for water tightness and prior to being accepted by the Engineer. Do not displace or damage pipe when compacting.
- F. Clear the interior of the pipe of dirt and superfluous materials as the work progresses. Keep a suitable swab or drag in the pipe and pull it forward past each joint immediately after the jointing has been completed.
- G. Keep trenches and other excavations free of water until final inspection. Do not lay pipe or construct masonry work in water. Do not allow water to rise over the work until concrete or mortar has had ample time to set.
- H. Close open ends of pipe and fittings in a manner acceptable to the Engineer when the work is not in progress so that trench water, earth and other substances will not enter the pipe or fittings.
- I. Handle pipe and fittings to avoid damage. Carefully inspect pipe and fittings for defects before lowering into the trench.
- J. Where necessary deflect pipelines to avoid obstructions or where long-radius curves are indicated. Do not exceed the maximum deflection recommended by pipe manufacturer. Provide short sections of pipe as necessary to maintain required line.
- K. Provide compatible pipe connections to each valve and to equipment. Provide unions on pipelines with welded soldered or threaded joints to allow removal of each valve and equipment without disturbing connecting pipelines. Connect different types of pipe and accessories with flexible couplings or pipe and accessories with flexible couplings or accepted transition fittings. Provide insulation fittings where ferrous pipe connects to nonferrous metallic pipe.
- L. Verify invert of each existing manhole prior to commencing work. Connect to each existing manhole where indicated or directed. Prevent debris from entering the pipelines. The work includes all necessary concrete work, cutting and shaping of invert.
- M. Repair linings, coatings and coverings damaged during construction with accepted materials equal to and compatible with original lining, coating or covering. Repair damaged galvanizing with zinc-rich paint.
- N. Connect to building sanitary sewer outlet and municipal sewer system as indicated.

3.04 PRECAST CONCRETE MANHOLE INSTALLATION:

- A. Maintain separation of sanitary sewer precast concrete manholes and water mains as specified in Paragraph 3.03A. above.

- B. Place precast manhole sections plumb and level, adjust to correct elevation. Provide bedding material as specified in Section 31 23 33.
 - C. After manhole assembly, plug liftholes with non-shrink grout.
 - D. Cut and fit for pipe connections.
 - E. Invert Channels
 - 1. Precast concrete.
 - 2. Smooth and semicircular, conforming to inside of adjacent sewer section.
 - 3. Changes in direction of flow made with a smooth curve radius as large as manhole size will permit.
 - 4. Slope floor of manhole outside channels, smooth and not less than 1 inch per foot nor more than 2 inches per foot.
 - F. Set manhole frames and covers level to correct elevations.
- 3.05 VALVE INSTALLATION:
- A. Set valves on solid bearing.
 - B. Install valves according to applicable AWWA Standard.
- 3.06 REPAIR/RESTORATION:
- A. Repair any existing utilities/structures, or features damaged during installation of sanitary sewerage utilities to Owner's satisfaction, and at no cost to Owner.
- 3.07 FIELD TESTING:
- A. General:
 - 1. Perform field-testing under provisions of Section 01 40 00.
 - 2. All field testing shall be conducted in the presence of the Engineer.
 - B. Cleaning and Testing
 - 1. Test for Displacement of Buried Sanitary Sewers: After trench has been backfilled and compacted, after cover over pipeline has been brought to finished grade, and after debris and silt has been removed, pipelines will be tested by the Engineer, as follows: Light will be flashed between manholes, or, if manholes have not yet been constructed, between locations of manholes, by means of flashlight or by reflecting

sunlight with mirror. Correct poor alignment, displaced pipe, and other defects indicated by the Engineer.

2. Test for Deflection of PVC Sanitary Sewers
3. Measure pipelines for vertical ring deflection within 15 days after completion of backfill and at least 4 months after installation, but no later than 30 days before substantial completion of the project. Limit maximum ring deflection of pipeline under load to 5 percent of vertical internal pipe diameter. Relay or replace pipe exceeding this deflection and retest.
4. Use deflectometer that produces continuous record of pipe deflection or pull mandrel, sphere, or pin-type go/no-go device through the pipeline. Make diameter of the go/no-go device 95 percent of undeflected inside diameter of pipe.
5. Cleaning: Flush out and clean sanitary force mains of foreign matter before placing systems into operation. Use flushing velocity of 10 feet per second, minimum. Take care to prevent scale and other objectionable matter from entering piping. Properly dispose of water used for flushing.
6. Force Main Pressure Test: To prevent movement of pipe, backfill between joints to provide 2-foot minimum cover. Expose only area immediately at pipe joints. Test force main hydrostatically for 2 hours at 1.5 times the design working pressure. Measure leakage in accordance with, and not exceeding, the allowable leakage specified in AWWA C605.
7. Air Testing of Gravity Sewer Pipes: Conduct tests in the presence of the Engineer. Furnish materials, labor, and equipment required for tests and repair system until test results are satisfactory. Perform tests in accordance with UNI-B-6 for PVC pipelines.
8. Vacuum Test: For precast concrete manholes 25 feet deep and less, a vacuum test may be used instead of exfiltration test. Conduct tests prior to backfilling and include joint between manhole cover and frame. Plug and brace pipe openings. Draw vacuum of 10 inches of mercury. Minimum time to drop to 9 inches of mercury follows:

Table 33 30 00-1			
	Manhole Diameter in Inches		
Depth in Feet	48	60	72
Up to 10	60 sec.	75 sec.	90 sec.
10.01-15	75 sec.	90 sec.	105 sec.
15.01-25	90 sec.	105 sec.	120 sec.

9. If manhole fails the test, make necessary repairs and repeat the vacuum test and repairs until manhole passes test. Submit test results.

3.08 FIELD PAINTING/COATINGS:

- A. Repair any shop painting/coatings damaged during storage or installation to Owner's satisfaction.

3.09 ADJUSTING:

- A. Coordinate with Engineer for any field adjustments. The Engineer reserves the right to reject any field adjustments.

3.10 PROTECTION:

- A. Protect sanitary sewerage utilities from damage throughout storage, installation, testing, and final acceptance.

3.11 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Section 01 77 00.

END OF SECTION

SECTION 40 90 10 - CONTROL EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Design, Supply and Install all hardware and software products required to provide a complete and fully functional control system as shown on the Contract Drawings and/or herein specified.
- B. Connect and test all input and output field wiring to and from the control equipment.
- C. Provide all manufacturer's services required for installation, startup, calibration, inspection, and training.

1.2 WARRANTY

- A. Conform with all Contract Warranty requirements specified in the General Conditions and General Requirements.
- B. Provide an extended manufacturer's warranty on all products and equipment to remain in effect for not less than one year after the successful completion of the reliability acceptance tests.

1.3 CONTRACTOR RESPONSIBILITIES

- A. The contractor shall retain the services of a qualified system integrator to assist in the selection of equipment, preparation of submittals, installation, configuration and startup of all control equipment.

1.4 SUBMITTALS

- A. Submit catalog cuts, shop drawings, and O&M manuals including the following.
 - 1. All control equipment hardware, software and control panel shop drawings shall be reviewed and approved by the System Integrator prior to submission to the Engineer.

PART 2 - PRODUCTS

2.1 AUTO DIALER

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis-of-design: Sensaphone, 1800 Monitoring System.

2. Or, approved equal.

B. Features:

1. Auto dialer shall provide a minimum of 8 zones.
2. Integral battery backup with capacity for approximately 24-hour backup
3. LED indicator for each alarm zone
4. Event logging in onboard non-volatile memory
5. Interface for telephone land line connection
6. Configurable zone types
7. Integral keypad for navigating programmable logic
8. Surge protection on all zones, telephone land line, and power supply

C. Enclosure:

1. Solid door enclosure.
2. Integral mechanism for pad lock
3. NEMA Type 4X rating

D. Warranty:

1. The manufacturer shall warrant the hardware specified above against all defects in material and workmanship for a period of three years

PART 3 - EXECUTION

3.1 SCHEDULING OF WORK

- A. The Plant will be kept in full scale operation during the performance of the work specified in this section. All modifications to existing panels, all equipment/device/panel replacement work and all rehabilitation work shall be scheduled by the contractor and submitted to the Engineer for approval.
- B. The Contractor, in addition to the requirements of Section 01 33 00 – SUBMITTALS, shall submit an expended initial schedule to the Engineer for approval showing all the work specified in this section. The contractor shall adjust the schedule as per the comments of the Engineer and resubmit the schedule for final approval by the Engineer.
- C. Written consent from the Owner or Owner's representative must be obtained not less than one week prior to carrying out any portion of the work included in this Contract which requires interruption of service and control/instrumentation systems.
- D. Unavoidable interruptions must be confined to the daytime. Contractor will not receive extra compensation for overtime, should this become necessary to insure continued service.
- E. In connection with all of the foregoing, Contractor must have on the construction site, all materials, equipment, construction facilities, adequate supervision and a sufficient number of qualified workmen to insure carrying out of the above work in the shortest possible time.

3.2 INSTALLATION

- A. All items shall be installed in accordance with the manufacturer's recommendations.
- B. The Contractor shall furnish and install all material and hardware required to supply a complete and functional installation.
- C. All conduit shall be installed and routed above the drop ceiling, where applicable.
- D. Notify Plant personnel prior to disconnect any existing signals.
- E. Deliver all salvaged equipment to Owner.

3.3 TESTING

- A. Test the hardware and software using simulated inputs and outputs prior to installation.
 - 1. The Contractor shall retain the services of a system integrator to provide detailed test plans and procedures to demonstrate and document that all equipment has been properly installed and configured for a full functional system which meets all contract requirements.
- B. Test the complete installed system by demonstrating that all signals are properly received and sent and that the control system operates as intended.

END OF SECTION

SECTION 40 90 20 – PROCESS INSTRUMENTATION

PART 1 - GENERAL

1.1 SCOPE

A. Description of Work

1. Provide all labor, material and necessary equipment to install instrumentation and control systems, and be responsible for the satisfactory operation of the entire system as specified herein and as shown on the drawings.
2. Work includes supplying erecting, testing and placing in operation the system specified.
3. Work includes the supply and installation of all process measuring elements, transmitters interconnecting wiring and process taps as specified herein and indicated on the drawings.
4. Work includes the provision and connection of all wiring to and from every electrical device furnished under this Section including 120 volt power wiring and all instrumentation and control wiring.
 - a. All wiring shall be in accordance with Section 26 05 10, BASIC ELECTRICAL MATERIALS AND METHODS with exceptions as required herein.
 - b. Instrumentation and Control Wiring noted within this Specification Section includes:
 - 1) Circuits used to carry analog signals
 - 2) Circuits used to start and stop equipment
 - 3) Circuits used to key a control function or serve as an interlock
 - 4) Circuits used to indicate equipment operating status
 - 5) Circuits used to actuate alarms.
 - c. Work includes the provision and installation of and all piping, manual shut-off valves, and mounting hardware (e.g. nuts, bolts, washers, pipe stands, or cinch anchors) associated with connecting or mounting the instrumentation, as described herein.

B. Related Work Specified Elsewhere

1. The provisions of this Section are a direct extension of Section 26 05 10, BASIC ELECTRICAL MATERIALS AND METHODS, and although set forth only once within the Specification, shall apply equally to this Section.

1.2 SUBMITTALS

- A. Operating instructions, manuals and shop drawings shall be submitted in accordance with Division 01, Section SUBMITTALS.
- B. Instrument supplier shall review the Contract drawings to verify suitability of the supplied instrument for the intended application prior to submittal process.

1. Provide verification of this review process by instrument and application.
- C. Shop drawings shall include the following:
 1. Catalog Cutsheets.
 2. Field wiring diagrams.
 3. Construction drawings and engineering data defining materials of construction, dimensions, weights and sizes.
- D. Operation and Maintenance Manual:
 1. Submit complete bound manuals for all hardware and software components assembled into 3 ring binders.
 2. Include:
 - a. Shop Drawing information
 - b. Calibration information
 - c. Configuration of each device, as configured at time of Maintenance Training.
 - d. Disk copies of all custom programs incorporated.

1.3 TESTING

A. Factory Tests

1. Testing of Individual Components
 - a. Each item of equipment shall be fully factory inspected and tested for function, operation and continuity of circuits.
 - b. Each instrument shall be factory calibrated. Calibration sheets verifying instrument accuracy shall be supplied.
2. Full System Tests
 - a. An operation check of the entire system shall be performed by the instrumentation supplier at his factory. Power and manually adjustable measurement and control circuits shall be connected to the central control for simulating the functions specified within the Specification section.
 - b. The Owner shall be notified at least ten (10) days in advance of any factory systems tests and reserves the right to have its representatives in attendance.

B. Field Tests

1. An operation check of the entire system shall be performed by the instrumentation supplier after installation to verify operation.
2. Power and manually adjustable measurement and control circuits shall be connected to the control system to verify the functions specified within the Specification section.

1.4 WARRANTY

- A. Warranty shall be in accordance with the General Conditions.

- B. The equipment shall be unconditionally guaranteed to meet or exceed the design criteria detailed in Part 2 of this Specification.

PART 2 - PRODUCTS

2.1 RECORDING INSTRUMENTS

A. Electronic Recorder

1. Basis-of-Design: Square D , Eurotherm nanodac Recorder/Controller, or approved equal.
2. Description: Digital chart recorder of capturing and storing electronic data.
3. Features:
 - a. Multiple I/O options
 - b. High accuracy universal inputs
 - c. Secure data recording
 - d. Compact design
 - e. User configurable to match application requirements

PART 3 - EXECUTION

3.1 ERECTION

A. General

1. Equipment shall be located so that it will be readily accessible for operation and maintenance.
2. The Contractor shall examine the Contract Drawings and shop drawings for the various equipment in order to determine the best arrangement for the work as a whole, and shall use personnel skilled in the applicable trade for the erection of the various materials and interconnections.

B. Equipment Mounting and Support

1. Field instruments shall be mounted in the areas specified or otherwise noted.
2. Instruments attached directly to concrete shall be spaced out from the mounting surface not less than 1/2 inch by use of phenolic spacers or framing channel.
3. Expansion shields or cast-in-place inserts shall be used for securing equipment or supports to concrete surfaces.
4. Unless otherwise noted, field instruments shall be mounted between 48 and 60 in. above the floor or work platform.

C. Transmitters

1. Transmitters shall be remotely mounted in the electrical/control equipment enclosure.
2. Provide required support and hardware for wall mounting.

D. Magnetic Flowmeters

1. Ground magnetic flow meter flow tubes and grounding rings in strict accordance with the manufacturer's recommendations.

3.2 ELECTRICAL WORK

A. Signal wiring shall be carried in raceways or conduit provided in accordance with other sections of this Division of the Specifications.

1. Shielded twisted pairs carrying 4-20 mAdc and other low level signals shall be run in conduits or raceways separate from all other control and power wiring.
 - a. All analog circuits shall be run as twisted pairs or triads.
 - b. In no case shall a circuit be made up using conductors from different pairs or triads.
 - c. Triads shall be used wherever three (3) wire circuits are required.
 - d. Triads shall not be formed by using two (2) pairs.
2. Terminal blocks shall be provided at all instrument cable junctions, and all circuits shall be identified at such junctions.
3. Signal circuits shall, in general, be run without splices between instruments, terminal boxes or panels.

B. Shields shall, in general, be bonded to the ground bus at the control panel and isolated at all other locations.

1. Terminal blocks shall be provided for interconnecting shield drain wires at all junction boxes.

C. Alternating current power supply connections for panel mounted equipment shall be by cord and plug (where practicable).

1. Field mounted units shall be wired in solid and provided with a power disconnect switch either internally or adjacent to the unit.
2. Where multiple field mounted units are fed from a single circuit breaker, each field mounted unit shall be protected by individual draw-out fuses.

3.3 FIELD TESTING AND ACCEPTANCE

A. Analog Instrument Calibration

1. All analog instruments shall be installed such that taps and parts, etc. are available for in-place calibration and test without removal. For those instruments where such in situ calibrations are not feasible (e.g. pH immersion electrodes, etc.), other calibration methods shall be provided subject to review by the Engineer.
2. Field calibration shall be achieved using a minimum of five (5) points (0, 25, 50, 75, and 100 percent) for calibration. Additional points may be required by the Engineer for non-linear instruments.

3. Receiving elements such as controllers, final operators, etc. shall be observed and readings documented during transmitter exercising to demonstrate correct operation of entire control loop.
4. Other elements such as controllers, final operators, etc. shall be exercised to demonstrate correct operation.

B. Operational Tests

1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
2. Electrical Tests: Minimum required tests are as follows:
 - a. Verify the absence of unwanted voltages between circuit conductors and ground.
 - b. Test all conductors for short circuits using an insulation-testing device.
 - c. With each circuit pair, short circuit at the far end of circuit and measure circuit resistance with an ohmmeter. Record circuit resistance of each circuit.
3. Pretesting:
 - a. After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents.
 - b. Correct deficiencies observed in pretesting.
 - c. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved.
 - d. Prepare forms for systematic recording of acceptance test results.
 - e. After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.
4. Operational Tests:
 - a. Schedule tests after pretesting has been successfully completed.
 - b. Test all modes of system operation at each device.
 - c. All conditions of operation shall be simulated to demonstrate that each system operates properly.
 - d. Test each initiating and indicating device for operation and proper response at local control stations, PLC panel and supervisory control station.
5. Report of Tests and Inspections:
 - a. Prepare a written record of tests, inspections, and detailed test results in the form of a test log.
6. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

C. Acceptance

1. The system will not be accepted until all equipment satisfies the acceptance test requirements. The complete system shall operate continuously during an acceptance test period of not less than thirty (30) days with no down-time of the complete system

resulting from failure of hardware. Downtime of the system or portions of the system resulting from the following causes will not be considered system failures:

- a. Downtime resulting from an outage of the main power supply provided that automatic shutdown and restart of the system satisfies the requirements of these Specifications.
- b. Downtime of a portion of the system resulting from failure of a communications channel provided that the system operated as specified under this condition.
- c. Downtime caused by operator error.

3.4 EXPENDABLES

- A. One (1) year's supply of expendables shall be provided as noted within this Specification Section. Expendables (charts, ink, test chemicals, etc.) used during calibration and checkout prior to plant acceptance shall be replenished at the Contractor's expense to insure a full year supply at the time of plant acceptance.

3.5 MAINTENANCE

- A. Corrective maintenance shall be performed only by a factory trained service technician specifically trained for servicing the types of equipment furnished under this Contract.

END OF SECTION

APPENDIX A
DIG CLEAN SAFETY AND LAND USE ADVISORIES

TO: , AECOM

Phone: (302)318-2587

Fax:

email: charles.chiu@aecom.com

FROM: Delaware Department of Natural Resources and Environmental Control



Contact Information see below under Sites



**RE: Miss Utility Delaware Ticket:
220420780**

Ticket Priority: DESIGNER

Work Address: BENGE RD, HOCKESSIN

Near Intersection: CREEK ROAD

Work Date: 03/09/22

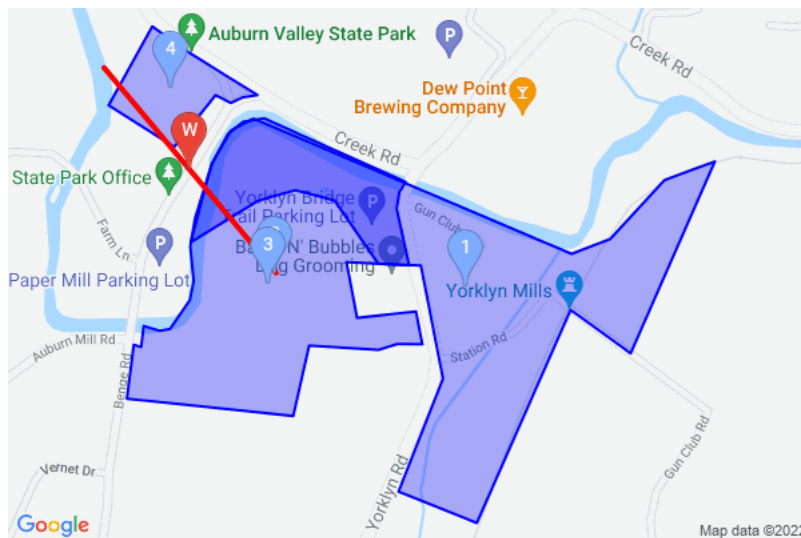
Work Done For: DNREC DIV OF PARKS & REC

Location Details: LOCATE/MARK: BENGE RD FROM
INTERSECTION WITH CREEK ROAD TO

Work Description: LOCATE/MARK: BENGE RD FROM INTERSECTION WITH CREEK ROAD TO . Work Type: INST SWR
MAIN

Dig Clean Safety and Land Use Advisory

Please be advised that the work location may be at or near sites where hazardous substances including petroleum are likely present in the soil or groundwater. Sites are shown on the map below relative to the extent of the planned excavation. Known contaminants of concern are also listed with a hyperlink to health and safety information (if available), and whether soil or groundwater is impacted. DNREC has prepared a generic Contaminated Material Management Plan https://terradex.link/de_cmmp to properly handle contaminated soil and groundwater. If further guidance is needed please contact DNREC with the contact information listed on this form. DNREC does not provide excavation field marks, and does not attend site meetings unless a request is made to the listed DNREC Primary Contact.



W (red) and line indicate your work area as provided to.

Numbered and shaded polygons (blue) are the areas of the site(s) of concern.
Note, on occasion the area is outside of the map view.

SITES WITH LAND USE CONTROLS SHOWN ON MAP:

Site 1: NVF (YORKLYN) (DE-0071)

, DE

Contact Information: Louis Lasorte, (302)395-2610 , Louis.Lasorte@delaware.gov

Chemicals:

- Iron [View ATSDR 7439-89-6 View Agency for Toxic Substances & Disease Info](#)
- Lead [View ATSDR 7439-92-1 View Agency for Toxic Substances & Disease Info](#) [View NIOSH 7439-92-1](#)
- Manganese [View ATSDR 7439-96-5 View Agency for Toxic Substances & Disease Info](#)
- Arsenic [View ATSDR 7440-38-2 View Agency for Toxic Substances & Disease Info](#)
- Zinc [View ATSDR 7440-66-6 View Agency for Toxic Substances & Disease Info](#)

Site 2: 1145 LIMITED (3-001169)

SR 257 YORKLYN, DE

Contact Information: Stephen Peterson, 302-395-2507 , Stephen.Peterson@delaware.gov

Chemicals:

- Gasoline, Automotive [View ATSDR 8006-61-9 View NIOSH 8006-61-9](#)

Site 3: YORKLYN REDEV SITE (DE-1461)

, DE

Contact Information: Louis Lasorte, (302)395-2610 , Louis.Lasorte@delaware.gov

Site 4: Auburn Heights-August 2010 removals (3-002503)

3000 Creek Road Yorklyn, DE

Contact Information: Stephen Peterson, 302-395-2507 , Stephen.Peterson@delaware.gov

ALTERNATIVES TO VIEW INFORMATION:

View on the Web: <https://digclean.com>, enter under Option 2: 4772234

Sent By Terradex, Inc. on behalf of Delaware Department of Natural Resources and Environmental Control

Terradex at: operations@terradex.com Phone 650-227-3250, Fax 3255 Terradex Reference: pg_eventid=4772234

1: 13051138m 1.20783e-05area 30 length1865 2: 1912138m 1.01806e-05area 10 length1865 3: 192675139m

9.25404e-06area length1865 4: 112266180m 1.59159e-06area 5 length1865

Date: 2022-2-12

TO: , AECOM

Phone: (302)318-2587

Fax:

email: charles.chiu@aecom.com

**FROM: Delaware Department of Natural Resources and
Environmental Control**



Contact Information see below under Sites



**RE: Miss Utility Delaware Ticket:
220420781**

Ticket Priority: DESIGNER

Work Address: BENGE ROAD, HOCKESSIN

Near Intersection: CREEK ROAD

Work Date: 03/09/22

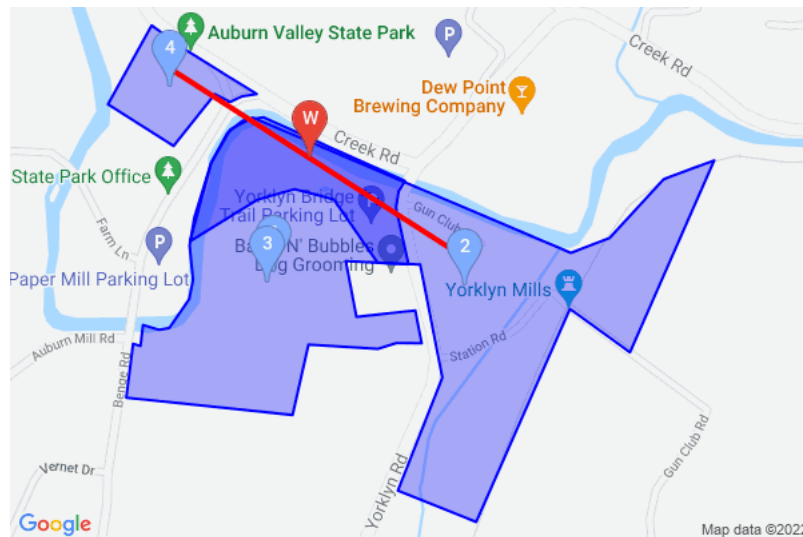
Work Done For: DNREC DIV OF PARKS & REC

Location Details: LOCATE/MARK: BENGE ROAD ACROSS RED
CLAY CREEK AND FOLLOW

Work Description: LOCATE/MARK: BENGE ROAD ACROSS RED CLAY CREEK AND FOLLOW . Work Type: INST SWR MAIN

Dig Clean Safety and Land Use Advisory

Please be advised that the work location may be at or near sites where hazardous substances including petroleum are likely present in the soil or groundwater. Sites are shown on the map below relative to the extent of the planned excavation. Known contaminants of concern are also listed with a hyperlink to health and safety information (if available), and whether soil or groundwater is impacted. DNREC has prepared a generic Contaminated Material Management Plan https://terradox.link/de_cmmp to properly handle contaminated soil and groundwater. If further guidance is needed please contact DNREC with the contact information listed on this form. DNREC does not provide excavation field marks, and does not attend site meetings unless a request is made to the listed DNREC Primary Contact.



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Numbered and shaded polygons (blue) are the areas of the site(s) of concern.
Note, on occasion the area is outside of the map view.

SITES WITH LAND USE CONTROLS SHOWN ON MAP:

Site 1: 1145 LIMITED (3-001169)

SR 257 YORKLYN, DE

Contact Information: Stephen Peterson, 302-395-2507 , Stephen.Peterson@delaware.gov

Chemicals:

- Gasoline, Automotive [View ATSDR 8006-61-9](#) [View NIOSH 8006-61-9](#)

Site 2: NVF (YORKLYN) (DE-0071)

, DE

Contact Information: Louis Lasorte, (302)395-2610 , Louis.Lasorte@delaware.gov

Chemicals:

- Iron [View ATSDR 7439-89-6](#) [View Agency for Toxic Substances & Disease Info](#)
- Lead [View ATSDR 7439-92-1](#) [View Agency for Toxic Substances & Disease Info](#) [View NIOSH 7439-92-1](#)
- Manganese [View ATSDR 7439-96-5](#) [View Agency for Toxic Substances & Disease Info](#)
- Arsenic [View ATSDR 7440-38-2](#) [View Agency for Toxic Substances & Disease Info](#)
- Zinc [View ATSDR 7440-66-6](#) [View Agency for Toxic Substances & Disease Info](#)

Site 3: YORKLYN REDEV SITE (DE-1461)

, DE

Contact Information: Louis Lasorte, (302)395-2610 , Louis.Lasorte@delaware.gov

Site 4: Auburn Heights-August 2010 removals (3-002503)

3000 Creek Road Yorklyn, DE

Contact Information: Stephen Peterson, 302-395-2507 , Stephen.Peterson@delaware.gov

ALTERNATIVES TO VIEW INFORMATION:

View on the Web: <https://digclean.com>, enter under Option 2: 4772233

Sent By Terradex, Inc. on behalf of Delaware Department of Natural Resources and Environmental Control

Terradex at: operations@terradex.com Phone 650-227-3250, Fax 3255 Terradex Reference: pg_eventid=4772233
1: 19120m 1.01806e-05area 10 length1867 2: 130510m 1.20783e-05area 30 length1867 3: 192675146m
9.25404e-06area length1867 4: 112266546m 1.59159e-06area 5 length1867
Date: 2022-2-12

TO: , AECOM

Phone: (302)318-2587

Fax:

email: charles.chiu@aecom.com

FROM: Delaware Department of Natural Resources and Environmental Control



Contact Information see below under Sites



**RE: Miss Utility Delaware Ticket:
220420782**

Ticket Priority: DESIGNER

Work Address: YORKLYN RD, HOCKESSIN

Near Intersection: CREEK ROAD

Work Date: 03/09/22

Work Done For: DNREC DIV OF PARKS & REC

Location Details: LOCATE/MARK: YORKLYN ROAD FROM
INTERSECTION WITH CREEK ROAD TO

Work Description: LOCATE/MARK: YORKLYN ROAD FROM INTERSECTION WITH CREEK ROAD TO . Work Type: INST
SWR MAIN

Dig Clean Safety and Land Use Advisory

Please be advised that the work location may be at or near sites where hazardous substances including petroleum are likely present in the soil or groundwater. Sites are shown on the map below relative to the extent of the planned excavation. Known contaminants of concern are also listed with a hyperlink to health and safety information (if available), and whether soil or groundwater is impacted. DNREC has prepared a generic Contaminated Material Management Plan https://terradex.link/de_cmmp to properly handle contaminated soil and groundwater. If further guidance is needed please contact DNREC with the contact information listed on this form. DNREC does not provide excavation field marks, and does not attend site meetings unless a request is made to the listed DNREC Primary Contact.



W (red) and line indicate your work area as provided to.

Numbered and shaded polygons (blue) are the areas of the site(s) of concern.
Note, on occasion the area is outside of the map view.

SITES WITH LAND USE CONTROLS SHOWN ON MAP:

Site 1: NVF COMPANY (3-000089)

YORKLYN YORKLYN, DE

Contact Information: Stephen Peterson, 302-395-2507 , Stephen.Peterson@delaware.gov

Chemicals:

- Gasoline, Automotive [View ATSDR 8006-61-9](#) [View Agency for Toxic Substances & Disease Info](#) [View NIOSH 8006-61-9](#)

Site 2: NVF (YORKLYN) (DE-0071)

, DE

Contact Information: Louis Lasorte, (302)395-2610 , Louis.Lasorte@delaware.gov

Chemicals:

- Iron [View ATSDR 7439-89-6](#) [View Agency for Toxic Substances & Disease Info](#)
- Lead [View ATSDR 7439-92-1](#) [View Agency for Toxic Substances & Disease Info](#) [View NIOSH 7439-92-1](#)
- Manganese [View ATSDR 7439-96-5](#) [View Agency for Toxic Substances & Disease Info](#)
- Arsenic [View ATSDR 7440-38-2](#) [View Agency for Toxic Substances & Disease Info](#)
- Zinc [View ATSDR 7440-66-6](#) [View Agency for Toxic Substances & Disease Info](#)

Site 3: 1145 LIMITED (3-001169)

SR 257 YORKLYN, DE

Contact Information: Stephen Peterson, 302-395-2507 , Stephen.Peterson@delaware.gov

Chemicals:

- Gasoline, Automotive [View ATSDR 8006-61-9](#) [View NIOSH 8006-61-9](#)

Site 4: YORKLYN REDEV SITE (DE-1461)

, DE

Contact Information: Louis Lasorte, (302)395-2610 , Louis.Lasorte@delaware.gov

ALTERNATIVES TO VIEW INFORMATION:

View on the Web: <https://digclean.com>, enter under Option 2: 4772232

Sent By Terradex, Inc. on behalf of Delaware Department of Natural Resources and Environmental Control

Terradex at: operations@terradox.com Phone 650-227-3250, Fax 3255 Terradex Reference: pg_eventid=4772232
1: 19900m 1.04248e-05area 10 length1543 2: 130510m 1.20783e-05area 30 length1543 3: 1912111m 1.01806e-05area 10 length1543 4: 192675113m 9.25404e-06area length1543
Date: 2022-2-12

APPENDIX B
DNREC CONTAMINATED MATERIAL MANAGEMENT PLAN



Contaminated Material Management Plan (CMMP) For Utility Installation and Repair at DNREC Sites

Delaware Department of Natural Resources and Environmental Control (DNREC)

The purpose of this CMMP is to provide general guidance to utility companies for safe handling of contaminated materials (soil and groundwater) at DNREC sites contaminated or potentially contaminated with hazardous substance and/or petroleum. The CMMP addresses the management of material related to soil excavation activities to be performed for installation or replacement of underground utilities by workers under their own utility company contract.

Background

There are hundreds of sites contaminated or potentially contaminated with hazardous substances that are being addressed by DNREC Site Investigation and Restoration Section (SIRS) and thousands of sites contaminated or potentially contaminated with petroleum releases from underground and aboveground storage tanks that are being addressed by DNREC-Tank Management Section (TMS). These sites are at different stages of investigation and cleanup process and the amount of information regarding contamination at these sites varies. Some sites are at the beginning of the investigation and have only limited information whereas at other sites the remedy is in place such as a cap. Sites with remedy in place such as engineered cap might have special instructions on the advisory ticket to contact DNREC prior to excavation.

Intrusive Activities

Intrusive activities are defined as activities penetrating the existing ground surface which include, but are not limited to:

- Excavation and proper material management (soil and groundwater) associated with trenches for utility excavation due to utility installations or utility system repairs.
- Backfilling excavated areas.
- Management of underground storage tanks (USTs) and associated piping, components and foundations, if encountered.
- Excavation of landscaped areas or site grading.

Excavation, Handling and Management of Contaminated Materials

The contaminant of concern for the site where excavation is taking place will be listed in the advisory. However, some of these sites are in the initial stages of investigations and may not have a detailed list. It is not possible to sample every location on a site, so there is potential for encountering contamination other than the ones listed. So the following measures should be taken as standard procedures.

Soil

The advisory for the ticket should give a general idea of what types of contaminants are likely to be encountered during the excavation. The advisory may also provide any special information about the site such as there is a 1 to 2 feet thick soil cap present at the site. The advisory should be consulted to determine how to handle the excavated soil.

Soil that is excavated or disturbed at a location with known Volatile Organic Compounds (VOCs), semi volatile Organic Compounds (SVOCs), gasoline, or diesel contamination will require special treatment in the following cases. These contaminants are generally iden-

tifiable by characteristic petroleum odors or staining.

- If these signs are identified during excavation, and the soil is not immediately scheduled to be reused in the excavation, soil should be stockpiled on top of double 6 mil thick polyethylene sheeting and be covered with a similar material at the end of each work day and secured by weights to minimize removal of the cover by wind. If the soil is stored in the staging area for more than 14 days after stockpiling, the excavator will install silt fencing around the stockpile and temporarily stabilize using DNREC approved best management practices.
- If the purpose of the excavation is to install or replace a water supply line, organic impacted soils (i.e. petroleum, chlorinated solvents, etc.) cannot be reused in the excavation without DNREC approval. Clean imported soil and the use of non-permeable materials including water mains and organic-resistant gaskets are standard practices in these cases.
- Any non-reusable soils generated that are not going to be used to fill the excavation should not be considered as "clean fill". These soils need to be characterized prior to off-site disposal. Contact DNREC person listed on your ticket for coordination on testing and soil disposal requirements.
- In the event that soil is heavily contaminated with petroleum compounds to a point that there is free product mixed with the soil or grossly contaminated with other contaminants indicated by heavy staining or strong odor, backfilling activities cannot proceed without DNREC approval.

If the advisory indicates inorganic contamination in soil such as metals only and the excavated soil does not show indication of contamination determined using visual, olfactory or instrumental evidence then the soil can be put back into the excavation.

If the advisory indicate that a 1 or 2 foot thick cap is present at the site then the soil encountered in the upper 1 or 2 feet of the excavation should be separated from the rest of the soil generated from the excavation. This clean soil is required to be put back on the excavation as an upper fill, as encountered prior to excavation. In this way, we can minimize exposure to deeper potentially contaminated soils.

Fill/Debris Materials

If visually contaminated, the debris materials (timber, treated wood, railroad ties and/or concrete) encountered during excavation activities will be segregated and stockpiled on 6 mil polyethylene sheeting. If debris material is determined to be hazardous, it will be managed following RCRA generator, transportation and disposal requirements.

USTs, ASTs and Piping

If USTs, ASTs or associated piping are encountered during any of the intrusive activities at the site, they will be properly drained of liquids, removed, decontaminated and disposed off site in accordance with the Delaware Regulations Governing Underground Storage Tank Systems or the Delaware Regulations Governing Aboveground Storage Tank Systems. If a regulated UST or piping associated with a regulated AST or UST is discovered, you must contact the DNREC Tank Management Section. In general, if any component of an AST or UST system is encountered, the DNREC Tank

(Continued on next page)



Contaminated Material Management Plan (CMMP) For Utility Installation and Repair at DNREC Sites *(continued)*

Management Section can be contacted at 302-395-2500 to answer any questions.

Groundwater

If groundwater is encountered during excavation activities, the utility company is responsible for obtaining a wastewater discharge permit prior to dewatering activities from the appropriate local and state agency. All dewatering operations require DNREC approval. Please contact DNREC Water Supply Section for permits at 302-739-9945. For the City of Wilmington, all dewatering fluids are required to be routed into one of the designated sanitary sewer man-holes approved by the City in accordance with the Wastewater Discharge Permit. Initial pretreatment of the groundwater may include a sedimentation tank, a filtration unit, an oil/water separator, or a carbon filtration unit if necessary, before discharging into the sewer system. Water pumped from the excavation shall be treated, as necessary, to meet the discharge concentrations specified by the wastewater permit issued by the City or a state agency.

Health and Safety

The intrusive activities shall be conducted under the guidance of the Health and Safety (H&S) plan of each utility company. The H&S plan should indicate what level of training the worker would need such as OSHA 24-hour HAZWOPER training or 40-hour HAZWOPER training. In general a modified level D OSHA personal protective equipment (PPE) within the project area is required. However, a higher level of protection may be required based on the contaminants as indicated in the H & S plan. The excavator shall provide adequate protective measures to limit potential public exposure to environmentally impacted materials.

Transportation of Contaminated Materials

a) Soil Disposal

1. Contaminated soil shall either be loaded or temporarily stockpiled in preparation for loading into dump trucks or trailers by the excavator. The excavator is responsible for monitoring the loading and stockpiling the soil. The soil will be transported to a DNREC approved disposal location and copies of completed waste manifests shall be forwarded to DNREC contact listed in the ticket.
2. The trucks shall be loaded so that the solids are at least six (6) inches below the top of the trailer bed.
3. The trucks shall be covered during transport.
4. The excavator should remove accumulated material from the truck tires prior to the trucks leaving the site. Soil removed from the truck tires shall be collected and managed as per the specifications of this plan.
5. The excavator shall keep all roadways entering and leaving the site free from soil. If necessary a tracking pad or street sweeper will be used to prevent any soil tracked on roadways from trucks leaving the site.
6. A manifest record should be kept by the excavator.

b) Fill/Debris Materials

1. Excavator should be responsible for transportation and disposal of all concrete, asphalt, metal and untreated wood resulting from the excavation. If debris material is determined to be hazardous, it will be managed following RCRA generator, transportation and disposal requirements. Copies of Com-

pleted waste manifests shall be forwarded to DNREC contact listed in the ticket.

c) Petroleum Contaminated Water and Oil (if encountered)

1. Petroleum contaminated water will be pre-treated, as necessary, and then pumped to a treatment water plant or sewer system if applicable and permitted.
2. The transporter of any recovered oil will be a fully licensed, insured and permitted company to transport petroleum contaminated liquids in the State of Delaware.
3. The excavator is responsible for keeping all disposal records as appropriated.

Site Restoration

Restoring the site conditions to conditions prior to excavation activities is a requirement to protect the integrity of any remedy in place. Therefore, after excavation is complete, the utility company is required to restore the site to a condition that prevents potential contact with contaminated materials.

- Procedure for backfilling: The upper 1 to 2 foot of clean soil indicated in ticket as a cap needs to be put back on the excavation as an upper fill.
- Impervious surfaces (asphalt, concrete, etc): Asphalt and concrete from utility trenches must be restored to a previous excavation condition of the cap. This would prevent exposure to the soil underneath the cap.
- Landscaped areas: materials from the landscape areas at sites with cap must be restored to a condition previous to excavation. This would prevent exposure to the soil underneath the cap.

Emergency Utility Repair

For emergency utility repairs, except for water lines replacement or installation, reusing the onsite excavating materials from the utility trench back into the trench is an acceptable procedure for DNREC. However, if evidence of contamination was detected and if possible, the soil should be stock piled. If that is not possible, soil can be temporarily put back in the excavation but DNREC should be informed by the next working day. However, if free product is encountered during the excavation, the excavator should contact the material and notify DNREC emergency response team immediately.

Further Support

For further support regarding safe handling of contaminated materials please contact DNREC. For best response select the Tank Management Section for petroleum related contamination, or the Site Investigation and Restoration Section for non-petroleum related contamination:

- **DNREC Tank Management Section**
Lori Spagnolo
302-395-2500
- **DNREC Site Investigation and Restoration Section**
Meghan Crystall
302-395-2600
- **DNREC Emergency Response Team**
800-662-8802

APPENDIX C

AECOM REPORT FOR GEOTECHNICAL INVESTIGATION

DNREC NVF BENGE ROAD PS AND FM



July 31, 2019
60593246.2A

Mr. Ed Strauss, P.E.
AECOM
Sabre Building, Suite 300
4051 Ogletown-Stanton Road
Newark, DE

Re: **Report for Geotechnical Investigation
DNREC NVF Bengel Road PS and FM
Newcastle County
Hockessin, Delaware**

Dear Mr. Strauss,

We are pleased to present this report on geotechnical investigation for the proposed small pumping station and a force main in Hockessin, Delaware. The work was performed in accordance with our email proposal dated October 28, 2018.

1.0 PROJECT DESCRIPTION

It is understood that the project consists a new force main, 3 inches in diameter, to be horizontal directionally drilled to a minimum depth of 42 inches beneath Red Clay Creek in Hockessin, DE. A pump station will consist of a wet well and a 15 HP submersible pump. The wet well will be a precast concrete structure 10 ft in diameter and 13 ft in depth. In addition, a concrete vault, 6 ft by 8 ft in plan, and a 4 ft deep, will be constructed.

The geotechnical investigation was requested to determine proximity to rock for constructability purposes. Our services consisted of planning the investigation, full-time monitoring of the subsurface exploration program, laboratory testing of representative soil samples, and preparation of this data report.

The project location is shown on Plate 1, Regional Location Plan.

2.0 SITE GEOLOGY

Based on a review of available geologic information, the site is underlain by the bedrock of the Wissahickon Schist of Paleozoic Age. The Wissahickon Schist consists of predominantly Dense micaceous schist, gneiss and migmatite. (Reference: Spoljaric, Nenad and Jordan, Robert R., 1966, Generalized Geologic Map of Delaware SP4, State of Delaware, Delaware Geological Survey.)

3.0 SUBSURFACE CONDITIONS

AECOM Technical Services
625 West Ridge Pike, Suite E-100
Conshohocken, PA 19428
Tel: 215.365.3605
Fax: 215.832.3501

Mr. Ed Strauss, P.E.
AECOM
July 31, 2019
Page 2 of 5

The subsurface conditions at the site were explored by two new test borings, B-1 and B-2, as shown on Plate 2, Boring Location Plan.

Subsurface conditions are summarized below:

- **Stratum 1, Fill** – Fill was encountered at ground surface in B-1 with a thickness of approximately 4 feet. The fill consists of dark brown silty coarse to fine sand with trace gravel. Based on the resistance to hand tools, the soils of this stratum are judged to be in a medium dense condition.

The result of one moisture content test indicates a moisture content of 35 percent. Grain size distribution curves are shown in Attachment B.

- **Stratum 2, Alluvial**– was encountered immediately beneath fill in Boring B-1 and at ground surface in B-2 with a thickness of 9 and 13.5 ft. The material consists of brown silty medium to fine sand/ sandy silt. Standard Penetration Test (SPT) values range from 3 to 18 blows per foot (bpf), but generally 3 to 7 bpf, indicative of loose condition.

Results of three moisture content tests indicated moisture contents ranging from 7.6 to 21.5 percent. Two Atterberg Limit tests indicated plastic limits of non-plastic and 27 percent, a liquid limit of 34 percent, and plasticity index of 7. Grain size distribution curves are shown in Attachment B.

- **Stratum 3, Residual** – Encountered below Stratum 1 at depths of approximately 9 and 13.5 ft below ground surface where both borings were terminated in this Stratum. The material consists of a light brown silty micaceous coarse to fine sand. SPT values range from 13 to 50 blows over a few inches, indicative of a medium dense to very dense condition.

Results of two moisture content tests indicated moisture contents of 23 and 27 percent. Grain size distribution curves are shown in Attachment B.

- **Groundwater** – Groundwater was observed at depth of 11 ft and 5 ft below ground surface in Borings B-1 and B-2 ft, respectively, at the completion of drilling. It should be noted that groundwater levels are subject to seasonal and long-term variations due to climatic and man-made influences.

4.0 GEOTECHNICAL EVALUATION

Based on the test borings, the site is underlain by medium dense silty coarse to fine sand (possible fill) followed by loose silty coarse to fine sand of Stratum 2 (Alluvial Soil) at a depth of

Mr. Ed Strauss, P.E.
AECOM
July 31, 2019
Page 3 of 5

9 ft to 13 ft followed by medium dense silty micaceous coarse to fine sand of Stratum 3 (Residual Soil).

4.1 Foundation: The foundation may be supported on competent soils and/or structural fill for a maximum net bearing pressure of 2,000 psf. With this bearing pressure, the maximum total and differential settlements are expected to be negligible. The settlements are expected to occur concurrently with the load application.

4.2 Creek Crossing: The geotechnical data, including test boring logs and lab testing report for Borings B-1, B-2, and B-3 are presented in Attachment A and Attachment B.

5.0 RECOMMENDATIONS

5.1 Foundations: The proposed new foundations should consist of shallow spread footings supported on competent soils and/or structural fill with a maximum net bearing pressure 2,000 psf. The recommended bearing values may be increased by 1/3 for short-term loading such as due to wind and or seismic. The foundations should be based at least 3 feet below the finished adjacent grade, or deeper, if required by the local codes, for frost protection.

Foundation subgrades should be carefully inspected before concrete placement. If any soft or yielding materials are encountered, these materials should be excavated and replaced with structural fill, as discussed below in Section 5.2. Foundation soils should not be exposed overnight. Concrete for the footings should be placed the same day when the excavation is made. Alternatively, a mud mat may be placed at the subgrade, consisting of at least three inches of lean concrete.

5.2 Structural Fill: Structural fill may be required for backfilling below the proposed structures and equipment and for replacement of unsuitable materials under loaded areas. Structural fill should consist of predominately granular soil or crushed stone with a maximum particle size of 2 inches, and not greater than 10 percent passing the No. 200 sieve, such as DelDOT Borrow Type G-1 or DelDOT Graded Aggregate Type "A" (CR-1). Any fine-grained soils from the excavation should not be used as structural fill.

5.3 Seismic Criteria: Based on the 2012 edition of the International Building Code (IBC), the site soil classification is Site Class D.

5.4 Excavation Slopes: Temporary excavations above the groundwater level should have side slopes not steeper than 1.5H:1V. Pertinent OSHA and local regulations should be followed where they require flatter side slopes than given above. Sheet piling and shoring for excavations, if required, should be designed by an engineer registered in the State of Delaware.

5.5 Groundwater Control: The contractor should be prepared to perform any temporary dewatering, should groundwater be encountered.

Mr. Ed Strauss, P.E.
AECOM
July 31, 2019
Page 4 of 5

5.6 Construction Observation: It is recommended that full-time construction observation be provided during foundation construction by AECOM or a qualified geotechnical engineering firm that is familiar with the subsurface conditions and the foundation design criteria. The items which should be observed, monitored, and/or tested include subgrade preparation, drilled pier inspection, and placement and compaction of structural fill.

6.0 LIMITATIONS

The services described in this report were provided in accordance with the standard of care. No warranty or guarantee, expressed or implied, is intended. The recommendations presented in this report are solely for the use of our client for this particular project. Any re-use of this document, particularly by third parties, without the express written permission of AECOM is solely at their own risk.

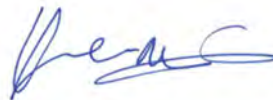
Mr. Ed Strauss, P.E.
AECOM
July 31, 2019
Page 5 of 5

We sincerely appreciate the opportunity to be of service to you on this project. If you have any questions on the contents of this report, or if we may be of additional service, please give us a call.

Very truly yours,



Neil Scafonas, P.E.
Geotechnical Engineer



Yongli Min, P.E.
Geotechnical Engineering
Department Manager

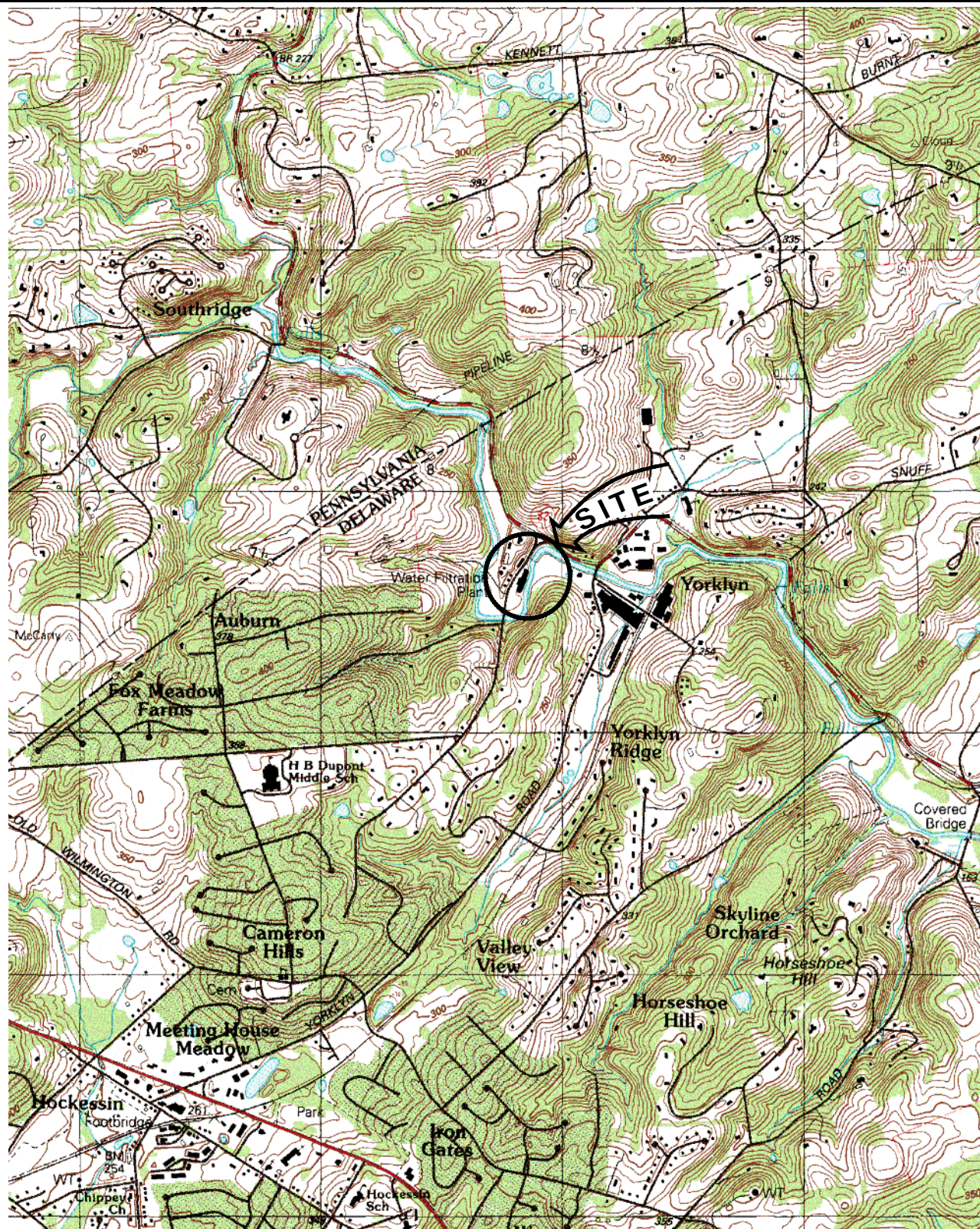
Plates:

Plate 1	Regional Location Map
Plate 2	Test Boring Location

Appendices:

Attachment A	Subsurface Exploration
Attachment B	Laboratory Testing

Plates



SCALE IN FEET



MAP SOURCE
KENNETT SQUARE, PA.-DEL
USGS QUADS, 1993

AECOM

625 West Ridge Pike, Suite E-100
Conshohocken PA 19428
Direct: 610.832.3500 Fax: 610.832.3501

Job: 60593246.2A

Prepared by: TFP

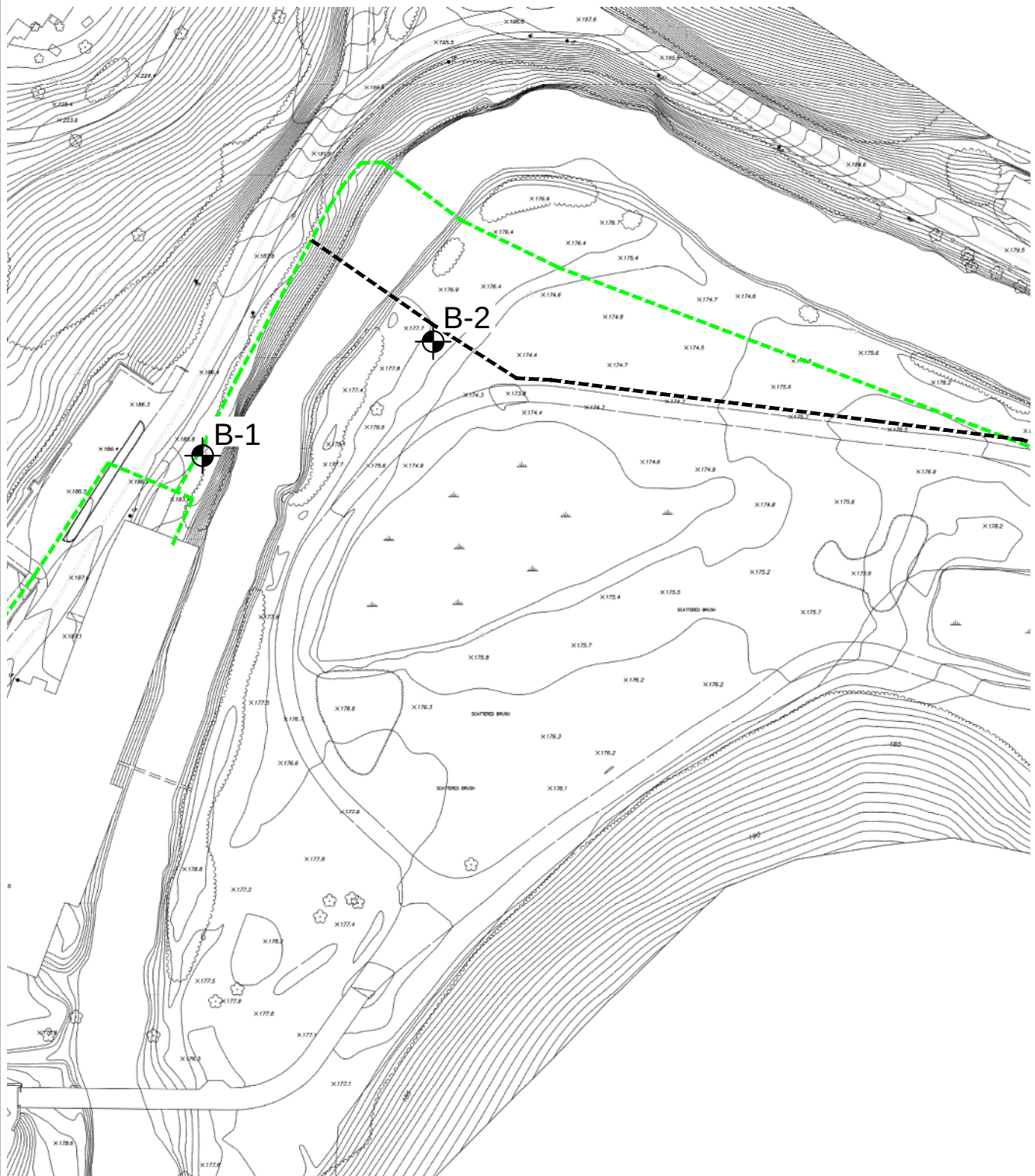
Checked by: NGS

Date: 07/25/2019

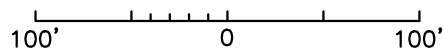
REGIONAL LOCATION PLAN

DNREC NVF BENG RD PS AND FM
NEW CASTLE COUNTY
HOCKESSIN, DELAWARE

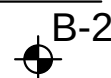
PLATE 1



SCALE IN FEET



LEGEND:



TEST BORING LOCATION



625 West Ridge Pike, Suite E-100
Conshohocken PA 19428
Direct: 610.832.3500 Fax: 610.832.3501

Job: 60593246.2A

Prepared by: TFP

Checked by: NGS

Date: 07/25/2019

BORING LOCATION PLAN

DNREC NVF BENG RD PS AND FM
NEW CASTLE COUNTY
HOCKESSIN, DELAWARE

PLATE 2

Attachment A
Subsurface Investigation

The subsurface exploration consisted of two test borings located as shown on Plate 2, Test Boring Location Plan. The borings were drilled on May 30, 2019, by CGC Geoservices, LLC, located in Newark, Delaware. The test borings were conducted under full-time technical supervision of AECOM. The test borings were located in the field by AECOM. Boring locations are based on field measurements by AECOM. Ground surface elevations were estimated based on a topographic map. Utility clearance was conducted by CGC Geoservices using hand tools for the top 5 ft of each boring.

The soil conditions at the top 5 ft of each boring were evaluated based on resistance to the hand auger. Soil samples were obtained with a hand auger at various depths.

The test borings were performed using a CME-55 truck mounted drilling rig and were advanced by hollow stem auger and mud rotary drilling techniques. Samples of the subsoils were recovered from the borings for identification and classification purposes by means of a 2-inch O.D. split-barrel sampler driven 24 inches by a 140-pound hammer freely falling 30 inches (the Standard Penetration Test, ASTM D1586). The number of hammer blows required to drive the sampler during the interval from 6 to 18 inches, or fraction thereof, is reported on the test boring logs as the sampling resistance.

At the completion of the test borings, the boreholes were backfilled with auger cuttings mixed with bentonite/cement grout.

A "Key to Soil Symbols and Terms" used in this report is included on page A-2. The logs of the test borings in the final investigation are presented on Pages A-3 and A-4.

LOG of BORING No. B-1DATE 5/30/19 SURFACE ELEVATION 183.0 LOCATION See Plate 2

DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0			AU	Medium dense dark brown silty coarse to fine SAND, trace fine gravel						
			AU	(Stratum 1)	179.0		34.6			M
5		3	SS	Loose brown silty coarse to fine SAND, with gravel			21.5	34	27	M
6			SS							
10		3	SS	- sand and gravel, with silt			7.6	NP	NP	M
		7	SS	(Stratum 2)	169.5					
15		39	SS	Dense to very dense light brown silty coarse to fine SAND, trace fine gravel, micaceous						
20		36	SS				26.8			M
25		30	SS							
30		50/3"	SS	(Stratum 3)	153.1					
35				Notes: 1. The boring was advanced to 5 ft depth using hand tools. Samples were obtained using hand tools at various depths. The relative density was evaluated based on the resistance to the hand tools. 2. Groundwater was observed at approximately 11 ft depth at the completion of drilling. 3. Drilling resistance, i.e. Rig Chatter, was observed at depths of 16 to 19 ft.						
40										

Completion Depth: 29.9 ft.Water Depth: See ft., After _____ hrs.Project No.: 60593246.2ANotes ft., After _____ hrs.Project Name: DNREC NVF Bengie Rd PS and FM

ft., After _____ hrs.

Drilling Method: Hollow Stem Augers

ft., After _____ hrs.

DATE 5/30/19 SURFACE ELEVATION 176.5 LOCATION See Plate 2

7/29/19 BORLOGR BENDER LOGS.GPJ

_____ ft., After _____ hrs.

Attachment B
Laboratory Testing

Physical property tests were conducted in the laboratory on selected representative soil samples to aid in classification and for correlation with engineering behavior of the soils. These tests included natural water content (ASTM D 2216), grain size analysis (ASTM D 422) and Atterberg Limits testing (ASTM D 4318).

The numerical results are summarized on Page B-2 and are also shown on the appropriate boring logs. Grain-size distribution curves are presented on Pages B-3 and B-4.

Project: DNREC NVF PS & FM
Project No.: 60593246



SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2 μ (%)			Stress (psi)	Strain (%)	UU	CIU		
B-1 HD-2	2.0-4.0	Brown SILTY SAND	SM	34.6						37									
B-1 S-1	5.0-7.0	Brown SILTY SAND with GRAVEL	SM	21.5		34	27			32									
B-1 S-3	9.0-11.0	Gray POORLY GRADED GRAVEL with SILT and SAND	GP-GM	7.6		NP	NP			6									
B-1 S-6	19.0-21.0	Brown SANDY SILT	ML	26.8						61									
B-2 S-2	7.0-9.0	Brown SILTY SAND	SM	13.6						14									
B-2 S-5	11.0-13.0	Brown SILTY SAND	SM	22.8						19									

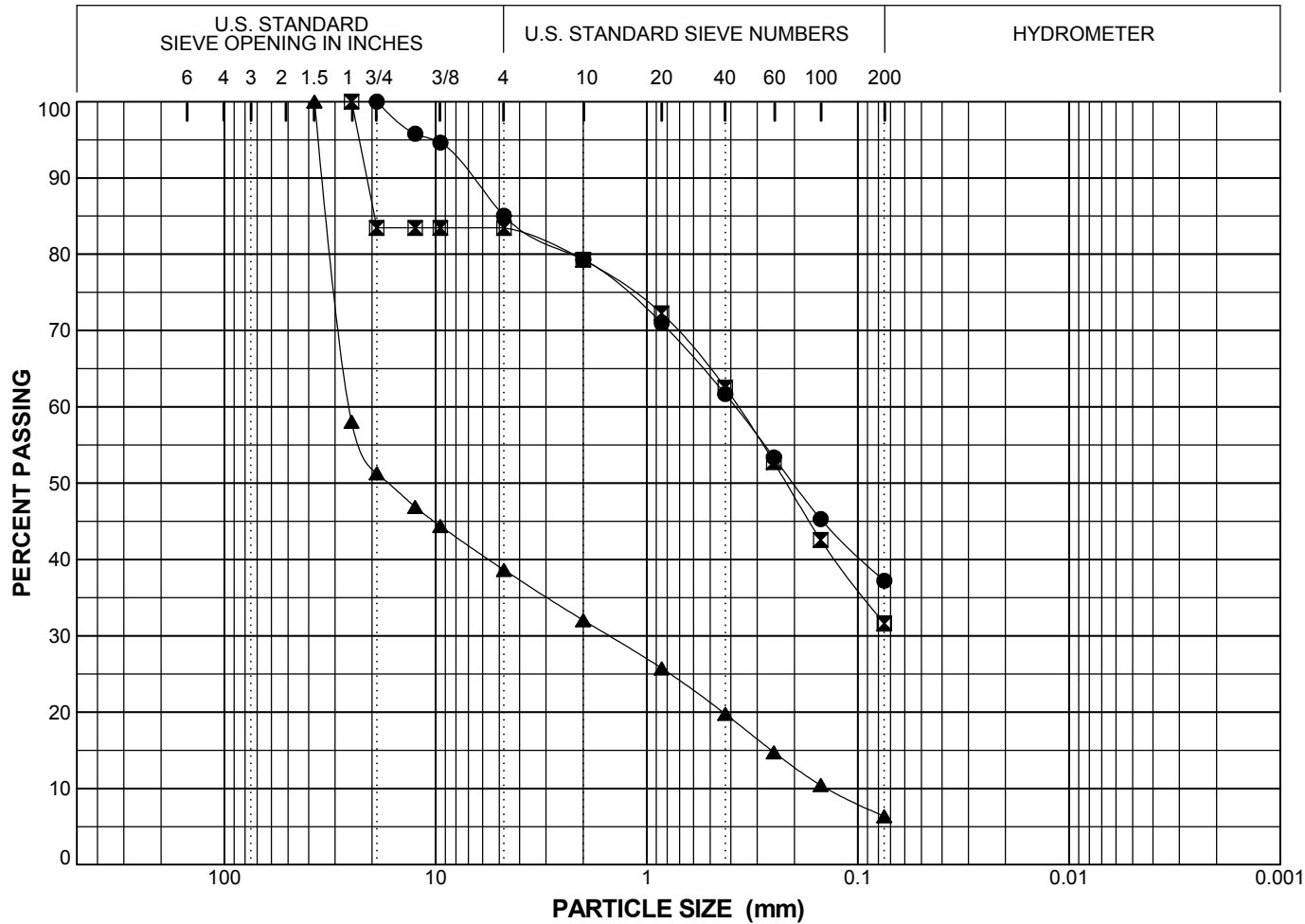
Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

★ Refer to Laboratory Test Curves

Sheet 1 of 1

Project File Path:

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



SYMBOL	●	☒	▲
Boring	B-1	B-1	B-1
Sample	HD-2	S-1	S-3
Spec			
Depth (ft)	2.0-4.0	5.0-7.0	9.0-11.0
% +3"	0.0	0.0	0.0
% Gravel	15.0	16.5	61.4
% Sand	47.8	51.8	32.3
% Fines	37.2	31.6	6.3
% -2 μ			
Cc			0.65
Cu			182.53
LL		34	NP
PL		27	NP
PI		7	NP
USCS	SM	SM	GP-GM
w (%)	34.6	21.5	7.6

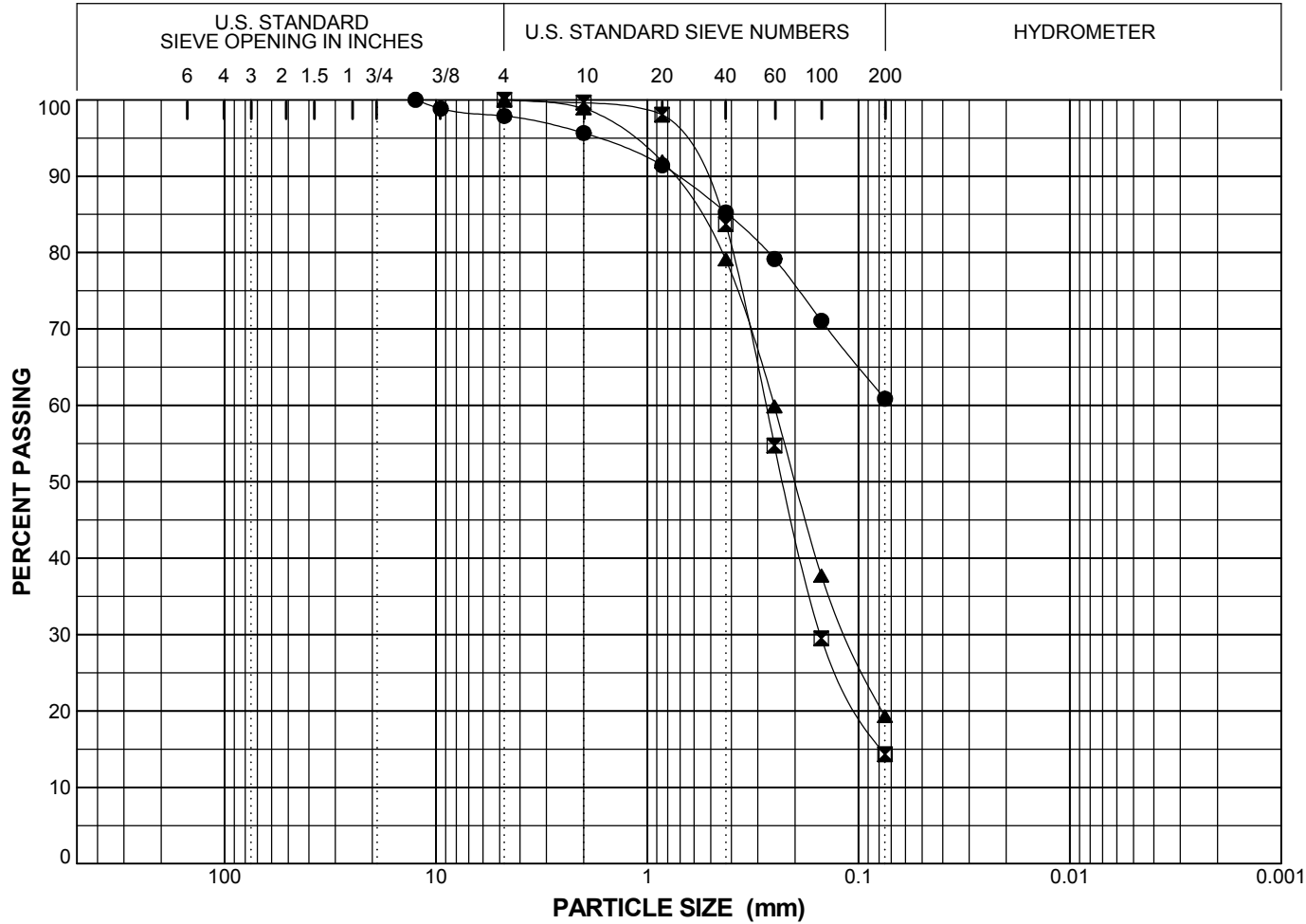
Particle Size (Sieve #)	PERCENT FINER		
	●	☒	▲
2"			
1 1/2"			100.0
1"		100.0	58.0
3/4"	100.0	83.5	51.3
1/2"	95.8	83.5	46.9
3/8"	94.6	83.5	44.4
4	85.0	83.5	38.6
10	79.3	79.3	32.0
20	71.0	72.2	25.7
40	61.7	62.5	19.8
60	53.4	52.8	14.7
100	45.3	42.6	10.4
200	37.2	31.6	6.3

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SILTY SAND (SM)
☒	Brown SILTY SAND with GRAVEL (SM)
▲	Gray POORLY GRADED GRAVEL with SILT and SAND (GP-GM)

PARTICLE SIZE DISTRIBUTION		
DNREC NVF PS & FM		
Project Number 60593246	July 2019	Figure 1
AECOM		

SIEVE BLUEBELL_NEW 60593246_2019-06-15_DNREC NVF PS & FM.GPJ URS_BLUE_GDT 7/12/19

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



SYMBOL	●	☒	▲
Boring	B-1	B-2	B-2
Sample	S-6	S-2	S-5
Spec			
Depth (ft)	19.0-21.0	7.0-9.0	11.0-13.0
% +3"	0.0	0.0	0.0
% Gravel	2.1	0.0	0.0
% Sand	37.0	85.7	80.7
% Fines	60.9	14.3	19.3
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	ML	SM	SM
w (%)	26.8	13.6	22.8

Particle Size (Sieve #)	PERCENT FINER		
	●	☒	▲
2"			
1 1/2"			
1"			
3/4"			
1/2"	100.0		
3/8"	98.9		
4	97.9	100.0	100.0
10	95.7	99.6	98.9
20	91.4	98.1	92.0
40	85.3	83.7	79.1
60	79.2	54.7	59.9
100	71.1	29.5	37.7
200	60.9	14.3	19.3

SYMBOL	DESCRIPTION AND REMARKS
●	Brown SANDY SILT (ML)
☒	Brown SILTY SAND (SM)
▲	Brown SILTY SAND (SM)

PARTICLE SIZE DISTRIBUTION		
DNREC NVF PS & FM		
Project Number 60593246	July 2019	Figure 2
AECOM		

APPENDIX D

JOHN D. HYNES & ASSOCIATES, INC.

REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL
CONSULTING SERVICES



JOHN D. HYNES & ASSOCIATES, INC.

*Geotechnical and Environmental Consultants
Monitoring Well Installation
Construction Inspection and Materials Testing*

January 25, 2024

Julio F. Seneus, M.C.C., P.E.
DNREC Division of Parks and Recreation
89 Kings Highway
Dover, Delaware 19901

Re: Report of Subsurface Exploration and Geotechnical Consulting Services
DNREC-Auburn Valley Master Plan Area Redevelopment of NVF
Site-Benge Road Pump Station
Yorklyn, Delaware
Project No.: JDH-10/23/407

Dear Mr. Seneus:

John D. Hynes & Associates, Inc. has completed the authorized subsurface exploration and geotechnical consulting services for the proposed DNREC-Auburn Valley Master Plan Area Redevelopment of NVF Site-Benge Road Pump Station in Dover, Delaware. Our services were performed, generally, in accordance with our proposal dated October 20, 2023.

This report describes the exploration methods employed, exhibits the data obtained, and presents a discussion regarding the materials encountered. We encountered rock in Boring B-3 at 18.1 feet. The other borings were all drilled deeper than scheduled without encountering rock.

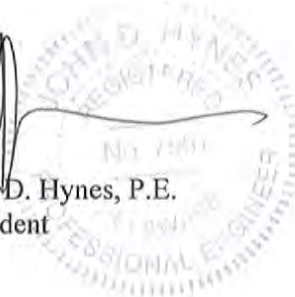
We appreciate the opportunity to be of service to you. If you have any questions regarding the contents of this report or if we may be of further assistance, please contact our office.

Respectfully,
JOHN D. HYNES & ASSOCIATES, INC.

Kelly Chiers
for: Evan H. Cross
Geologist

EHC: JDH/kc

John D. Hynes
John D. Hynes, P.E.
President





**REPORT OF
SUBSURFACE EXPLORATION
AND
GEOTECHNICAL CONSULTING SERVICES**

**DNREC-AUBURN VALLEY MASTER PLAN AREA REDEVELOPMENT OF NVF SITE-BENGE
ROAD PUMP STATION
YORKLYN, DELAWARE**

**PREPARED FOR
DNREC**

**JANUARY 25, 2024
PROJECT NO.: JDH-10/23/407**



TABLE OF CONTENTS

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PURPOSE AND SCOPE	1
EXISTING SITE CONDITIONS	1
PROJECT DESCRIPTION	1
FIELD EXPLORATION AND STUDY	1
SUBSURFACE CONDITIONS	2
REMARKS.....	2
APPENDIX	4



PURPOSE AND SCOPE

The subsurface exploration study was performed to evaluate the subsurface conditions with respect to the following:

1. Characteristics of subgrade subsurface soils and rock; and
2. Location of groundwater and applicable construction dewatering control procedures.

An evaluation of the site, with respect to potential construction problems and recommendations dealing with earthwork and inspection during construction, is included. The inspection is considered necessary both to confirm the subsurface conditions and to verify that the soils related construction phases are performed properly.

EXISTING SITE CONDITIONS

As shown on the Project Location Map (Drawing JDH-10/23/407-A) in the Appendix, the project site is located at 3000 Creek Road within the Auburn Valley State Park in Hockessin, Delaware. The property is currently developed with buildings, parking lot pavements, and landscaped areas associated with the State Park. The site is located in a rural area with undeveloped woodland to the west, Creek Road to the north, Bengé Road to the east, and Farm Lane to the south. Topographically, the project site sits atop a plateau with elevation decreasing gently to the south, east, and west.

PROJECT DESCRIPTION

The project includes the improvements to the existing network of utilities, sewer lines and associated pumping stations. Hynes & Associates was asked to provide soil, rock (if encountered), and groundwater data at 4 locations within the project site.

FIELD EXPLORATION AND STUDY

In order to determine the nature of the subsurface conditions along the proposed utility alignments, 4 test borings, designated as B-3 through B-6, were drilled to depths of 15.5 to 25.0 feet below existing grade on December 18, 2023 at the approximate locations indicated on the attached Boring Location Plan (Drawing JDH-10/23/407-B) in the Appendix. Borings B-3, B-4, B-5 and B-6 were planned to be drilled to depths of 25 feet, 15 feet, 15 feet and 10 feet, respectively. Borings B-4, B-5 and B-6 were drilled to depths of 19.5, 19 and 15.5 respectively to explore for rock. We note that test borings B-1 and B-2 had been drilled in a previous subsurface exploration. A track mounted Geoprobe 3230 DT drill rig was used to drill the test borings.

Samples of the subsurface soils were examined by our engineering staff and were visually classified in accordance with the Unified Soil Classification System (USCS) and ASTM Specification D-2488. The estimated USCS symbols appear on the boring logs and keys to the systems' nomenclature are provided in the Appendix of this report. Also included are reference sheets which define the terms and symbols used on the boring logs and explain the Standard Penetration Test procedures.

We note that the test boring records represent our interpretation of the field data based on visual examination. Indicated interfaces between materials may be gradual.



The field exploration data is supplemented with laboratory testing data. Hynes & Associates performed 4 Atterberg Limits (Liquid and Plastic) tests on soils, and 2 unconfined compressive strength tests on rock core samples. The unconfined compressive strength for the rock was 1230 psi and 1490 psi. We note that the rock was weathered.

SUBSURFACE CONDITIONS

At the time of our field exploration, approximately 6 to 24 inches of organic bearing soil were encountered at the ground surface at the test boring locations. Varying thicknesses of organic bearing soils or other surficial materials may be encountered at other locations on site.

The soils encountered below the organic soil horizon were visually classified in accordance with the USCS and consisted of interbedded layers of Silty SAND (SM) and Clayey SILT (ML) to the boring termination depths. The single granular soil layer encountered was characterized by a Standard Penetration Test (SPT) value (N-value) of 13 blows per foot, indicating an in-place relative density of medium dense. N-values in the cohesive soil layers ranged from 4 blows per foot to 50 blows over 1 inch, indicating in-place consistencies of soft to hard.

We note that micaceous decomposed rock was encountered as shallow as 2.5 feet below grade and extended to the boring termination depths. We encountered rock at test boring location B-3 at a depth of 18.0 feet below existing grade. Core drilling was performed at boring location B-3 and samples of the bedrock were recovered. The rock was classified as highly weathered, very soft Schist from 18 to 20 feet below grade and highly to moderately weathered, soft to moderately hard Gneiss from 20 to 25.5 feet below grade. Rock Quality Designation (RQD) ranged from 16 percent to 23 percent. The rock core unconfined compressive strength test results are presented in the table below. The tests consisted of highly weathered rock samples from 23 to 24 feet below grade at test boring location B-3.

Location	Rock Type	Core Diameter (in)	Average Compressive Strength (psi)
B-3/Run-2/23.0' to 23.5'	GNEISS (Weathered)	2	1,230
B-3/Run-2/23.5' to 24.0'	GNEISS (Weathered)	2	1,490

Groundwater was not encountered in the test borings to their respective boring termination depths. Groundwater elevations may vary at other times during the year due to seasonal changes, the extent of local surface development, and the amount of local precipitation.

REMARKS

This report has been prepared solely and exclusively for DNREC to provide guidance to design professionals in developing facilities plans for the proposed DNREC-Auburn Valley Master Plan Area Redevelopment of NVF Site-Benge Road Pump Station in Dover, Delaware. It has not been developed to meet the needs of others, and application of this report for other than its intended purpose could result in substantial difficulties. The Consulting Engineer cannot be held accountable for any problems which occur due to the application of this report to other than its intended purpose. This report in its entirety should be attached to the project specifications.



These analyses and recommendations are, of necessity, based on the concepts made available to us at the time of the writing of this report, and on-site conditions, surface and subsurface that existed at the time the exploratory borings were drilled. Further assumption has been made that the limited exploratory borings, in relation both to the areal extent of the site and to depth, are representative of conditions across the site. It is also recommended that we be given the opportunity to review all plans for the project in order to comment on the interaction of soil conditions as described herein and the design requirements.

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted engineering principles and practices.



APPENDIX

1. Investigative Procedures
2. Project Location Map
3. Boring Location Plan
4. Boring Logs
5. Unified Soil Classification Sheet
6. Field Classification Sheet
7. Important Information Sheet



INVESTIGATIVE PROCEDURES

SOIL TEST BORINGS

Soil drilling and sampling operations were performed in accordance with ASTM Specification D-1586. The borings were advanced by mechanically turning continuous hollow stem auger flights into the ground. At regular intervals, samples were obtained with a standard 1.4 inch I.D., 2.0 inch O.D. splitspoon sampler. The sampler was first seated 6 inches to penetrate any loose cuttings and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is the "Standard Penetration Resistance". The penetration resistance, when properly evaluated, is an index to the soil's strength, density and behavior under applied loads. The soil descriptions and penetration resistances for each boring are presented on the Test Boring Records in the Appendix.

SOIL CLASSIFICATION

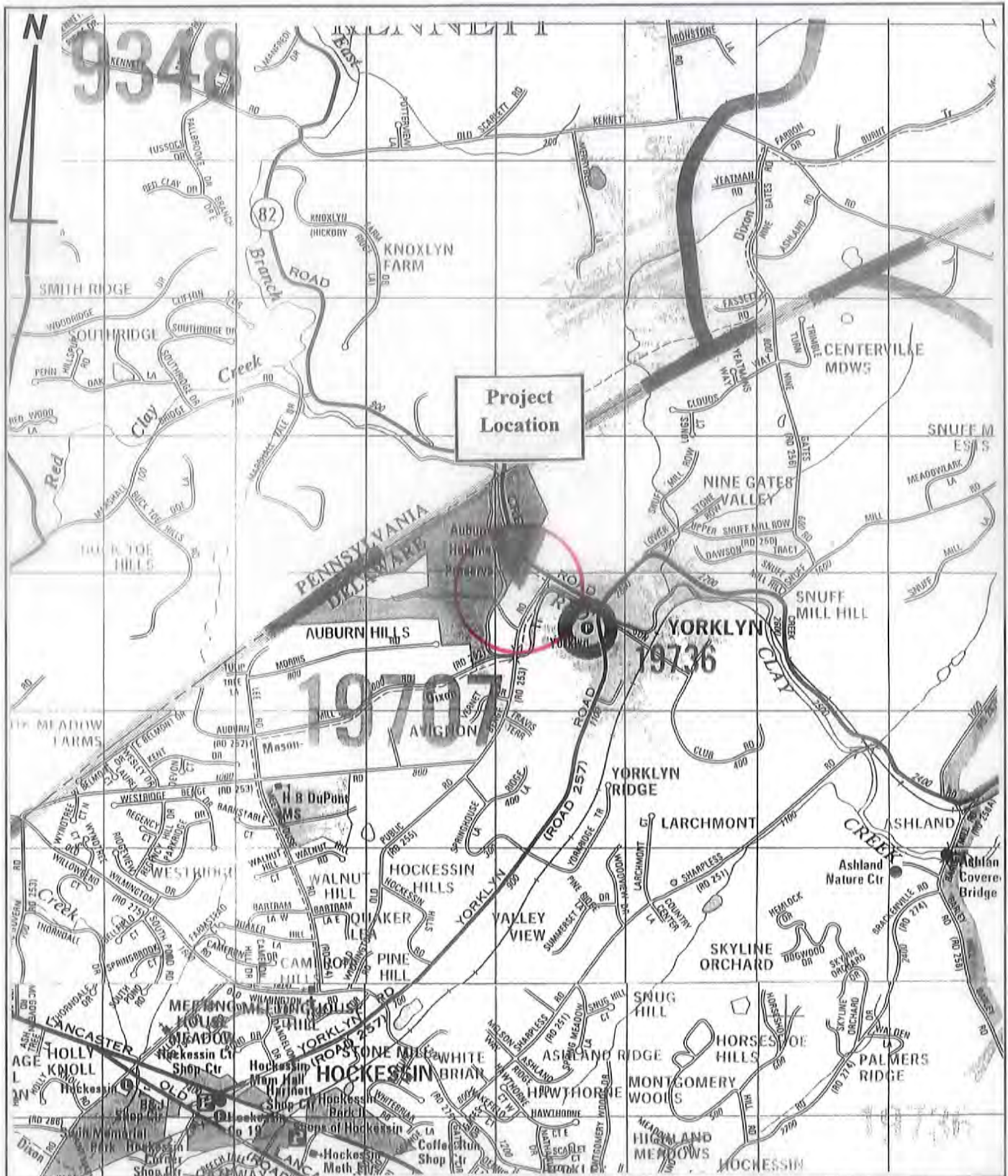
Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigation, jar samples obtained during drilling operations are examined in our laboratory and visually classified by the geotechnical engineer in accordance with ASTM Specification D-2488. The soils are classified according to the AASHTO or Unified Classification System (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior.

ATTERBERG LIMITS TEST

Portions from representative soil samples obtained during drilling operations were selected for Atterberg Limits tests. The Atterberg Limits are indicative of the soil's plasticity characteristics. The liquid limit is the moisture content at which the soil will flow as a heavy viscous fluid and is determined in accordance with ASTM Specification D-4318. The plastic limit is the moisture content at which the soil begins to lose its plasticity and is determined in accordance with ASTM Specification D-4318.

UNCONFINED COMPRESSIVE STRENGTH TEST ON ROCK CORES

Uniaxial compressive strength of rock ASTM Specification D-7012 is used for obtaining strength determinations. Deformation and strength of rock are known to be functions of confining pressure. This strength test is used in our evaluation of the stability of structures against loads.



JOHN D. HYNES & ASSOCIATES, INC.

32185 Beaver Run Drive • Salisbury, Maryland 21804

410-546-6462 / Fax: 410-548-5346

Date: December 20, 2023

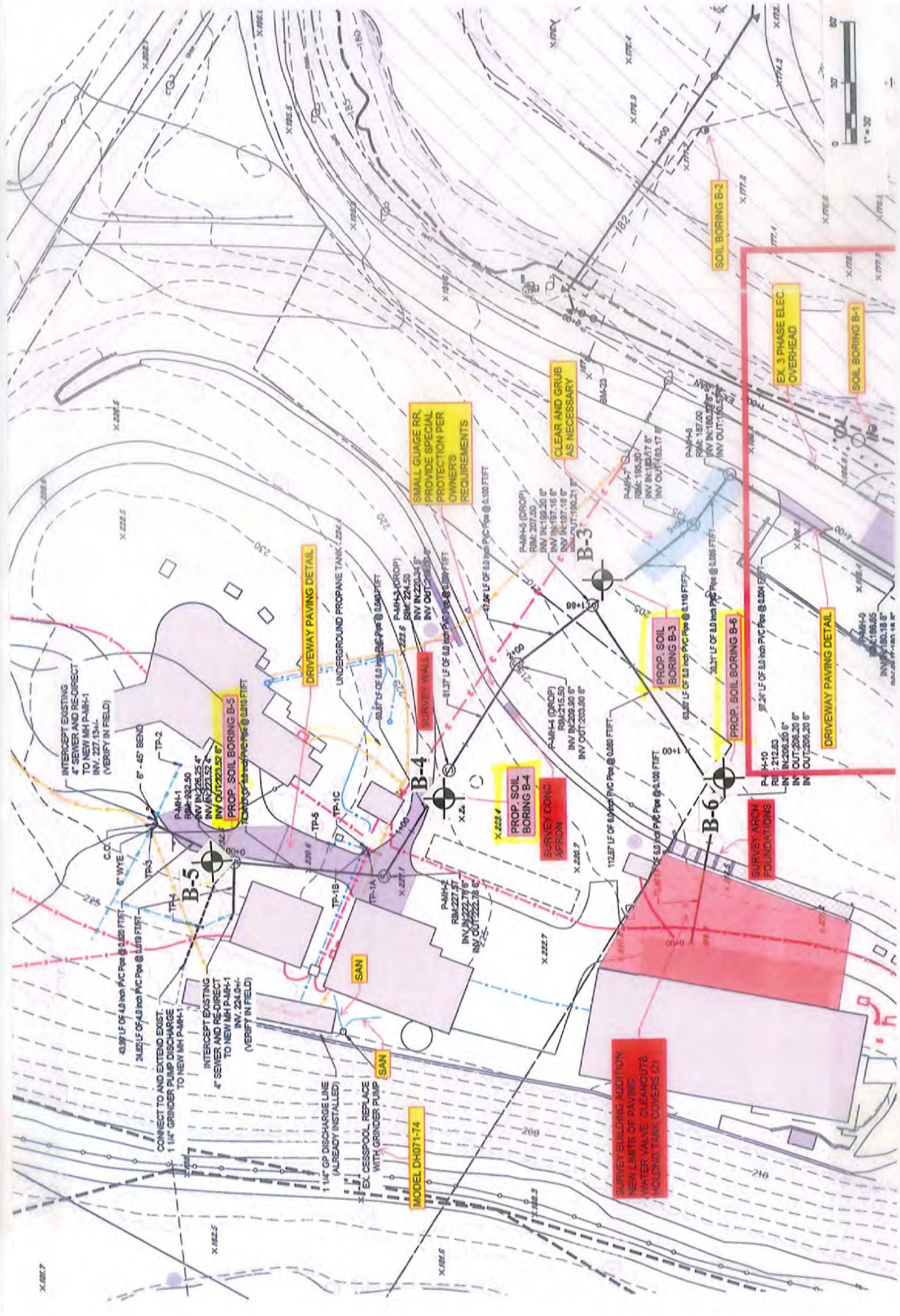
Scale = 1" = 2000 feet

Drawn: ADC Maps

DWG. No.

JDH-10-23-407-A

Project Location Map
DNREC-Auburn Valley
Hockessin, Delaware





JOHN D. HYNES & ASSOCIATES, INC.
 32185 Beaver Run Drive • Salisbury, Maryland 21804
 410-546-6462 / Fax: 410-548-5346

Boring Location Plan
 DNREC-Auburn Valley
 Hockessin, Delaware

Date: December 20, 2023
 Scale: As Shown
 Drawn: AECOM
 DWG. No. JDH-10-23-407-B



**HYNES
&
ASSOCIATES**

LOG OF BORING B-3

(Page 1 of 1)

DNREC Division of Parks and Recreation
89 Kings Highway
Dover, Delaware 19901

Date Completed: : December 12, 2023
Logged By: : E. Cross
Drilled By: : B. Walters
Drilling Method: : HSA (Geoprobe 3230)
Total Depth: : 25 feet

DNREC-Auburn Valley Benge Road Pump Sta.

Project No.: JDH-10/23/407

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, wet, soft, clayey SILT		ML	1	1-1-1-3	Scale 1" ~ 5 feet
2						Approximately 10 inches of organic bearing soil was encountered at the ground surface.
4	Dark brown, wet, soft, organic SILT, with little fine to medium sand (decomposed rock, micaceous)			2	3-4-7	Groundwater was not encountered during drilling operations.
6				3	3-3-6	Boring caved in at 5 feet.
8						Laboratory Test Results
10			ML	4	4-6-7	Sample No. 5 From 14 to 15.5 feet
12						Atterberg Limits
14				5	6-8-11	Liquid Limit = 40 Plasticity Index = 0 Natural Moisture = 12.4%
16						
18	Gray, soft to medium hard, weathered, Schist (REC = 90%; RQD = 16%)		Rock Core	6	50/1"	
20	Gray, medium hard to hard, weathered to fresh, Gneiss (REC = 90%; RQD = 53%)			7		
22			Rock Core			
24				8		
26	Boring terminated at 25 feet.					
28						
30						
32						



**HYNES
&
ASSOCIATES**

LOG OF BORING B-4

(Page 1 of 1)

DNREC Division of Parks and Recreation
89 Kings Highway
Dover, Delaware 19901

Date Completed: : December 12, 2023
Logged By: : E. Cross
Drilled By: : B. Walters
Drilling Method: : HSA (Geoprobe 3230)
Total Depth: : 19.5 feet

DNREC-Auburn Valley Benge Road Pump Sta.

Project No.: JDH-10/23/407

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, wet, soft, clayey SILT		ML	1	2-3-2-3	Scale 1" ~ 5 feet
2	Brown, wet, medium stiff, clayey SILT (decomposed rock, micaceous)		ML	2	2-3-5	Approximately 6 inches of organic bearing soil was encountered at the ground surface.
4	Brown, wet, very stiff, clayey SILT (decomposed rock, micaceous, rock fragments)		ML	3	5-7-12	Groundwater was not encountered during drilling operations.
6	Brown, wet, hard, clayey SILT (decomposed rock, micaceous)		ML	4	17-22-33	Boring caved in at 5 feet.
8	Brown, wet, hard, clayey SILT (decomposed rock, micaceous, rock fragments)		ML	5	28-50/3"	Laboratory Test Results
10						Sample No. 2 From 3 to 4.5 feet
12						Atterberg Limits
14						Liquid Limit = 31 Plasticity Index = 0 Natural Moisture = 19.3%
16						Sample No. 6 From 19 to 19.5 feet
18						Atterberg Limits
20	Boring terminated at 19.5 feet.			6	50/5"	Liquid Limit = 26 Plasticity Index = 0 Natural Moisture = 6.0%
22						
24						
26						
28						
30						
32						



**HYNES
&
ASSOCIATES**

LOG OF BORING B-5

(Page 1 of 1)

DNREC Division of Parks and Recreation
89 Kings Highway
Dover, Delaware 19901

Date Completed: : December 12, 2023
Logged By: : E. Cross
Drilled By: : B. Walters
Drilling Method: : HSA (Geoprobe 3230)
Total Depth: : 19 feet

DNREC-Auburn Valley Benge Road Pump Sta.
Project No.: JDH-10/23/407

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, wet, soft, clayey SILT, with trace sand		ML	1	2-1-2-2	Scale 1" ~ 5 feet
2	Brownish gray, wet, medium dense, fine to coarse SAND, with little silt, trace gravel, trace mica		SM	2	3-5-8	Approximately 24 inches of organic bearing soil was encountered at the ground surface.
4	Brownish gray, wet, medium stiff to hard, clayey SILT (decomposed rock, micaceous)		ML	3	3-4-6	Groundwater was not encountered during drilling operations.
6				4	10-14-18	Boring caved in at 4 feet.
8				5	30-42-50/3"	
10				6	50/4"	
12						
14						
16						
18	Light brown, wet, hard, clayey SILT (decomposed rock, micaceous)		ML			
20	Boring terminated at 19 feet.					
22						
24						
26						
28						
30						
32						



**HYNES
&
ASSOCIATES**

LOG OF BORING B-6

(Page 1 of 1)

DNREC Division of Parks and Recreation
89 Kings Highway
Dover, Delaware 19901

Date Completed: : December 12, 2023
Logged By: : E. Cross
Drilled By: : B. Walters
Drilling Method: : HSA (Geoprobe 3230)
Total Depth: : 15.5 feet

DNREC-Auburn Valley Benge Road Pump Sta.

Project No.: JDH-10/23/407

Depth in Feet	DESCRIPTION	GRAPHIC	USCS	Sample No.	Blows per 6 inches	REMARKS
0	Brown, wet, soft, clayey SILT		ML	1	1-1-1-3	Scale 1" ~ 5 feet
2						Approximately 6 inches of organic bearing soil was encountered at the ground surface.
4	Brown, wet, medium stiff to very stiff, clayey SILT (decomposed rock, micaceous)		ML	2	3-4-12	Groundwater was not encountered during drilling operations.
6						Boring caved in at 4 feet.
8	Light brown, wet, hard, clayey SILT (decomposed rock, rock fragments, micaceous)			3	2-2-4	Laboratory Test Results
10			ML	4	3-3-6	Sample No. 4 From 9 to 10.5 feet
12						Atterberg Limits
14				5	2-8-50/4"	Liquid Limit = 41 Plasticity Index = 0 Natural Moisture = 29.7%
16	Boring terminated at 15.5 feet.					
18						
20						
22						
24						
26						
28						
30						
32						



JOHN D. HYNES & ASSOCIATES, INC.

Geotechnical and Environmental Consultants
Monitoring Well Installation
Construction Inspection and Materials Testing

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions			Group Symbols	Typical Names	Laboratory Classification Criteria			
Coarse-grained soils (More than half of material is larger than No 200 sieve size)	Gravels (More than half of coarse fraction is larger than No 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No 200 sieve size), coarse grained soils are classified as follows: Less than 5 percent More than 12 percent 5 to 12 percent GW, GP, SW, SP GM, GC, SM, SC <i>Borderline cases requiring dual symbols^a</i>	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3		
			GP	Poorly graded gravels, gravel sand mixtures, little or no fines		Not meeting all gradation requirements for GW		
		Gravels with fines (Appreciable amount of fines)	GMA	d		Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols
				u				
	Sands (More than half of coarse fraction is smaller than No 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands,		Atterberg limits above "A" line with P.I. greater than 7	Above "A" line with P.I. between 4 and 7 are <i>borderline</i> cases requiring use of dual symbols	
			SP	Poorly graded sands, gravelly sands, little or no fines				
		Sands with fines (Appreciable amount of fines)	SMA	d				Silty sands, sand-silt mixtures
				u				
			SC	Clayey sands, sand-clay mixtures				
Fine-grained soils (More than half material is smaller than No 200 sieve)	Silts and clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity					
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays					
		OL	Organic silts and organic silty clays of low plasticity					
	Silts and clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts					
		CH	Inorganic clays of high plasticity, fat clays					
		OH	Organic clays of medium to high plasticity, organic silts					
	Highly organic soils	Pt	Peat and other highly organic soils					



FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

NON-COHESIVE SOILS

(Silt, Sand, Gravel and Combinations)

DENSITY

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	- 11 to 30 blows/ft.
Dense	- 31 to 50 blows/ft.
Very Dense	- 51 blows/ft. or more

PARTICLE SIZE IDENTIFICATION

Boulders	- 8 inch diameter or more
Cobbles	- 3 to 8 inch diameter
Gravel	- Coarse - 1 to 3 inch - Medium - 1/2 to 1 inch - Fine - 4.75 mm to 1/2 inch
Sand	- Coarse - 2.0 mm to 4.75 mm - Medium - 0.425 mm to 2.0 mm - Fine - 0.075 mm to 0.425 mm
Silt	- 0.075 mm to 0.002 mm

RELATIVE PROPORTIONS

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

COHESIVE SOILS

(Clay, Silt and Combinations)

CONSISTENCY

Very Soft	- 3 blows/ft. or less
Soft	- 4 to 5 blows/ft.
Medium Stiff	- 6 to 10 blows/ft.
Stiff	- 11 to 15 blows/ft.
Very Stiff	- 16 to 30 blows/ft.
Hard	- 31 blows/ft. or more

PLASTICITY

Degree of Plasticity	Plasticity Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	over 22

Classification on logs are made by visual inspection of samples unless a sample has been subjected to laboratory classification testing.

Standard Penetration Test - Driving a 2.0 " O.D., 1-3/8" I.D., splitspoon sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. It is customary to drive the spoon 6 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the test are recorded for each 6 inches of penetration on the drill log (Example - 6/8/9). The standard penetration test value (N - value) can be obtained by adding the last two figures (i.e. 8 + 9 = 17 blows/ft.). (ASTM D-1586)

Strata Changes - In the column "Soil Descriptions," on the drill log, the horizontal lines represent strata changes. A solid line (—) represents an actually observed change, a dashed line (----) represents an estimated change.

Groundwater - Observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc. may cause changes in the water levels indicated on the logs.

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply this report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time to perform additional study.* Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help

others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold-prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical-engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.



8811 Colesville Road/Suite G106, Silver Spring, MD 20910

Telephone: 301/565-2733 Facsimile: 301/589-2017

e-mail: info@geoprofessional.org www.geoprofessional.org

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APPENDIX E
DELDOT SAFETY PERMIT
(TO BE INSERTED)

APPENDIX F
DNREC STANDARD PLAN APPROVAL AND
CONSTRUCTION SITE STORMWATER MANAGEMENT PLAN*

*CSSWM Plan Separately Attached



DNREC Division of Watershed Stewardship
285 Beiser Boulevard, Suite 102
Dover, DE 19904
(302) 739-9921

APPLICATION FOR STANDARD PLAN APPROVAL
MINOR LINEAR UTILITY DISTURBANCES

Applicability Criteria

1. Disturbance will be for linear utility construction, having a maximum width of disturbance of 40 feet.
2. One of the following is met:
 - a. Total disturbance is 1.0 acre or less; or
 - b. Total disturbance is 5.0 acres or less, and
 - i. No greater than 1.0 acre will be disturbed at any time throughout the course of construction, and
 - ii. Land cover will be restored to the pre-construction hydrologic condition. In the case of forest clearing, land cover will be restored to an equivalent meadow condition.

Site Information

Site Location (911 Address or road name with distance to nearest intersection):
628 Bengel Road, Yorklyn, DE 19736; 1165 Yorklyn Road, Yorklyn, DE 19736

Width of disturbed area (feet):	<u>20 ft</u>	Total Disturbed Acres (nearest 0.1ac):	<u>0.8 ac</u>
Length of disturbed area (feet):	<u>1,640 ft</u>	Proposed Impervious Area (square feet):	<u>N/A</u>
Length of disturbed area (miles):	<u>N/A</u>	Wooded area to be cleared:	<u>N/A</u>

Applicant Information

Owner: DNREC, Division of Parks & Recreation/ Julio Seneus	Applicant: AECOM/ Karen Du
Mailing Address: <u>89 Kings Way, Dover, DE 19901</u>	Mailing Address: <u>248 Chapman Road, Suite 101, Newark, DE 19702</u>
Owner Phone: <u>(302) 739-9231</u>	Applicant Phone: <u>(484) 947-9486</u>
Owner Email: <u>julio.seneus@delaware.gov</u>	Applicant Email: <u>karen.du@aecom.com</u>

Fees

The review fee is \$80 per disturbed acre to the nearest 0.1 acre with a minimum fee of \$80 for any standard plan approvals disturbing less than 1.0 acre. Make checks payable to Division of Watershed Stewardship.

Approval Information (for office use only)

Approval #	<u>2024-021</u>	Fee Paid: \$	<u>80.00</u>	IV requested	<u>3/14/2025</u>
Approved by:	<u><i>Elaine Z. Well</i></u>	Approval Date:	<u>03/14/2025</u>		
Title:	<u>Engineer VI</u>	Expiration Date:	<u>03/14/2030</u>		

Standard Conditions:

1. Stabilization with seed and mulch or seed and stabilization matting will occur daily so that no greater than one acre will be disturbed at any one time.
2. Construction through sensitive areas, including stream and wetland crossings, will be accomplished through directional drilling, with land disturbance happening outside of the sensitive area.
3. Construction site stormwater management best management practices will be used.
4. Construction projects exceeding 1.0 acre of total disturbance require submittal of a Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity. A plan fulfilling Stormwater Pollution Prevention Plan (SWPPP) requirements must be developed to obtain general permit coverage for Stormwater Discharges Associated with Construction Activity (see attachment).
5. Approval of this Standard Plan does not relieve the applicant from complying with any and all federal, state, county or municipal laws and regulations.

Stabilization Conditions

1. Following initial soil disturbance or redistribution, temporary or permanent stabilization with seed and mulch shall be completed within 14 calendar days to the surface of all disturbed areas not actively under construction.
2. Specific stabilization recommendations may be found in the Delaware Erosion and Sediment Control Handbook, 3.4.3 Standard and Specifications for Vegetative Stabilization.

Applicant Certification

I, the undersigned, certify that the information supplied on this Application for Standard Plan Approval is accurate, the proposed land disturbing activity meets the criteria established, and all conditions of this Standard Plan Approval will be met by the applicant, contractor, and owner during construction and post construction.

Applicant Signature:  Date: 4/5/2024
Applicant Printed Name: Julio Seneus Title: Civil Engineer IV

*****THIS STANDARD PLAN APPLICATION FORM MUST BE MAINTAINED ON THE SITE AT ALL TIMES DURING CONSTRUCTION*****

Standard Detail & Specifications

Construction Site Pollution Prevention

Delaware NPDES Discharge Permit

General Permit for Discharge of Stormwater from Construction Activities

((Project Name))

N/A

((NOI Permit Number))

((Agency Plan Approval ID))

((Contact Name & Number for Additional Site Information))

((Contact Name & Number to Obtain Copy of Approved Plan))

If you observe indicators of stormwater pollutants
in the discharge or in the receiving waterbody, call the
DNREC Spill Notification 24 HR Hotline at

1-800-662-8802

Example Construction General Permit (CGP) Signage

NOTES:

1. Minimum sign size 2' x 2'
2. Minimum text size 1"
3. Sign must be posted at a safe, publicly accessible location close to construction site
4. Sign must be visible from the public road nearest the active construction site
5. Signs posted within a DelDOT or other public road right-of-way (ROW) must be in accordance with all local and/or State requirements in regards to safety, location, orientation, etc.

Source:

Delaware ESC Handbook

Symbol:

Detail No.

DE-ESC-3.6.1

Sheet 1 of 4

Effective July 2023

Standard Detail & Specifications

Construction Site Pollution Prevention

Notes:

The Construction Site Pollution Prevention Plan includes the following elements:

1. Material Inventory

Document the storage and use of the following materials:

- a. Concrete
- b. Detergents
- c. Paints (enamel and latex)
- d. Cleaning solvents
- e. Pesticides
- f. Wood scraps
- g. Fertilizers
- h. Petroleum based products

2. Good housekeeping practices

- a. Store only enough product required to do the job.
- b. Store all materials in a neat, orderly manner in their original labeled containers and covered.
- c. Do not mix different substances.
- d. When possible, use all of a product prior to disposal of the container.
- e. Manufacturers' instructions for disposal should be strictly adhered to.
- f. Designate someone to inspect all BMPs daily.

3. Waste management practices

- a. Collect and store all waste materials in securely lidded dumpsters in a location that does not drain to a waterbody.
- b. Salvage and/or recycle waste materials whenever possible.
- c. The dumpsters shall be emptied a minimum of twice per week, or more if necessary. The licensed trash hauler is responsible for cleaning out dumpsters.

Source:

Adapted from USEPA
Pub. 840-B-92-002

Symbol:

Detail No.

DE-ESC-3.6.1

Sheet 2 of 4

Effective July 2023

Standard Detail & Specifications

Construction Site Pollution Prevention

Notes (cont.)

- d. Dispose of all trash in accordance with all applicable Delaware laws.
- e. Littering is strictly prohibited. Trash cans should be placed at all lunch spots and recycle bins should be placed near the construction trailer.
- f. If fertilizer bags can not be stored in a weather-proof location, they should be kept on a pallet and covered with plastic sheeting which is overlapped and anchored.

4. Equipment maintenance practices

- a. If possible, equipment should be taken to off-site commercial facilities for washing and maintenance.
- b. If performed on-site, wash vehicles with high-pressure water spray without detergents in an area contained by an impervious berm.
- c. Use drip pans for all equipment maintenance.
- d. Inspect equipment for leaks on a daily basis.
- e. Direct washout from concrete trucks into a temporary pit for hardening and proper disposal.
- f. Equip fuel nozzles with automatic shut-off valves.
- g. Dispose of all used products such as oil, antifreeze, solvents and tires in accordance with manufacturers' recommendations and local, state and federal laws and regulations.

5. Spill prevention practices

- a. Identify potential spill areas and contain them in covered areas with no connection to the storm drain system.
- b. Post warning signs in hazardous material storage areas.
- c. Perform preventive maintenance on all tanks, valves, pumps, pipes and other equipment as necessary.
- d. Prioritize low or non-toxic substances for use.

Source:

Adapted from USEPA
Pub. 840-B-92-002

Symbol:

Detail No.

DE-ESC-3.6.1

Sheet 3 of 4

Effective July 2023

Standard Detail & Specifications

Construction Site Pollution Prevention

Notes (cont.)

- e. Prominently post contact information for reporting spills through the DNREC 24-Hour Toll Free Number.

6. Education

- a. Include Best Management Practices (BMPs) for construction site pollution control as part of regular progress meetings.
- b. Information regarding waste management, equipment maintenance and spill prevention should be prominently posted in the construction trailer.

CONTACT INFORMATION

DNREC 24-Hour Toll Free Number **800-662-8802**

DNREC Solid & Hazardous Waste Management Section **302-739-9403**

Source:

Adapted from USEPA
Pub. 840-B-92-002

Symbol:

Detail No.

DE-ESC-3.6.1

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Effective July 2023