

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

DIVISION OF PARKS AND RECREATION



BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT NO. 2013-NVF-100

November 22, 2013

NOT FOR BIDDING

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**BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT NO. 2013-NVF-100**

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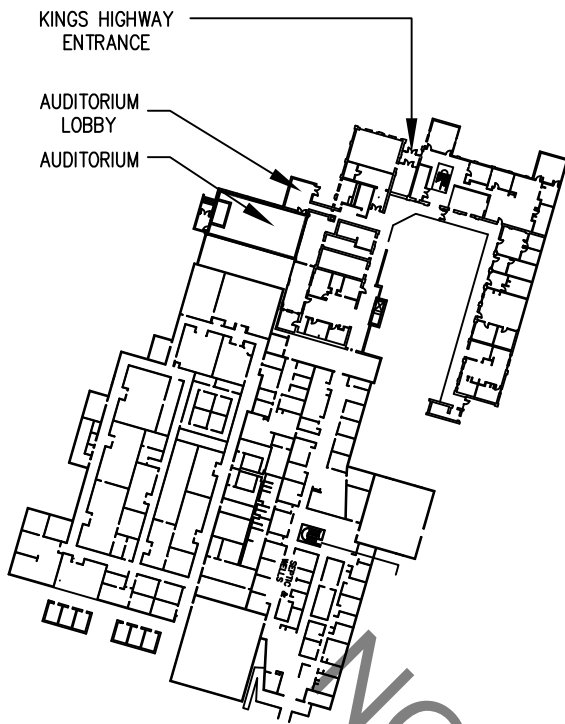
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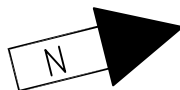
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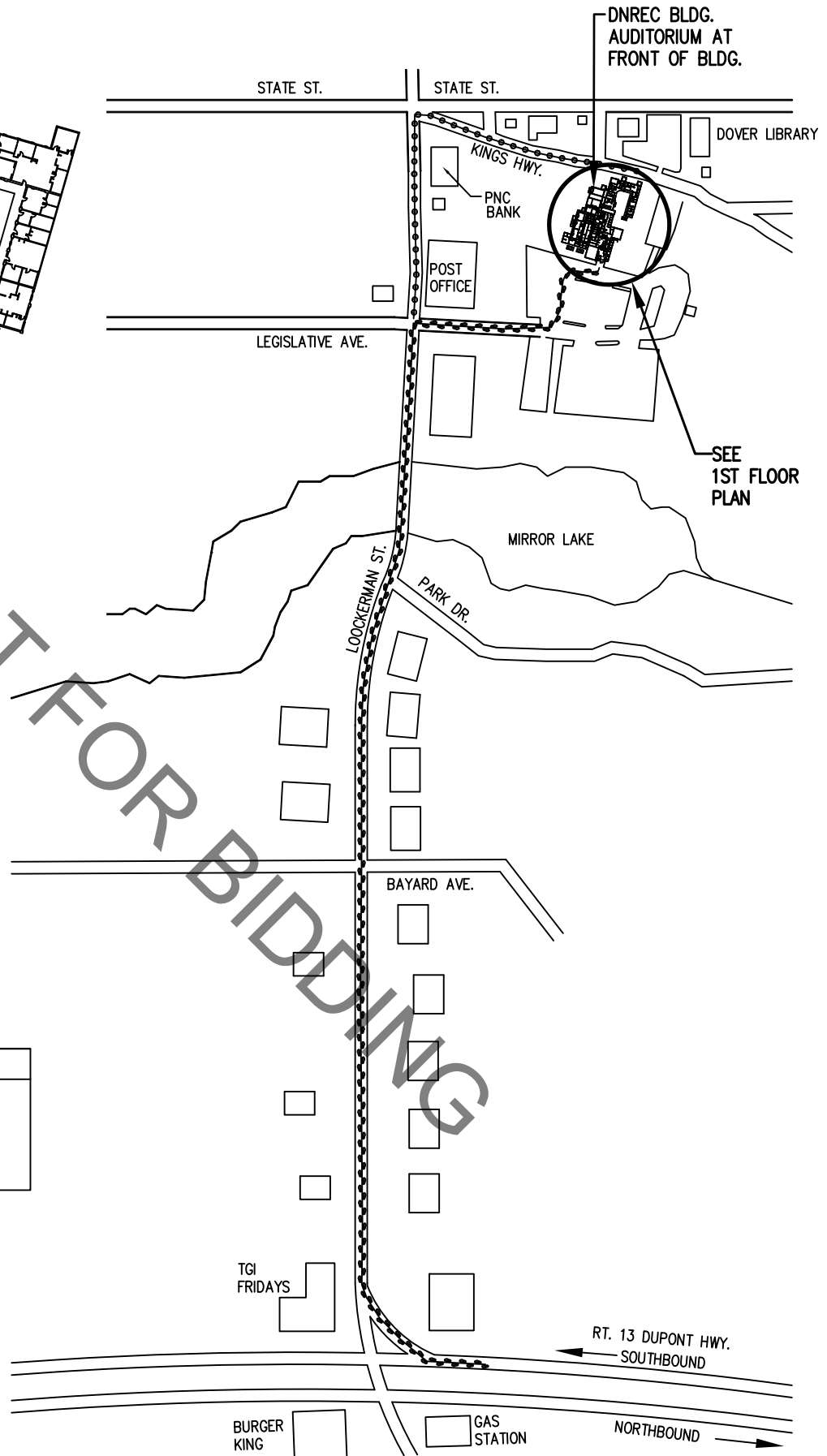
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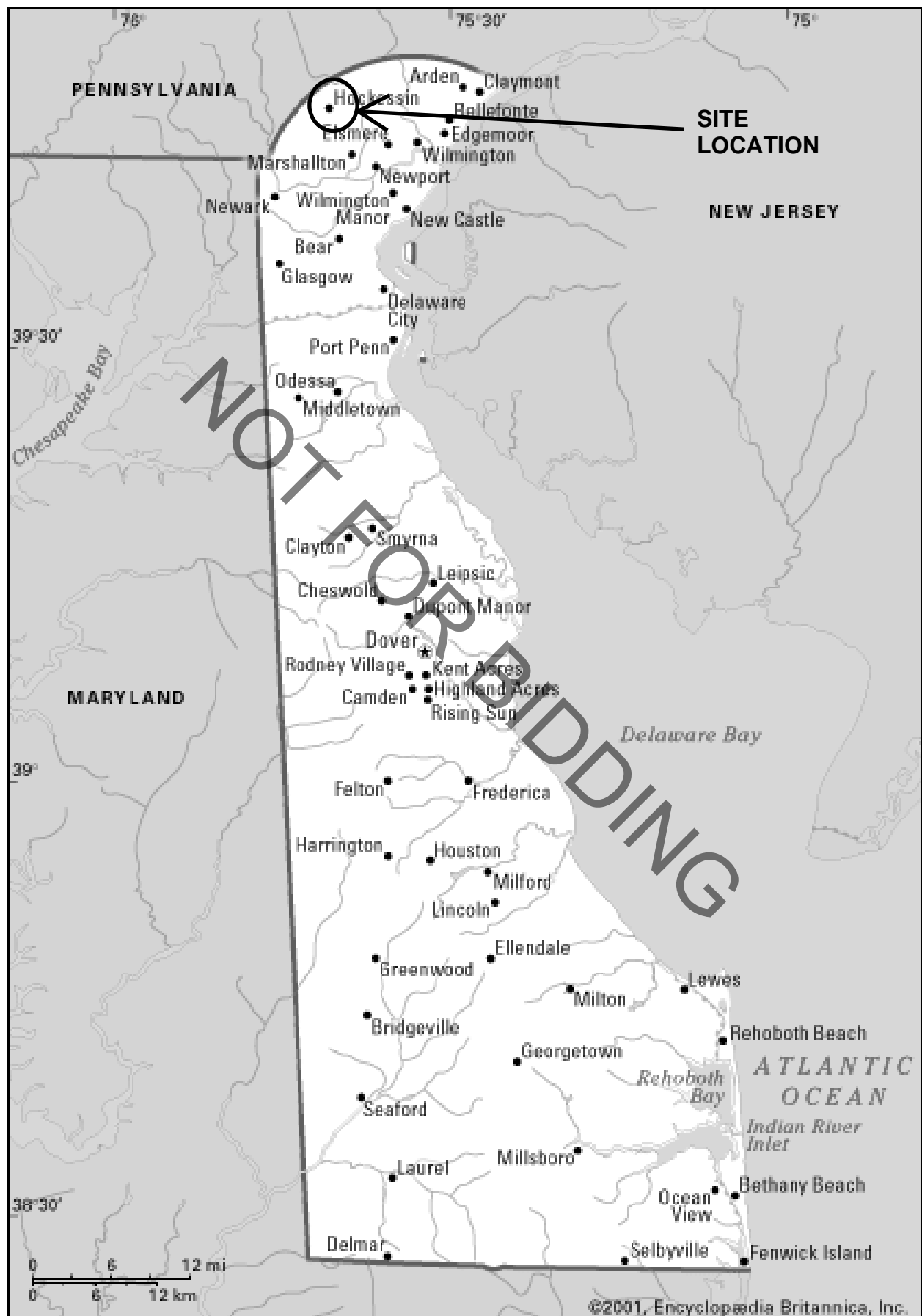
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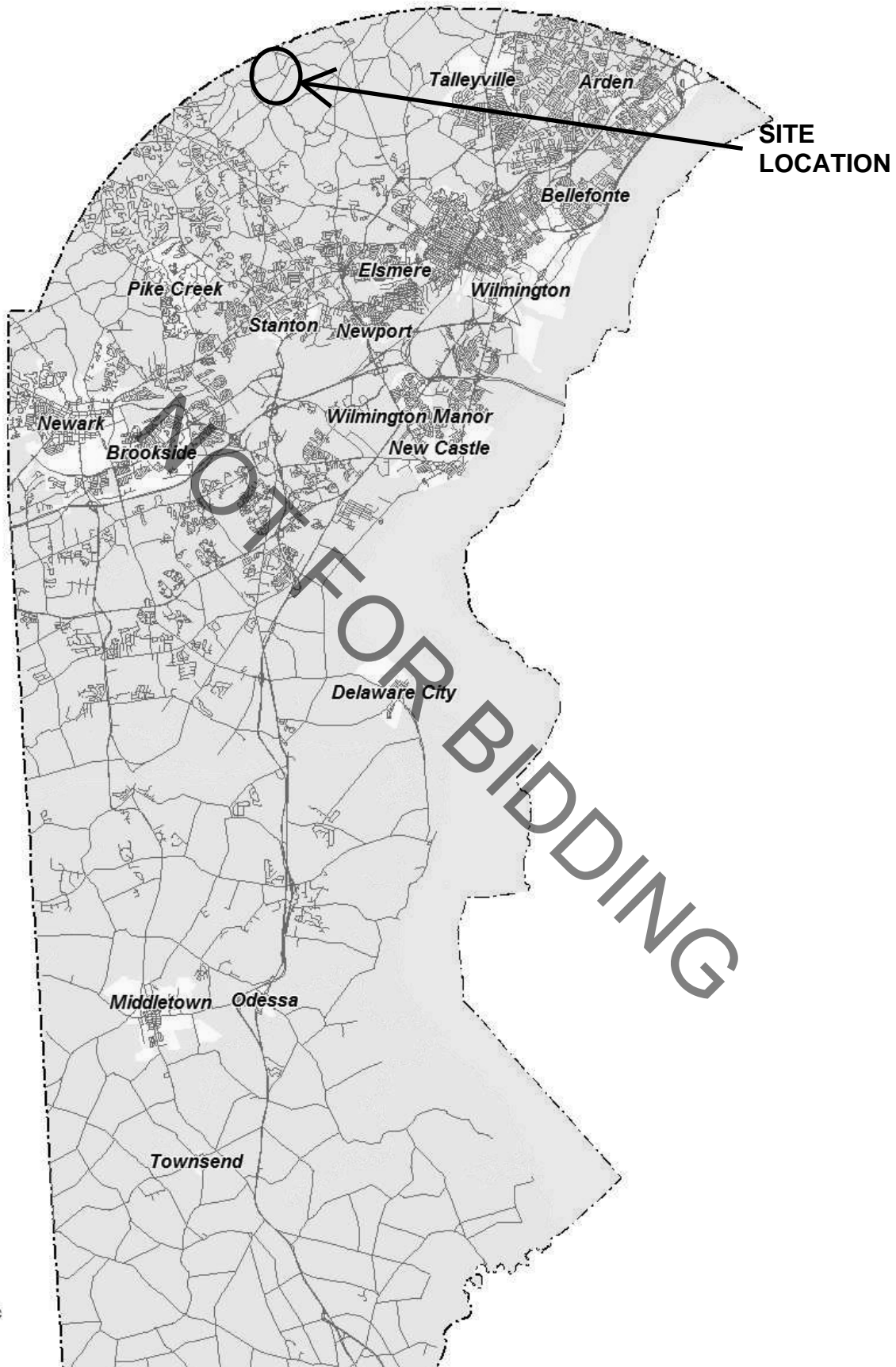
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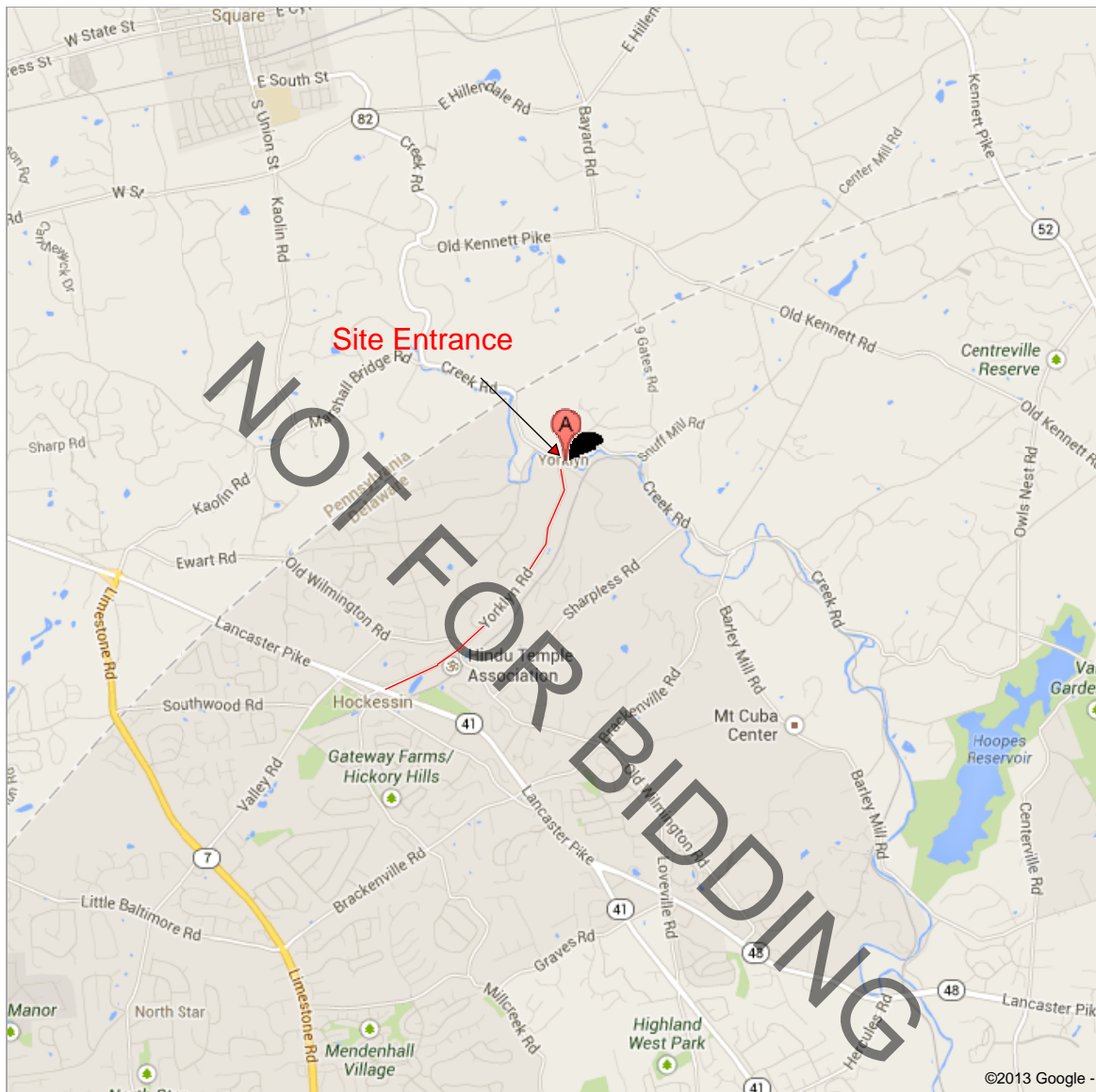


DNREC BUILDING (RICHARDSON & ROBBINS BUILDING)
LOCATION MAP



New Castle County





Bid Opening Date: 1/3/14

SECTION 00010 - INVITATION TO BID

The Department of Natural Resources and Environmental Control, Division of Parks and Recreation, Office of Design and Development, will receive sealed bids in the Auditorium, DNREC Building, 89 Kings Highway, Dover, Delaware 19901, until 3:00 p.m., January 3, 2014, at which time they will be publicly opened for the following project: BELLEVUE STATE PARK, GUN CLUB ROAD PROJECT, *CONTRACT NO. 2013-NVF-100*

This project includes widening and repaving approximately 580 feet of Yorklyn Road, construction of 700 feet of new roadway and associated work. New roadway will consist of a porous surface. A contractor or subcontractor with experience performing similar projects will be required. The project also includes a portion of work that fall under OSHA 29 CFR 1910.120 Hazardous Waste Operations. The selected contractor will be required to provide personnel with current OSHA 1910.120 certifications.

A pre-bid meeting will be held at 10:00 a.m. December 9, 2013 at the project site. Attendance at this meeting is mandatory for all prospective bidders and will be a pre-requisite for submitting a bid.

Proposals shall be placed in a sealed envelope clearly marked BID ENCLOSED, time of bid opening, Contract No. 2013-NVF-100 and addressed to:

Dept. of Natural Resources & Environmental Control
Division of Parks and Recreation
Office of Design and Development
89 Kings Highway Dover, De 19901
Attn: Cindy Todd Phone No. 302-739-9231

Prospective bidders may obtain CDs with bidding documents upon payment of \$25.00 for each CD at the above address. Checks are to be made payable to the Division of Parks and Recreation. This payment is non-refundable and the documents need not be returned.

Each bid must be accompanied by a bid guarantee equivalent to ten percent (10%) of the amount of the base bid and all add alternates. The bid guarantee may be a certified check or a bid bond secured by a surety authorized to do business in Delaware. The bid guarantee shall be made payable to the Department of Natural Resources and Environmental Control.

A copy of the bidding documents can be reviewed at the Delaware Contractors Association, 527 Stanton Christiana Road, Newark, Delaware 19713.

The Department of Natural Resources and Environmental Control, Division of Parks and Recreation, Office of Design and Development reserves the right to waive irregularities and reject any or all bids, and to waive any informalities therein. The Department also reserves the right to extend the time and place for bid opening from that described in this advertisement, with not less than 2 calendar days notice by certified mail, facsimile transmission or other verifiable electronic means to those bidders who have obtained copies of the plans and specifications. An Equal Opportunity Employer.

Collin P. O'Mara, Secretary

END OF SECTION 00010 - INVITATION TO BID

NOT FOR BIDDING

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SECTION 00100 - INSTRUCTIONS TO BIDDERS**TABLE OF ARTICLES**

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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 (OWNER):** 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 Bid opening 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.

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 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.

2.3 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 and shall submit a valid Delaware Business License Number with their Bid or shall state that the process of application for a Delaware Business License has been initiated.
- 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 Prospective Bidders may obtain complete sets of the Bidding Documents at the Department of Natural Resources & Environmental Control, Division of Parks & Recreation, Office of Design and Development, 89 Kings Highway, Dover, Delaware 19901. The cost for these documents is listed in the Invitation to Bid. This payment is non-refundable and the documents need not be returned.

- 3.1.2 Bidders shall use complete sets of Bidding Documents for preparation of Bids. Neither the issuing Agency nor the Architect assumes 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 Owner at least seven (7) 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, and received by, the Owner before 4:30 p.m., at least ten (10) 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 to the substitution, and any other information necessary for an evaluation. (Refer to Section

01600 for additional requirements) 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 time specified in 3.3.2 of this Section.

3.4 ADDENDA

3.4.1 Addenda will be sent by mail, fax, or other verifiable electronic means 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 4 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 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 of 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 Interlineations, alterations or erasures must be initialed by the signer of the Bid.

4.1.6 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 Documents.

4.1.7 Make no additional stipulations on the Bid Form and do not qualify the Bid in any other manner.

4.1.8 Each copy of the Bid shall include the legal name of the Bidder and a statement as to 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.

- 4.1.9 Bidder shall complete the Non-Collusion Statement form included with the Bid Forms and include it with their Bid.
- 4.1.10 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.

4.2 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 Office of Management and Budget (OMB) form (attached).
- 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 As required by Delaware Code, Title 29, section 6962(d)(10)b, 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 List of Sub-Contractor categories, established at, or subsequent to, the Pre-Bid Meeting, will be issued by the Owner and mailed to all prospective bidders who have obtained bidding documents. A Bid will be considered non-responsive unless the completed list is included.
- 4.3.2 Provide the Name and Address for each listed Subcontractor. Addresses by City, Town or Locality, plus State, will be acceptable.
- 4.3.3 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 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS

4.4.1 During the performance of this Contract, the Contractor agrees as follows:

- .1 The Contractor will not discriminate against any employee or applicant for employment because of race, creed, 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, 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 of race, creed, color, sexual orientation, gender identity or national origin."

4.5 PREVAILING WAGE REQUIREMENT

- 4.5.1 Wage Provisions: In accordance with Delaware Code, Title 29, Section 6960, renovation projects whose total cost shall exceed \$15,000, and \$100,000 for new construction, 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. A copy of the prevailing wage rate schedule for this project has been included at the end of this section.
- 4.5.2 The prevailing wage shall be the wage paid to a majority of employees performing similar work as reported in the Department's annual prevailing wage survey or in the absence of a majority, the average paid to all employees reported.
- 4.5.3 The employer shall pay all mechanics and labors employed directly upon the site of work, 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.
- 4.5.4 The scale of the wages to be paid shall be posted by the employer in a prominent and easily accessible place at the site of the work.
- 4.5.5 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.

4.6 SUBMISSION OF BIDS

- 4.6.1 Enclose the Bid, the Bid Security, and any other documents required to be submitted with the Bid in a sealed opaque envelope. Address the envelope to the party receiving the Bids. Identify with the project name, contract number, bid opening date and time, and the Bidder's name and address. If the Bid is sent by mail, enclose the sealed envelope in a separate mailing envelope with the notation "BID ENCLOSED" on the

face thereof. The State is not responsible for the opening of bids prior to bid opening date and time that are not properly marked.

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

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

4.6.4 Oral, telephonic or telegraphic Bids are invalid and will not receive consideration.

4.6.5 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.

4.7 MODIFICATION OR WITHDRAW OF BIDS

4.7.1 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.

4.7.2 Bidders submitting Bids that are late shall be notified as soon as practicable and the bid shall be returned.

4.7.3 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 days 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).

5.3 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:
 - .1 The Bidder's financial, physical, personnel or other resources including Subcontracts;
 - .2 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;
 - .3 The Bidder's written safety plan;
 - .4 Whether the Bidder is qualified legally to contract with the State;
 - .5 Whether the Bidder supplied all necessary information concerning its responsibility; and,
 - .6 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.
- 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.
 - .1 More than one Bid for the same Contract from an individual, firm or corporation under the same or different names.
 - .2 Evidence of collusion among Bidders.
 - .3 Unsatisfactory performance record as evidenced by past experience.

- .4 If the Unit Prices are obviously unbalanced either in excess or below reasonable cost analysis values.
- .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.
- .6 If the Bid is not accompanied by the required Bid Security and other data required by the Bidding Documents.
- .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, provided the amount of the low bid does not exceed the amount of funds available to the Owner to finance the contract, 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.
- 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. 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 a period of two years after the date of Substantial Completion.
- 5.4.6 If the successful Bidder fails to execute the required Contract and Bond, 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 Prior to receiving an award, the successful Bidder shall furnish to the Agency proof of State of Delaware Business Licensure. If the Bidder does not currently have a Business License, they may obtain an application by writing to: Division of Revenue, Carvel State Office Building, 820 French Street, Wilmington, DE 19899. A copy of the letter written to the Division of Revenue, sent with your Bid will be adequate proof for your firm to be considered for award until such time as you receive your license.

- 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 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 BUSINESS DESIGNATION FORM

- 6.2.1 Successful Bidder shall be required to accurately complete an Office of Management and Budget Business Designation Form for Subcontractors.

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 provided in the Contract Documents.
- 7.1.3 The Performance and Payment Bond forms used shall be the standard Office of Management and Budget (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.

ARTICLE 8: FORM OF AGREEMENT BETWEEN OWNER (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 SECTION 00100 - INSTRUCTIONS TO BIDDERS

NOT FOR BIDDING

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BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

For Bids Due: January 3, 2013 at 3:00pm.

To: Dept. of Natural Resources & Environmental Control
Division of Parks & Recreation
Office of Design and Development
89 Kings Highway Dover, DE 19901

Name of Bidder: _____

Delaware Business License No.: _____

Employers Identification No.: _____

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, that he has familiarized himself with all conditions affecting the prosecution of the work including the availability of materials and labor, 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, including allowance items, described by the aforesaid documents for the lump sum itemized below:

LUMP SUM BASE BID:

\$ _____
(Words)

\$ _____
(Figures)

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

ALTERNATES

Alternate prices conform to applicable project specification sections. Refer to Specification Section 01030 - Alternates for a complete description of the following Alternates. An "ADD" or "DEDUCT" amount is indicated by the crossed out part that does not apply.

ALTERNATE No. 1: Permeable Pavers Alternate 1 in lieu of Porous Asphalt

Add/Deduct: \$ _____
(Words)
\$ _____
(Figures)

ALTERNATE No. 2: Permeable Pavers Alternate 2 in lieu of Porous Asphalt

Add/Deduct: \$ _____
(Words)
\$ _____
(Figures)

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

UNIT PRICES

Unit prices conform to applicable project specification sections. Refer to Specification Section 01026 - Unit Prices for a complete description of the following Unit Prices:

Unit Price No. 1:

Over-excavation of unsuitable soils.

Add/Deduct \$ _____/CY

Unit Price No. 2:

Placement and compaction of backfill materials in over-excavation areas.

Add/Deduct \$ _____/CY

Unit Price No. 3:

Construction and demolition debris removal and offsite disposal.

Add/Deduct \$ _____/LF

Unit Price No. 4:

Removal of PCB-contaminated transformers.

Add/Deduct \$ _____/GAL

Unit Price No. 5:

Supply and Install 12 ft wide Bituminous Paved Trail
Up to 3,000 lf.

Add/Deduct \$ _____/LF

Unit Price No. 6:

Supply and Install 12 ft wide Bituminous Paved Trail
Up to 7,000 lf.

Add/Deduct \$ _____/LF

Unit Price No. 7:

Supply and Install 12 ft wide Bituminous Paved Trail
Up to 16,000 lf.

Add/Deduct \$ _____/LF

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

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

I/We agree that any changes in the scope of the work extra to the Contract requirements will be paid for pursuant to AIA Document A201, Article 7.

The bid shall remain valid and cannot be withdrawn for a period of thirty (30) days from the date of opening of bids, 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 of the Contract in accordance with the Construction Schedule and/or completion dates included with the Bid.

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.

I/We agree that all applicable Federal, State, and local taxes and cost of required insurance are included in the proposed prices.

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. This Proposal shall be attached as Exhibit A and made part of the Agreement executed by the Bidder.

I/We are licensed, or have initiated the license application as required by Section 2502, Chapter 25, Title 30, of the Delaware Code.

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

I am / We are (Check one):

_____ **An Individual.**

_____ **A Partnership** duly recorded in the Prothonatary's Office in _____ County
pursuant to Title 6 Delaware Code, Chapter 31.

_____ **A Corporation** registered with the State of Delaware pursuant to Title 8 Delaware Code.

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

Trading as _____

State of Corporation _____

Business Address: _____

Witness: _____ **By:** _____
(Authorized Signature)

(CORPORATE SEAL, if applicable) _____
Typed or printed name

(Title)

Date: _____

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

STATE OF _____)

_____ COUNTY) ss,

I hereby certify that before me this _____ day of _____,
20 _____, personally appeared _____, in
his official capacity as President/Principal, and acknowledged the aforesaid before me.

Given under by hand and notarial seal.

Notary Public

ATTACHMENTS

Non-Collusion Statement
Sub-Contractor List
Bid Security (certified check or bid bond issued on mandatory form)
(Others as Required by Project Manual)

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

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 Department of Natural Resources and Environmental Control, Division of Parks and Recreation.

All the terms and conditions of Contract No. _____ have been thoroughly examined and understood.

Name of Bidder: _____

**Authorized Representative
(Typed):** _____

**Authorized Representative
(Signature):** _____

Title: _____

Address of Bidder: _____

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.

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

SUBCONTRACTOR LIST

In accordance with Title 29, Chapter 6962 (d)(10)b Delaware Code, the following sub-contractor listing must accompany the bid submittal. The name and address (City and State) of the sub-contractor must be listed for each category where the bidder intends to use a sub-contractor to perform that category of work. In order to provide full disclosure and acceptance of the bid by the Owner, it is required that bidders list themselves as being the sub-contractor for all categories where he/she is qualified and intends to perform such work. In addition, specific requirements have been listed in the specifications and drawings for past performance and/or qualifications by subcontractors for all categories listed below. Documentation of compliance with these requirements must be submitted with this Bid Form.

The bid may be considered non-responsive if this form is incomplete.

Subcontractor Category

Subcontractor Information

(Address: City & State- no street address required)

- | | |
|---------------------------------------|-------------------------------|
| 1. _Porous Pavement Installer_____ | Name: _____
Address: _____ |
| 2. _Porous Pavement Manufacturer____ | Name: _____
Address: _____ |
| 3. _Permeable Pavers Alternate 1_____ | Name: _____
Address: _____ |
| 4. _Permeable Pavers Alternate 2_____ | Name: _____
Address: _____ |
| 5. _Surveyor_____ | Name: _____
Address: _____ |

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

6. _Excavation_____ Name: _____

Address: _____

7. _Demolition_____ Name: _____

Address: _____

NOT FOR BIDDING

BELLEVUE STATE PARK
GUN CLUB ROAD PROJECT
CONTRACT No.2013-NVF-100

BID FORM

NOT FOR BIDDING

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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 bound 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 the Department of Natural Resources and Environmental Control 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 bounden
Principal who has submitted to the Department of Natural Resources and Environmental Control 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
Department of Natural Resources and Environmental Control 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

NOT FOR BIDDING

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AGREEMENT FORM A101-2007

The following supplements modify the "Standard Form of Agreement Between Owner and Contractor," AIA Document A101-2007. 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 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."

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 8: MISCELLANEOUS PROVISIONS**8.2 Insert the following:**

"Payments are due 30 days after receipt of a valid Application for Payment. After that 30 day period, interest may be charged at the rate of 1% per month not to exceed 12% per annum."

8.5 Delete paragraph 8.5 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 SECTION 00500 - AGREEMENT FORM

NOT FOR BIDDING

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STATE OF DELAWARE
OFFICE OF MANAGEMENT AND BUDGET

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 State of Delaware, Department of Natural Resources and Environmental Control, Division of Parks and Recreation ("**Owner**"), 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, administrators, 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
OFFICE OF MANAGEMENT AND BUDGET

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 State of Delaware, Department of Natural Resources and Environmental Control, Division of Parks and Recreation ("**Owner**"), 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, administrators, 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:

SECTION 00600 - BONDS, CERTIFICATES AND ADMINISTRATIVE FORMS**TABLE OF ARTICLES**

1. Related Work Specified Elsewhere
2. Forms Submitted By Contractor
3. Forms Prepared by Owner

ARTICLE 1: Related Work Specified Elsewhere:

Section 00100 Instructions to Bidders
Section 00300 Bid Form
Section 00500 Agreement Form
Section 00700 General Conditions
Section 00710 General Requirements
Section 00800 Supplementary General Conditions

ARTICLE 2: Forms Submitted By Contractor:

- 2.1 Reference is made throughout this Project Manual to a number of standard forms which the Contractor is required to submit to the Owner prior to and during the execution of Work of this Project.
- 2.2 The Contractor shall be responsible for obtaining and submitting the following forms to the Owner when the forms are completed as specified.
- 2.3 Prior to commencing work, submit forms:
 - .1 AIA Document G715 "Acord Certificate of Insurance" (Latest Edition).
 - .2 "Performance Bond" and "Payment Bond" (Samples enclosed) Use of these forms is mandatory.
- 2.4 During the execution of the work, as appropriate, and prior to final payment, submit forms:
 - .1 AIA Document G702 "Application and Certificate for Payment".
 - .2 AIA Document G703 "Continuation Sheet" for G702, "Application and Certificate for Payment".
 - .3 AIA Document G706 "Contractor's Affidavit of Payment of Debts and Claims" (Latest Edition).
 - .4 AIA Document G706A "Contractor's Affidavit of Release of Liens" (Latest Edition).
 - .5 AIA Document G707 "Consent of Surety to Final Payment" (Latest Edition).
 - .6 AIA Document G707A "Consent of Surety to Reduction in or Partial Release of Retainage" (Latest Edition).
 - .7 Payroll Report (Sample Enclosed).
- 2.5 The forms specified above are available for examination in the Owner's office by prospective Bidders. Failure to examine the specified documents and to make allowances for them in his

Bid, shall not relieve the Contractor from using the forms and complying with their requirements.

ARTICLE 3: Forms Prepared by Owner:

- 3.1 The Owner shall prepare the following standard forms, as appropriate:
- .1 AIA Document A101-2007 "Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum".
 - .2 AIA Document G701 "Change Order" (Latest Edition).
 - .3 AIA Document G704 "Certificate of Substantial Completion" (Latest Edition).
 - .4 AIA Document G714 "Construction Change Directive" (Latest Edition).

END OF SECTION 00600 – BONDS CERTIFICATES AND ADMINISTRATIVE FORMS

NOT FOR BIDDING



STATE OF DELAWARE
DEPARTMENT OF LABOR
DIVISION OF INDUSTRIAL AFFAIRS
225 Corporate Boulevard, Suite 104
Newark, Delaware 19702

TELEPHONE (302) 761-8200
(302) 451-3423
Fax (302) 368-6604

Via Facsimile and Regular Mail

November 14, 2013

Ms. Cindy A. Todd
Construction Project Manager
DNREC
Division of Parks & Recreation
89 Kings Highway
Dover, DE 19901

Re: 2013-NVF-100 Bellevue State Park-Gun Club Road, New Castle County, DE

Dear Ms. Todd:

I am responding to your request for a category determination for the 2013-NVF-100 Bellevue State Park-Gun Club Road- Milling, Paving, Road Widening, culvert, Storm Drain, Manhole and, which is a state funded construction project located in New Castle County, DE. The work consists of the construction of the proposed Gun Club Road, storm drainage system, and miscellaneous site amenities; widening of Yorklyn Road at the proposed Gun Club Road entrance; the realignment of an unnamed tributary flowing through the NVF site; demolition of buildings, structures, and utilities within the limit of disturbance. You estimate the total cost of construction for this project to be [REDACTED].

Based on the information you provided, the Department of Labor has determined that this project is a Multiple Category project consisting of a Heavy Construction portion and a Highway Construction portion, each of which is substantial i.e., more than twenty percent (20%) of the overall cost of the project. The Heavy Construction portion, with an estimated cost of [REDACTED], represents approximately 45% of the total cost, involves the site work, grading, and the installation of a manhole with a steel sleeve. The Highway Construction portion, with estimated costs of [REDACTED], represents approximately 55% of the total cost, includes the milling, paving, road widening, culvert, storm drain, and striping.

Delaware's Prevailing Wage Regulations provide that the rates applicable to a project are the rates in effect on the date of publication of the specifications for that project. I have enclosed a certified copy of the March 15, 2013 prevailing wage rates for Highway Construction and Heavy Construction to be included in your bid specification. However, please be advised that, in the event that a contract for a project is not executed within one hundred and twenty (120) days from the earliest date the specifications were published, the rates in effect at the time of the execution of the contract shall be the applicable rates for the project.

If you have any questions or I can provide any additional assistance, please do not hesitate to contact me at (302) 451-3409.

Sincerely,

Kyle Maguire
Labor Law Enforcement Officer
Kyle.Maguire@state.de.us
Enclosure

STATE OF DELAWARE
DEPARTMENT OF LABOR
DIVISION OF INDUSTRIAL AFFAIRS
OFFICE OF LABOR LAW ENFORCEMENT
PHONE: (302) 451-3423

Mailing Address:
225 CORPORATE BOULEVARD
SUITE 104
NEWARK, DE 19702

Located at:
225 CORPORATE BOULEVARD
SUITE 104
NEWARK, DE 19702

PREVAILING WAGES FOR HIGHWAY CONSTRUCTION EFFECTIVE MARCH 15, 2013

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
BRICKLAYERS	46.83	46.83	14.51
CARPENTERS	42.64	50.06	39.82
CEMENT FINISHERS	28.79	26.13	23.29
ELECTRICAL LINE WORKERS	22.50	43.42	21.25
ELECTRICIANS	60.60	60.60	60.60
IRON WORKERS	42.20	23.87	25.35
LABORERS	28.95	26.97	25.35
MILLWRIGHTS	16.11	15.63	13.49
PAINTERS	58.07	58.07	58.07
PILEDRIERS	66.42	23.75	26.95
POWER EQUIPMENT OPERATORS	37.00	29.47	27.16
SHEET METAL WORKERS	22.75	20.31	18.40
TRUCK DRIVERS	29.08	21.42	19.13

CERTIFIED: 11/18/13

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, 1992.

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) 451-3423.

NON- REGISTERED APPRENTICES MUST BE PAID THE MECHANICS RATE.

PROJECT: 2013-NVF-100 Bellevue State Park-Gun Club Road-Milling, Paving, Road widening, Culvert, Storm Drains, Guardrail, Signage, and Pavement Striping/ Markers, New Castle County



STATE OF DELAWARE
DEPARTMENT OF LABOR
DIVISION OF INDUSTRIAL AFFAIRS
OFFICE OF LABOR LAW ENFORCEMENT
PHONE: (302) 451-3423

Mailing Address:
225 CORPORATE BOULEVARD
SUITE 104
NEWARK, DE 19702

Located at:
225 CORPORATE BOULEVARD
SUITE 104
NEWARK, DE 19702

PREVAILING WAGES FOR HEAVY CONSTRUCTION EFFECTIVE MARCH 15, 2013

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
ASBESTOS WORKERS	21.14	18.60	40.43
BOILERMAKERS	69.82	30.73	56.37
BRICKLAYERS	44.98	22.19	23.83
CARPENTERS	50.06	50.06	39.82
CEMENT FINISHERS	23.15	23.30	17.35
ELECTRICAL LINE WORKERS	34.86	26.30	25.89
ELECTRICIANS	60.60	60.60	60.60
GLAZIERS	19.54	16.96	11.48
INSULATORS	51.48	51.48	51.48
IRON WORKERS	58.70	25.54	55.78
LABORERS	38.30	38.30	38.30
MILLWRIGHTS	62.18	62.18	48.75
PAINTERS	58.07	58.07	58.07
PILEDRIVERS	67.87	37.64	29.30
PLASTERERS	18.40	15.97	10.80
PLUMBERS/PIPEFITTERS/STEAMFITTERS	72.03	21.62	17.12
POWER EQUIPMENT OPERATORS	57.06	23.65	57.06
SHEET METAL WORKERS	29.40	18.23	17.13
SPRINKLER FITTERS	31.68	11.99	9.83
TRUCK DRIVERS	28.21	19.72	18.27

CERTIFIED:

11/18/13

BY:

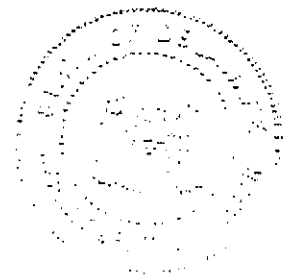
[Signature]
ADMINISTRATOR, OFFICE OF LABOR LAW ENFORCEMENT

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

PROJECT: 2013-NVF-100 Bellevue State Park-Gun Club Road-Site Prep, Grading, General Site Work, and Manhole , New Castle County



NOT FOR BIDDING

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[illegible]

DATE _____

I, _____
(Name of signatory party) (Title)

do hereby state:

1. That I pay or supervise the payment of persons employed by

_____ on the
(Contractor or Subcontractor)

(public project)

that during the payroll period commencing on the _____ day of
_____, 20_____ and ending on the _____ day of
_____, 20_____ all persons employed on said project

have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of the contractor or subcontractor from the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in the prevailing wage regulations of the State of Delaware.

2. That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work performed.
3. That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a state apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, and that the worksite ratio of apprentices to mechanics does not exceed the ratio permitted by the prevailing wage regulations of the State of Delaware.

List only those fringe benefits:

For which the employer has paid; and
Which have been used to offset the full prevailing wage rate.

(See Delaware Prevailing Wage Regulations for explanation of how hourly value of benefits is to be computed.)

HOURLY COST OF BENEFITS							
(List in same order shown on front of record)							
Employee							
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							

I hereby certify that the foregoing information is true and correct to the best of my knowledge and belief. I realize that making a false statement under oath is a crime in State of Delaware

Signature

STATE OF _____

COUNTY OF _____

SWORN TO AND SUBSCRIBED BEFORE ME, A NOTARY PUBLIC,

THIS _____ DAY OF _____, A.D. 20_____

Notary Public

An employer who fails to submit sworn payroll information to the Department of Labor weekly shall be subject to fines of \$1,000.00 and \$5,000. for each violation.

SECTION 00700 - GENERAL CONDITIONS

General Conditions:

The General Conditions of this Contract are as stated in The American Institute of Architects' AIA Document A201 (2007 Edition) entitled General Conditions of the Contract for Construction and is part of this Project Manual as if herein written in full.

Copies of the Document are available through the Owner.

END OF SECTION 00700 – GENERAL CONDITIONS

NOT FOR BIDDING

NOT FOR BIDDING

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SECTION 00710 - GENERAL REQUIREMENTS

The following GENERAL REQUIREMENTS supplement AIA Document A201 (2007 Edition). In the event of conflict or discrepancies among the Contract Documents, the Documents prepared by the State of Delaware, Division of Parks and Recreation shall take precedence over all other documents.

TABLE OF ARTICLES

1. GENERAL PROVISIONS
2. OWNER
3. CONTRACTOR
4. ARCHITECT
5. SUBCONTRACTORS
6. CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7. CHANGES IN THE WORK
8. TIME
9. PAYMENTS AND COMPLETION
10. PROTECTION OF PERSONS AND PROPERTY
11. INSURANCE AND BONDS
12. UNCOVERING AND CORRECTION OF WORK
13. MISCELLANEOUS PROVISIONS
14. TERMINATION OR SUSPENSION OF THE CONTRACT

ARTICLE 1: GENERAL PROVISIONS**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, 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, 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, color, sexual orientation, gender identity or national origin."

ARTICLE 2: OWNER

(NO ADDITIONAL GENERAL REQUIREMENTS – SEE SECTION 00800, 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 In conformance with Chapter 25, Title 30, Section 2502, any person desiring to engage in business in the State of Delaware shall obtain a license upon making application to the Division of Revenue. This license must be obtained and proof of license compliance must be made prior to, or in conjunction with, the execution of a contract to such person. In the case of contracts in excess of \$50,000 which are competitively bid, such person shall have initiated the license application procedure required by this subsection with the Division of Revenue prior to, or in conjunction with, the submission of a bid on a contract, or, in the case of a Subcontractor, prior to the submission of a bid by the General Contractor.
- 3.11.2 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 Department of Finance within 10 days after entering into any contract with a contractor or subcontractor not a resident of this State, a statement of the total value of such contract or contracts together with the names and addresses of the contracting parties."
- 3.11.3 The Contractor shall comply with all requirements set forth in Section 6962, Chapter 69, Title 29 of the Delaware Code.

ARTICLE 4: ARCHITECT

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 material or performing labor in the performance of the Contract, of all sums of money due the person for such labor and material. (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 judgment 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 proof that the 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 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 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:
 - .1 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;
 - .2 That the Bidder is duly licensed by the State to engage in such specialty work, if the State requires licenses; and
 - .3 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 lists 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:
 - .1 Is unqualified to perform the work required;

- .2 Has failed to execute a timely reasonable Subcontract;
- .3 Has defaulted in the performance on the portion of the work covered by the Subcontract; or
- .4 Is no longer engaged in such business.

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 If any firm entering into a Public Works Contract 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 BY 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 Architect, 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 direct salary plus customary fringe benefits (prevailing wage rates) and documented statutory costs such as workman's compensation insurance, Social Security/Medicare, and unemployment insurance (a maximum multiplier of 1.35 times DPE).
- 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 subcontractor's 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.
- 7.3.4 Additional work performed by the Contractor without authorization of a Change Order will not entitle him to an increase in the Contract Price or an extension of the Contract Time, except for emergencies as outlined in AIA Document A201, Paragraph 10.4 EMERGENCIES.

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), 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 hold permanently, 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.

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.

.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 materialmen, 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, except 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 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):

- .1 Evidence satisfactory to the Owner that all payrolls, material bills, and other indebtedness connected with the Work have been paid,
- .2 An acceptable RELEASE OF LIENS,
- .3 Copies of all applicable warranties,
- .4 As-built drawings,
- .5 Operations and Maintenance Manuals,
- .6 Instruction Manuals,
- .7 Consent of Surety to final payment.
- .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, shall not 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 \$1,000,000 \$1,000,000	for each person for each occurrence aggregate
Property Damage	\$ 500,000 \$1,000,000	for each occurrence aggregate

11.7.2 Contractor's Protective Liability Insurance

Minimum coverage to be:

Bodily Injury	\$ 500,000 \$1,000,000 \$1,000,000	for each person for each occurrence aggregate
Property Damage	\$ 500,000 \$ 500,000	for each occurrence aggregate

11.7.3 Automobile Liability Insurance

Minimum coverage to be:

Bodily Injury	\$1,000,000 \$1,000,000	for each person 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):

- .1 Minimum Limit on employer's liability to be as required by law.
- .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

- .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.
- .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.
- .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 Owner and 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 the Owner, to ascertain its historic and cultural significance and to determine the need for compliance with the relevant State and Federal law and policies.

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 OR SUSPENSION OF THE 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 SECTION 00710 - GENERAL REQUIREMENTS

SECTION 00800 – SUPPLEMENTARY GENERAL CONDITIONS

The following supplements modify the "General Conditions of the Contract for Construction," AIA Document A201-2007. Where a portion of the General Conditions is modified or deleted by the Supplementary General Conditions, the unaltered portions of the General Conditions shall remain in effect.

TABLE OF ARTICLES

1. GENERAL PROVISIONS
2. OWNER
3. CONTRACTOR
4. ARCHITECT
5. SUBCONTRACTORS
6. CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
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9. PAYMENTS AND COMPLETION
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13. MISCELLANEOUS PROVISIONS
14. TERMINATION OR SUSPENSION OF THE CONTRACT
15. CLAIMS AND DISPUTES

ARTICLE 1: GENERAL PROVISIONS**1.1 BASIC DEFINITIONS****1.1.1 THE CONTRACT DOCUMENTS**

Delete the last sentence in its entirety and replace with the following:

"The Contract Documents also include Advertisement for Bid, Instructions to Bidders, sample forms, the Bid Form, the Contractor's completed Bid and the Award Letter."

Add the following clause:

- 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 Parks and Recreation shall take precedence over all other documents.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following subparagraphs:

- 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

Delete subparagraph 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."

Delete subparagraph 1.5.2 in its entirety.

ARTICLE 2: OWNER

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

To subparagraph 2.2.3 – Add the following sentence:

"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."

Delete subparagraph 2.2.5 in its entirety and substitute the following:

2.2.5 The Contractor will be furnished, free of charge, a specified number of copies of Drawings and Project Manuals. Refer to Section 01005, ADMINISTRATIVE PROVISIONS. Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 3: CONTRACTOR**3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR**

Amend subparagraph 3.2.2 to state that any errors, inconsistencies or omissions discovered shall be reported to the Architect and Owner immediately.

Delete the third sentence in subparagraph 3.2.4.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following clause to subparagraph 3.3.2:

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.

Add the following subparagraphs:

3.3.4 The Contractor must provide suitable storage facilities at the Site for the proper protection and safe storage of their materials. Consult the Owner and the Architect before storing any materials.

3.3.5 When 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 subparagraphs:

3.4.4 Before starting the Work, each Contractor, or Subcontractor, 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 General Contractor/Construction Manager 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 subparagraphs:

- 3.5.1 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 guarantee.
- 3.5.2 Defects appearing during the period of guarantee 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 guarantee will have elapsed.
- 3.5.3 In addition to the General Guarantee there are other guarantees 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 guarantees will commence at the same time as the General Guarantee.
- 3.5.4 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 expense of the Contractor and/or his surety.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add the following subparagraphs:

- 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 reproducible 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 The Contractor shall provide two (2) prints of the as-built conditions, along with the reproducible drawings themselves, to the Owner and one (1) set to the Architect. In addition, attach one complete set to each of the Operating and Maintenance Instructions/Manuals.

3.13 USE OF SITE

Add the following new subparagraphs:

- 3.13.1 The Contractor will not load nor permit any part of the structure to be loaded with weight that will endanger the structure.
- 3.13.2 Storage areas will be defined for the storage of the Contractor's materials and equipment and he shall confine his materials, equipment, and operations of his workmen to such limits as indicated by the Owner. Unless otherwise indicated in the Specifications, the storage areas will be outdoors, and the contractor shall provide whatever shelter is necessary for his storage and fabricating needs. No

workmen shall trespass within areas or buildings of the Owner other than those related to the Work of the Contract. The Contractor shall rigidly enforce this regulation. Any materials, equipment or temporary structures belonging to the Contractor shall be moved when so directed by the Owner to permit the execution of the work of others in connection with the Project.

3.17 ROYALTIES, PATENTS AND COPYRIGHTS

In the second sentence of the paragraph, insert "indemnify and" between "shall" and "hold".

ARTICLE 4: ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

Delete the first sentence of subparagraph 4.2.7 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.

Delete the second sentence of subparagraph 4.2.7 and replace with the following:

The Architect's action will be taken with such reasonable promptness as to cause no delay in the Work or 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 clause to subparagraph 4.2.10:

4.2.10.1 There will be no full-time project representative provided by the Owner or Architect on this project.

Add to subparagraph 4.2.13 "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

Delete subparagraph 5.2.3 in its entirety and replace with the following:

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, subject to the statutory requirements of 29 Delaware Code § 6962(d)(10)b.3 and 4.

ARTICLE 6: CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

Delete Paragraph 6.1.4 in its entirety.

6.2 MUTUAL RESPONSIBILITY

6.2.3 In the second sentence, strike the word "shall" and insert the word "may".

Add the following Paragraph to Article 6:

6.4 DEPARTMENT FURNISHED MATERIALS AND EQUIPMENT

6.4.1 If any materials or equipment are to be furnished by the Owner for the Work, they will be so specified in the Contract Documents. Unless otherwise specified, it shall be the Contractor's responsibility to locate, receive, handle and store, if necessary, any item of Owner furnished material or equipment which he is required by the Contract to install, erect or handle in any way, from the time it is received by the Contractor at the jobsite or other Owner approved location until completion of the Work in accordance with the Contract Documents. Damaged or lost Owner furnished items shall be repaired or replaced by the Contractor without additional cost to the Owner. See Section 01005, ADMINISTRATIVE PROVISIONS for list of Owner furnished materials and equipment.

ARTICLE 7: CHANGES IN THE WORK

(SEE ARTICLE 7: CHANGES IN WORK IN THE GENERAL REQUIREMENTS)

ARTICLE 8: TIME**8.2 PROGRESS AND COMPLETION**

Add the following clause to subparagraph 8.2.1:

8.2.1.1 Refer to Specification Section 01005, ADMINISTRATIVE PROVISIONS for Contract time requirements.

Add the following new subparagraph:

8.2.4 If 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 EXTENSIONS OF TIME

8.3.1 Strike "arbitration" and insert "remedies at law or in equity".

Add the following clause to subparagraph 8.3.2:

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.

Delete subparagraph 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 Paragraph 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 subparagraph:

- 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 subparagraphs:

- 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% of the initial contract amount.

9.3 APPLICATIONS FOR PAYMENT

Add the following clause to subparagraph 9.3.1:

- 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.

Add the following subparagraphs:

- 9.3.4 Until the Work is 90% complete, the owner will pay 95% of the value of completed Work, based on the Contract prices of labor and materials incorporated in the Work and of materials suitably stored at the site thereof up to the last day of the preceding month as estimated by the Architect, less the aggregate of previous payments. At the time the Work is 90% complete, if the manner of completion of the Work and its progress are and remain satisfactory to the Architect, and in the absence of other good and sufficient reasons, as provided in GENERAL REQUIREMENTS 8.5 RETAINAGE, the Architect shall, on presentation by the Contractor of Consent of Surety, certify for payment to the Contractor half the funds being held as retainage by the Owner. Thereafter, the Owner will pay 97.5% of the amount due the Contractor on account of remaining 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 clauses to subparagraph 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

Delete subparagraph 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.

9.7 FAILURE OF PAYMENT

In first sentence, strike "seven" and insert "thirty (30)". Also strike "binding dispute resolution" and insert "remedies at law or in equity".

9.8 SUBSTANTIAL COMPLETION

Add the following sentence to Subparagraph 9.8.3:

"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 In the second sentence, strike "shall" and insert "may".

ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY**10.1 SAFETY PRECAUTIONS AND PROGRAMS**

Add the following subparagraphs:

- 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.

10.3 HAZARDOUS MATERIALS

Delete subparagraph 10.3.3 in its entirety.

Delete subparagraph 10.3.6 in its entirety.

ARTICLE 11: INSURANCE AND BONDS**11.1 CONTRACTOR'S LIABILITY INSURANCE**

11.1.4 Strike "the Owner" immediately following "(1)" and strike "and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations."

11.2 OWNER'S LIABILITY INSURANCE

Delete Paragraph 11.2 in its entirety.

11.3 PROPERTY INSURANCE

Delete Paragraph 11.3 in its entirety and replace with the following:

11.3 The State will not provide Builder's All Risk Insurance for the Project. The Contractor and all Subcontractors shall provide property coverage for their tools and equipment, as necessary. Any mandatory deductible required by the Contractor's Insurance shall be the responsibility of the Contractor.

11.4 PERFORMANCE BOND AND PAYMENT BOND

Add the following sentence to subparagraph 11.4.1:

"The bonds will conform to those forms approved by the Office of Management and Budget."

ARTICLE 12: UNCOVERING AND CORRECTION OF WORK**12.2 CORRECTION OF WORK****12.2.2 AFTER SUBSTANTIAL COMPLETION**

12.2.2.1 Strike "one year" and insert "two years".
Strike "one-year" and insert "two-year".

Add the following subclause to clause 12.2.2.1:

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 defective work and that required under Contract including any damage to the structure.

12.2.2.2 Strike "one" and insert "two".

12.2.2.3 Strike "one" and insert "two".

12.2.5 In second sentence, strike "one" and insert "two".

ARTICLE 13: MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

Strike "except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4."

13.6 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." Insert "30 days of presentment of the authorized Certificate of Payment at the annual rate of 12% or 1% per month."

13.7 TIME LIMITS ON CLAIMS

Strike the last sentence.

Add the following Paragraph:

13.8 CONFLICTS WITH FEDERAL STATUTES OR REGULATIONS

- 13.8.1 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**14.4 TERMINATION BY THE OWNER FOR CONVENIENCE**

Delete subparagraph 14.4.3 in its entirety and replace with the following:

- 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and cost incurred by reason of such termination along with reasonable overhead.

ARTICLE 15: CLAIMS AND DISPUTES**15.1 CLAIMS**

- 15.1.2 Throughout the Paragraph strike "21" and insert "45".

Delete subparagraph 15.1.6 in its entirety.

15.2 INITIAL DECISION

Delete subparagraph 15.2.5 in its entirety and replace with the following:

- 15.2.5 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 other remedies at law or in equity.

Delete subparagraph 15.2.6 and its clauses in their entirety.

15.3 MEDIATION

15.3.1 Strike "binding dispute resolution" and insert "any or all remedies at law or in equity".

15.3.2 In the first sentence, delete "administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement," Strike "binding dispute resolution" and insert "remedies at law and in equity".

15.4 ARBITRATION

Delete subparagraph 15.4 and its subparagraphs in their entirety.

END OF SECTION 00800 - SUPPLEMENTARY GENERAL CONDITIONS

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SECTION 00850 - DRAWING INDEX

<u>Sheet No</u>	<u>Title</u>
C-100	CIVIL LEGEND AND GENERAL NOTES
C-101	PROJECT KEY PLAN
C-102	EXISTING SITE SURVEY
C-103	CONSTRUCTION LIMITS
C-104	DEMOLITION PLAN
C-110	ENTRANCE SITE LAYOUT
C-111	GUN CLUB ROAD SITE LAYOUT
C-115	ENTRANCE UTILITY PLAN
C-116	GUN CLUB ROAD UTILITY PLAN
C-120	ENTRANCE GRADING PLAN
C-121	GUN CLUB ROAD GRADIN PLAN
C-130	ENTRANCE SIGNING AND STRIPING PLAN
C-131	GUN CLUB ROAD SIGNING AND STRIPING PLAN
C-135	PERMANENT EROSION AND SEDIMENT CONTROL PLAN
C-140	GUN CLUB ROAD PROFILE AND CROSS SECTIONS
C-141	DRAINAGE PROFILES
C-142	ENTRANCE CROSS SECTIONS
C-150	CONSTRUCTION DETAILS SHEET 1
C-151	CONSTRUCTION DETAILS SHEET 2
C-152	CONSTRUCTION DETAILS SHEET 3
C-153	CONSTRUCTION DETAILS SHEET 4
C-154	CONSTRUCTION DETAILS SHEET 5
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C-156	CONSTRUCTION DETAILS SHEET 7
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ES-130	EROSION AND SEDIMENT CONTROL PLAN PHASE 1A
ES-131	EROSION AND SEDIMENT CONTROL PLAN PHASE 1B
ES-150	CONSTRUCTION DETAILS
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ES-152	CONSTRUCTION DETAILS
ES-153	CONSTRUCTION DETAILS
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T-101	ENTRANCE MAINTENANCE OF TRAFFIC PLAN
T-102	GUN CLUB ROAD MAINTENANCE OF TRAFFIC PLAN TEMPORARY ACCESS ROAD
T-103	GUN CLUB ROAD MAINTENANCE OF TRAFFIC PLAN PHASE 1
T-104	GUN CLUB ROAD MAINTENANCE OF TRAFFIC PLAN PHASE 2
T-105	NORTHBOUND YORKLYN ROAD MAINTENANCE OF TRAFFIC PLAN
T-106	SOUTHBOUND YORKLYN ROAD MAINTENANCE OF TRAFFIC PLAN
T-107	GUN CLUB ROAD MAINTENANCE OF TRAFFIC PLAN SEQUENCE OF CONSTRUCTION
T-108	MAINTENANCE OF TRAFFIC DETAILS
A-101	ALTERNATE BID ITEMS: PERMEABLE PAVERS

END OF SECTION 00850 – DRAWING INDEX

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SECTION 01005 - ADMINISTRATIVE PROVISIONS**TABLE OF ARTICLES**

1. WORK COVERED BY THE CONTRACT DOCUMENTS
2. CONTRACT METHOD
3. WORK SEQUENCE
4. CONTRACTOR USE OF PREMISES
5. OWNER OCCUPANCY
6. OWNER-FURNISHED PRODUCTS
7. ALLOWANCES
8. ALTERNATES
9. UNIT PRICES
10. APPLICATIONS FOR PAYMENT
11. OWNER SUPPLIED CONSTRUCTION DOCUMENTS
12. COORDINATION
13. FIELD ENGINEERING
14. REFERENCE STANDARDS

ARTICLE 1: WORK COVERED BY CONTRACT DOCUMENTS

- 1.1 The work includes, but is not necessarily limited to, construction of the new Gun Club Road and all else required to complete the Project in accordance with the Drawings and Specifications.

ARTICLE 2: CONTRACT METHOD

- 2.1 Construct the Work under a single, Lump Sum Contract.
- 2.2 Items noted "NIC" (Not in Contract), will be furnished and installed by others.

ARTICLE 3: WORK SEQUENCE

- 3.1 Construct Work in stages to accommodate Owner's occupancy requirements during the construction period; coordinate construction schedule and operations.
- 3.2 Begin Work within seven (7) days after issuance of a State purchase order and Notice to Proceed and be Substantially Completed 260 working days.

ARTICLE 4: CONTRACTOR USE OF PREMISES

- 4.1 Limit use of premises for work and for construction operations to allow for Owner occupancy.
- 4.2 Coordinate use of premises under direction of Owner.

ARTICLE 5: OWNER OCCUPANCY

- 5.1 Owner will occupy premises during entire period of construction for the conduct of his normal operations. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

ARTICLE 6: OWNER-FURNISHED PRODUCTS

None

ARTICLE 7: ALLOWANCES

None

ARTICLE 8: ALTERNATES

None

ARTICLE 9: UNIT PRICES

- 9.1 Unit Prices quoted on Bid Forms will be exercised as Owner option.
- 9.2 Coordinate related work and modify surrounding work affected by accepted Unit Prices as required to complete the Work.
- 9.3 Schedule of Unit Prices: (Refer to Bid Form and Section 01026 - Unit Prices)

ARTICLE 10: APPLICATIONS FOR PAYMENT

- 10.1 Submit 3 copies of each application under procedures of Sections 00710 and 00800.
- 10.2 Content and Format: Use table of contents of Project Manual.

ARTICLE 11: OWNER SUPPLIED CONSTRUCTION DOCUMENTS

- 11.1 The Contractor will be furnished, free of charge, ten (10) copies of Drawings and Project Manuals (or less if requested). Additional sets will be furnished at the cost of reproduction, postage and handling.

ARTICLE 12: COORDINATION

- 12.1 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.
- 12.2 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.
- 12.3 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.
- 12.4 In finished areas (except as otherwise shown), conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.
- 12.5 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.

ARTICLE 13: FIELD ENGINEERING

- 13.1 Provide field engineering services; establish grades, lines, and levels, by use of recognized engineering survey practices.
- 13.2 Control datum for survey is that shown on drawings. Locate and protect control and reference

points.

ARTICLE 14: REFERENCE STANDARDS

- 14.1 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.
- 14.2 The date of the standard is that in effect as of the Bid date, except when a specific date is specified.
- 14.3 Obtain copies of standards when required by Contract Documents. Maintain copy at job site during progress of the specific work.

END OF SECTION 01005 – ADMINISTRATIVE PROVISIONS

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SECTION 01010 - SUMMARY OF WORK**TABLE OF ARTICLES**

1. PROJECT DESCRIPTION
2. WORK SEQUENCE
3. CONTRACTOR USE OF PREMISES

ARTICLE 1: PROJECT DESCRIPTION

- 1.1 The Contractor for this Project shall furnish all labor, materials, equipment and services necessary for and reasonably incidental to fully perform all the Work indicated as their responsibility and as shown on the Drawings and specified in the Specifications.
- 1.2 The Work shall include the following:
Gun Club Road Project 2013-NVF-100, as shown on the Drawings and as specified in the Specification Manual, including, but not necessarily limited to the following.
 1. The realignment of Yorklyn Road at the new Gun Club Road Entrance including the milling and paving of designated sections of Yorklyn Road.
 2. The demolition of buildings, structures, and utilities within the limits of disturbance on the NVF site.
 3. The installation of a temporary stream diversion pumping system and appropriate erosion and sediment pollution controls.
 4. The realignment of the unnamed tributary running through the NVF site.
 5. The construction of the proposed Gun Club Road alignment, traffic controls, and stormwater drainage system.

ARTICLE 2: WORK SEQUENCE

- 2.1 The Work will be conducted in one phase to provide the least possible interference to the activities of the Owner's personnel and to permit an orderly transfer of personnel and equipment to the new facilities.

ARTICLE 3: CONTRACTOR USE OF PREMISES

- 3.1 General: Limit use of the premises to construction activities in areas indicated.
 - .1 Confine operations to areas within Contract limits indicated.

END OF SECTION 01010 - SUMMARY OF WORK

NOT FOR BIDDING

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SECTION 01020 - ALLOWANCES**TABLE OF ARTICLES**

1. RELATED DOCUMENTS
2. SUMMARY
3. EXAMINATION
4. PREPARATION
5. SCHEDULE OF ALLOWANCES

ARTICLE 1: RELATED DOCUMENTS

- 1.1 Drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements, and other Division- 1 Specification Sections, apply to this Section.

ARTICLE 2: SUMMARY

- 2.1 This Section specifies administrative and procedural requirements for Allowances.
- 2.2 Selected materials and equipment are specified in the Contract Documents by Allowances. In some cases, these Allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- 2.3 Types of Allowances may include the following (Refer to "Schedule of Allowances" included at the end of this Section):
 - .1 Lump-sum Allowances.
 - .2 Unit-cost Allowances.
 - .3 Contingency Allowances.
- 2.4 Selection and Purchase:
 - .1 At the earliest practical date after award of the Contract, advise the Owner of the date when the final selection and purchase of each product or system described by an Allowance must be completed to avoid delaying the Work.
 - .2 At the Owner's request, obtain proposals for each Allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
 - .3 Purchase products and systems specifically selected (in writing) by the Owner.
- 2.5 Submittals:
 - .1 Submit proposals and recommendations for purchase of products or systems included in Allowances, in form required for Change Order.
 - .2 Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each Allowance.

- 2.6 Coordinate Allowance Work with related work to ensure that each selection is completely integrated and interfaced with related work.
- 2.7 Lump-Sum Allowances and Unit-Cost Allowances:
- .1 These Allowances shall cover the cost to the Contractor, less any applicable trade discount, of the materials and equipment required by the Allowance delivered at the site, and all applicable taxes.
 - .2 The Contractor's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the original Allowance shall be included separately in the Contract Sum and not in the Allowance.
 - .3 Whenever the cost is more than or less than the Allowance, the Contract Sum shall be adjusted accordingly by Change Order:
 - .1 Change Order Mark-up: The amount of each change order resulting from final selection of products and systems covered by an Allowance shall be the difference between the Contractor's purchase price amount and the Allowance, and shall not include Contractor's mark-up (or subcontractor's mark-up) except to the extent clearly demonstrated (by Contractor) that either scope of installation or nature of work required was changed from that which could have been foreseen from description of Allowance and other information in Contract Documents. No mark-up is permitted for selection of higher or lower priced materials or systems, of same scope and nature as originally indicated.
 - .2 Change Order Data: Where applicable, include in each Change Order proposal both the quantities of products being purchased and unit costs, along with total amount of purchase to be made. Where requested, furnish survey-of-requirements data to substantiate quantities. Indicate applicable taxes, delivery charges, and amounts of applicable trade discounts.
- 2.8 Contingency Allowances:
- .1 Use the Contingency Allowance only as directed for the Owner's purposes and only by Change Orders that indicate amounts to be charged to the Allowance.
 - .2 Change Orders authorizing use of funds from the Contingency Allowance, for purchase of products and equipment, will include Contractor's related costs and reasonable overhead and profit margins. These related costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
 - .3 At Project Closeout, credit unused amounts remaining in the Contingency Allowance to the Owner by Change Order.
- 2.9 Unused Materials:
- .1 Return unused materials to the manufacturer or supplier for credit to the Owner, after installation has been completed and accepted.
 - .2 When requested by the Owner, prepare unused material for storage by Owner where it is not economically practical to return the material for credit. When directed by the Owner, deliver unused material to the Owner's storage space. Otherwise, disposal of unused material is the Contractor's responsibility.

ARTICLE 3: EXAMINATION

- 3.1 Examine products covered by an Allowance promptly upon delivery for damage or defects.

ARTICLE 4: PREPARATION

- 4.1 Coordinate materials and their installation for each Allowance with related materials and installations to ensure that each Allowance item is completely integrated and interfaced with related work.

ARTICLE 5: SCHEDULE OF ALLOWANCES

- 5.1 Allowance No. 1: Landscape Subcontractor Services. Include, in the Bid, the Lump Sum of \$150,000.00 for the purchase landscape subcontractor services. Detailed scope of landscape subcontract services shall be negotiated after award of the contract. The prime contractor will be expected to solicit quotes from 3 qualified subcontractors during the negotiation of scope of work. The \$150,000.00 lump sum amount shall include the subcontractor costs plus a 10% markup for the prime contractor overhead and a 10% markup for the prime contractor profit.
- 5.2 Allowance No. 2: Removal and Offsite Disposal of Contaminated Materials in 2 approximately 25,000 gallon Tanks. Include in the Bid, the Lump Sum of \$10,000.00 for the characterization, removal and offsite disposal of any contaminated materials that may be present in the 2 approximately 25,000 gallon above ground storage tanks currently at the site.
- 5.3 Allowance No. 3: Utility Work. Include in the Bid, the Lump Sum of \$300,000 for the purchase and installation of miscellaneous utilities. Detailed scope of work for the utilities shall be negotiated after award of the contract. The prime contractor will be expected to solicit quotes from 3 qualified subcontractors during the negotiations of scope of work. The \$300,000 lump sum amount shall include the subcontractor costs plus a 10% markup for the prime contractor overhead and a 10% markup for the prime contractor profit.

END OF SECTION 01020 – ALLOWANCES

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SECTION 01026 - UNIT PRICES**TABLE OF ARTICLES**

1. RELATED DOCUMENTS
2. SUMMARY
3. UNIT PRICE SCHEDULE

ARTICLE 1: RELATED DOCUMENTS

- 1.1 Drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements, and other Division-1 Specification Sections, apply to this Section.

ARTICLE 2: SUMMARY

- 2.1 This Section specifies administrative and procedural requirements for Unit Prices.
 - .1 A Unit Price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be added to, or deducted from, the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased.
 - .2 Unit Prices include all necessary material, labor, overhead, profit and applicable taxes.
 - .3 Refer to individual Specification Sections for construction activities requiring the establishment of Unit Prices. Methods of measurement and payment for Unit Prices are specified in those Sections.
- 2.2 Schedule: A "Unit Price Schedule" is included at the end of this Section. Specification Sections in the Project Manual contain requirements for materials and methods necessary to achieve the Work described under each Unit Price.
 - .1 The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established Unit Prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

ARTICLE 3: UNIT PRICE SCHEDULE**UNIT PRICE No. 1: Over-excavation of unsuitable soils**

Description: Contractor shall over excavate unsuitable soils in areas shown on Drawing C-111. Limits of over excavation shall be determined by geotechnical engineer in the field. Cost for transportation and offsite disposal of unsuitable soils shall be included in the Unit Price. Measurement for the number of yards over-excavated shall be based on a comparison of survey of the area prior to the start of over-excavation and after completion of the over-excavation activities. Contractor shall provide the surveys, no separate payment shall be made for the surveys. Should the actual quantity of work measured be more or less than 500 CY, the contract amount will be adjusted based on the Unit Price.

Unit of Measure: CY

(Estimated Quantity of unsuitable soils = 500 CY x Unit Price \$_____/Unit of Measure =
\$_____ Amount to be included in Bid)

UNIT PRICE No. 2: Placement and compaction of backfill materials in over-excavation areas

Description: Contractor shall backfill over excavate areas shown on Drawing C-111 with suitable soils. Costs backfill and compaction with suitable soils shall be included in the Unit Price. Measurement for this Unit Price Item shall be based on the surveys provided for Unit Price No. 1. Should the actual quantity of work measured be more or less than 500 CY, the contract amount will be adjusted based on the Unit Price

Unit of Measure: CY

(Estimated Quantity of backfill materials = 500 CY x Unit Price \$_____/Unit of Measure =
\$_____ Amount to be included in Bid)

UNIT PRICE No. 3: Construction and demolition debris removal and offsite disposal

Description: Contractor shall remove existing stockpiles of construction and demolition debris from the project site and dispose of the material at a licensed facility. Construction and demolition debris included in this item is limited to existing stockpiles generated by others at the site. Construction and demolition debris generated during the execution of this work is not included in this unit price item. Cost for transportation and offsite disposal of appropriate materials shall be included in the Unit Price. Measurement of tons disposed of shall be based on weigh scale tickets from the disposal facility. Should the actual quantity of work measured be more or less than 1,000 tons, the contract amount will be adjusted based on the Unit Price

Unit of Measure: Tons

(Estimated quantity of construction debris = 1000 Tons x Unit Price \$_____/Unit of Measure =
\$_____ Amount to be included in Bid)

UNIT PRICE No. 4: Removal of PCB-contaminated transformers (oil).

Description: This unit price applies to the testing, collection, transportation and disposal of PCB contaminated oils and transformers located on the site. Basis of measurement for this unit price shall be the actual gallons of PCB contaminated oils found on the site at the start of the project. Include 200 Gallons of PCB contaminated oil testing, collection, transportation and disposal in the Lump Sum Base Bid. Should the actual quantity of PCB contaminated oils be more or less than 200 Gallons, the contract amount will be adjusted based on the Unit Price. All work shall be performed in accordance with all pertinent regulations for working with PCBs.

Unit of Measure: Gallons (Gal)

(Estimated quantity of PCB oil = 200 Gal x Unit Price \$_____/Unit of Measure =
\$_____ Amount to be included in Bid)

UNIT PRICE No. 5: Supply and install 12 ft wide Bituminous Paved Trail up to 3,000 lf

Description: Contractor shall supply all necessary materials and install the Bituminous Paved Trail as shown in Detail 3 on Drawing C-152. Work covered under this unit price will be for sections of trail that comprise up to 3,000 lf that are approved for installation by the State during a single mobilization. All costs associated with supplying and installing materials shown in the detail referenced above will be included in the unit price. Should the actual quantity of work measured be less than 3,000 linear feet, the contract amount will be reduced based on the Unit Price

Unit of Measure: LF

(Estimated quantity of trail = 3,000 lf x Unit Price \$_____/Unit of Measure = \$_____. Amount to be included in Bid)

UNIT PRICE No. 6: Supply and install 12 ft wide Bituminous Paved Trail up to 7,000 lf

Description: Contractor shall supply all necessary materials and install the Bituminous Paved Trail as shown in Detail 3 on Drawing C-152. Work covered under this unit price will be for sections of trail that comprise up to 7,000 lf that are approved for installation by the State during a single mobilization. All costs associated with supplying and installing materials shown in the detail referenced above will be included in the unit price. Should the actual quantity of work measured be less than 7,000 linear feet, the contract amount will be reduced based on the Unit Price

Unit of Measure: LF

(Estimated quantity of trail = 7,000 lf x Unit Price \$_____/Unit of Measure = \$_____. Amount to be included in Bid)

UNIT PRICE No. 7: Supply and install 12 ft wide Bituminous Paved Trail up to 16,000 lf

Description: Contractor shall supply all necessary materials and install the Bituminous Paved Trail as shown in Detail 3 on Drawing C-152. Work covered under this unit price will be for sections of trail that comprise up to 16,000 lf that are approved for installation by the State during a single mobilization. All costs associated with supplying and installing materials shown in the detail referenced above will be included in the unit price. Should the actual quantity of work measured be less than 16,000 linear feet, the contract amount will be reduced based on the Unit Price

Unit of Measure: LF

(Estimated quantity of trail = 16,000 lf x Unit Price \$_____/Unit of Measure = \$_____. Amount to be included in Bid)

END OF SECTION 01026 - UNIT PRICES

NOT FOR BIDDING

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SECTION 01030 - ALTERNATES**TABLE OF ARTICLES**

1. RELATED DOCUMENTS
2. SUMMARY
3. SCHEDULE OF ALTERNATES

ARTICLE 1: RELATED DOCUMENTS

- 1.1 Drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements, and other Division-1 Specification Sections, apply to this Section.

ARTICLE 2: SUMMARY

- 2.1 This Section specifies administrative and procedural requirements for Alternates.
- 2.2 Definition: An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the bidding requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept the corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in Contract Documents.
- 2.3 Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the Project.
- 2.4 Notification: Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.
- 2.5 Schedule: A "Schedule of Alternates" is included at the end of this Section. Specification Sections in the Project Manual contain requirements for materials and methods necessary to achieve the Work described under each Alternate.
 - .1 Include as part of each Alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

ARTICLE 3: SCHEDULE OF ALTERNATES:

Alternate No. 1: Alternate No. 1 shall include the supply and installation of a Permeable paver consistent with the requirements shown on Drawing A-101 and Specification Section 321400 as indicated for Alternate No. 1.

Alternate No. 2: Alternate No. 2 shall include the supply and installation of a Permeable paver consistent with the requirements shown on Drawing A-101 and Specification Section 321400 as indicated for Alternate No. 2.

END OF SECTION 01030 - ALTERNATES

NOT FOR BIDDING

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SECTION 01040 - PROJECT COORDINATION**TABLE OF ARTICLES**

1. RELATED DOCUMENTS
2. SUMMARY
3. COORDINATION
4. SUBMITTALS
5. GENERAL INSTALLATION PROVISIONS
6. CLEANING AND PROTECTION

ARTICLE 1: RELATED DOCUMENTS

- 1.1 Drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements, and other Division-1 Specification Sections, apply to this Section.

ARTICLE 2: SUMMARY

- 2.1 This Section specifies administrative and supervisory requirements necessary for Project Coordination including, but not necessarily limited to:
 - .1 Coordination.
 - .2 Administrative and Supervisory Personnel.
 - .3 General Installation Provisions.
 - .4 Cleaning and Protection.
- 2.2 Field engineering is included in Section "Field Engineering".
- 2.3. Progress meetings, coordination meetings and pre-installation conferences are included in Section "Project Meetings".
- 2.4. Requirements for the Contractor's Construction Schedule are included in Section "Submittals".

ARTICLE 3: COORDINATION

- 3.1 Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.
 - .1 Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
 - .2 Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
 - .3 Make adequate provisions to accommodate items scheduled for later installation.
- 3.2 Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

- .1 Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.
- 3.3 Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - .1 Preparation of schedules.
 - .2 Installation and removal of temporary facilities.
 - .3 Delivery and processing of submittals.
 - .4 Progress meetings.
 - .5 Project Close-out activities.
- 3.4 Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 - .1 Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

ARTICLE 4: SUBMITTALS

- 4.1 Staff Names: Within 15 days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

ARTICLE 5: GENERAL INSTALLATION PROVISIONS

- 5.1 Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- 5.2 Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- 5.3 Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- 5.4 Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- 5.5 Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- 5.6 Recheck measurements and dimensions, before starting each installation.
- 5.7 Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- 5.8 Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- 5.9 Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated.

Refer questionable mounting height decisions to the Architect for final decision.

ARTICLE 6: CLEANING AND PROTECTION

- 6.1 During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- 6.2 Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- 6.3 Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
 - .1 Excessive static or dynamic loading.
 - .2 Excessive internal or external pressures.
 - .3 Excessively high or low temperatures.
 - .4 Thermal shock.
 - .5 Excessively high or low humidity.
 - .6 Air contamination or pollution.
 - .7 Water or ice.
 - .8 Solvents.
 - .9 Chemicals.
 - .10 Light.
 - .11 Radiation.
 - .12 Puncture.
 - .13 Abrasion.
 - .14 Heavy traffic.
 - .15 Soiling, staining and corrosion.
 - .16 Bacteria.
 - .17 Rodent and insect infestation.
 - .18 Combustion.
 - .19 Electrical current.
 - .20 High speed operation.
 - .21 Improper lubrication.
 - .22 Unusual wear or other misuse.
 - .23 Contact between incompatible materials.
 - .24 Destructive testing.
 - .25 Misalignment.
 - .26 Excessive weathering.
 - .27 Unprotected storage.
 - .28 Improper shipping or handling.
 - .29 Theft.
 - .30 Vandalism.
 - .31 Wind damage.

END OF SECTION 01040 - PROJECT COORDINATION

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SECTION 01050 - FIELD ENGINEERING**TABLE OF ARTICLES**

1. RELATED DOCUMENTS
2. SUMMARY
3. SUBMITTALS
4. QUALITY ASSURANCE
5. EXAMINATION
6. PERFORMANCE

ARTICLE 1: RELATED DOCUMENTS

- 1.1 Drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements, and other Division-1 Specification Sections, apply to this Section

ARTICLE 2: SUMMARY

- 2.1 General: This Section specifies administrative and procedural requirements for Field Engineering services, including, but not necessarily limited to, the following:
 - .1 Land Survey Work
 - .2 Engineering Services

ARTICLE 3: SUBMITTALS

- 3.1 Project Record Documents: Submit a record of Work performed and record survey data as required under provisions of Sections "Submittals" and "Project Closeout".

ARTICLE 4: QUALITY ASSURANCE

- 4.1 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.
- 4.2 Engineer: Engage a Professional Engineer of the discipline required, registered in the State of Delaware, to perform required engineering services.

ARTICLE 5: EXAMINATION

- 5.1 The Owner will identify existing control points and property line corner stakes.
- 5.2 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.

- 5.3 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.
- 5.4 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.

ARTICLE 6: PERFORMANCE

- 6.1 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.
- 6.2 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.
- 6.3 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.
- 6.4 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.

END OF SECTION 01050 - FIELD ENGINEERING

SECTION 01090 - DEFINITIONS AND STANDARDS**TABLE OF ARTICLES**

1. DEFINITIONS
2. SPECIFICATION FORMAT AND CONTENT EXPLANATION
3. DRAWING OF SYMBOLS
4. INDUSTRY STANDARDS

ARTICLE 1: DEFINITIONS:

- 1.1 Basic Contract definitions are included in the General Conditions, Supplementary General Conditions, General Requirements, and Instructions to Bidders.
- 1.2 INDICATED refers to graphic representations, notes or schedules on Drawings, or Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used, it is to help locate the reference.
- 1.3 DIRECTED: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Engineer", "requested by the Engineer", and similar phrases. No implied meaning shall be interpreted to extend the Owner's Representative's responsibility into the Contractor's supervision of construction.
- 1.4 APPROVE, used in conjunction with action on submittals, applications, and requests, is limited to the Owner's Representative's duties and responsibilities stated in General Conditions and Supplementary General Conditions. Approval shall not release the Contractor from responsibility to fulfill Contract requirements.
- 1.5 REGULATION includes laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.
- 1.6 FURNISH means "supply and deliver, ready for unloading, unpacking, assembly, installation, and similar operations."
- 1.7 INSTALL describes operations at the site including "unloading, unpacking, assembly, erection, anchoring, applying, working to dimension, protecting, cleaning and similar operations."
- 1.8 PROVIDE means "furnish and install, complete and ready for use."
- 1.9 INSTALLER: "Installer" is the Contractor or an entity engaged by the Contractor, as an employee, subcontractor or sub-subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - .1 The term "experienced", when used with "Installer" means having a minimum of 5 previous projects similar in size to this Project, and familiar with the precautions required, and with requirements of the authority having jurisdiction.
- 1.10 PROJECT SITE is the space available for construction activities, either exclusively or with others performing other construction on the Project. The extent of the Project Site shall be as directed by the Owner's Representative, and may or may not be identical with the description of the land upon which the Project is to be built.

- 1.11 TESTING LABORATORIES: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, at the Project Site or elsewhere, and to report on, and, if required, to interpret results of those inspections or tests.
- 1.12 WORKING DAY: Any calendar day, except: 1) Saturdays, Sundays, and holidays; 2) days where conditions identified in the Contract require the Contractor to suspend construction operations; 3) days with inclement weather that prevents prosecution of the scheduled work. On inclement weather days that result in partial prosecution of the work, partial working days will be charged as determined by the Engineer. Partial working days will be charged in one-quarter day increments. If the Contractor receives permission from the Engineer to work on a Sunday or holiday, full working days will be charged, weather permitting. No time charge will be assessed if the Contractor elects to work on Saturdays. Should the Contractor prepare to begin work on any day on which inclement weather prevents the work from beginning at the usual starting time and the crew is dismissed as a result, the Contractor will not be charged for a working day whether or not conditions change during the day and the rest of the day becomes suitable for construction operations.

ARTICLE 2: SPECIFICATION FORMAT AND CONTENT EXPLANATION

- 2.1 SPECIFICATION FORMAT: These specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTER FORMAT numbering system.
- 2.2 Language used in the Specifications is the abbreviated type. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and where the context so indicates.
- .1 IMPERATIVE LANGUAGE is used generally. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text subjective language is used to describe responsibilities which must be fulfilled indirectly by the Contractor, or by others when so noted.
- .2 The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.
- 2.3 ASSIGNMENT OF SPECIALISTS: Certain construction activities shall be performed by specialists, recognized experts in the operations to be performed. Specialists must be engaged for those activities, and assignments are requirements over which the Contractor has no option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

ARTICLE 3: DRAWING OF SYMBOLS

- 3.1 GENERAL: Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., ninth edition.
- 3.2 MECHANICAL/ELECTRICAL DRAWINGS: Graphic symbols on mechanical and electrical Drawings are aligned with symbols recommended by ASHRAE. Where appropriate, they are supplemented by symbols recommended by technical associations. Refer instances of uncertainty to the Engineer for clarification before proceeding.

ARTICLE 4: INDUSTRY STANDARDS

- 4.1 APPLICABILITY OF STANDARDS: Except where the Contract Documents include more stringent requirements, applicable industry standards have the same force and effect as if bound

or copied into Contract Documents. Such standards are part of the Contract Documents by reference. Individual Sections indicate standards the Contractor must keep available at the Project Site.

- 4.2 PUBLICATION DATES: Where the date of issue of a referenced standard is not specified, comply with the standard in effect as of date of Contract Documents.
- .1 UPDATED STANDARDS: Submit a Change Order proposal where an applicable standard has been revised and reissued after the date of the Contract Documents and before performance of Work. The Engineer will decide whether to issue a Change Order to proceed with the updated standard.
- 4.3 CONFLICTING REQUIREMENTS: Where compliance with two or more standards that establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced. Refer uncertainties as to which quality level is more stringent to the Engineer for a decision before proceeding.
- .1 MINIMUM QUANTITIES OR QUALITY LEVELS: The quantity or quality shown or specified is the minimum to be provided or performed. Indicated values are minimum or maximum values, as appropriate for the requirements. Refer instances of uncertainty to the Engineer for decision before proceeding.
- 4.4 COPIES OF STANDARDS: Each entity engaged on the Project shall be familiar with standards applicable to that activity. Copies of applicable standards are not bound with the Contract Documents.
- .1 Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.
- .2 Although copies of standards needed for enforcement of requirements may be part of submittals, the Owner's Representative reserves the right to require submittal of additional copies for enforcement of requirements.
- 4.5 ABBREVIATIONS AND NAMES: Where acronyms or abbreviations are used in the Specifications or other Contract Documents they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable. Refer to the "Encyclopedia of Associations", published by Gale, available in most libraries.
- 4.6 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, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

END OF SECTION 01090 - DEFINITIONS AND STANDARDS

NOT FOR BIDDING

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2014 HOLIDAYS

STATE OF DELAWARE 2014 Holidays		
In accordance with Title 1, Chapter 5, §501, Delaware Code, as amended, the following are legal holidays in the State of Delaware for Calendar Year 2014 :		
New Years Day	January 1	Wednesday
Martin Luther King Jr. Day	January 20	Monday
Good Friday	April 18	Friday
Memorial Day	May 26	Monday
Independence Day	July 4	Friday
Labor Day	September 1	Monday
Election Day	November 4	Tuesday
Return Day (after 12:00 noon Sussex County)	November 6	Thursday
Veterans Day	November 11	Tuesday
Thanksgiving Day	November 27	Thursday
Day After Thanksgiving	November 28	Friday
Christmas Day	December 25	Thursday

NOTE: THE STATE OF DELAWARE 2015 HOLIDAYS WILL BE THE SAME AS THOSE LISTED ABOVE, HOWEVER DATES MAY CHANGE.

Revised: 07/2013

SECTION 01200 - PROJECT MEETINGS**TABLE OF ARTICLES**

1. RELATED DOCUMENTS
2. SUMMARY
3. PRE-CONSTRUCTION CONFERENCE
4. PRE-INSTALLATION CONFERENCES
5. COORDINATION MEETINGS
6. PROGRESS MEETINGS

ARTICLE 1: RELATED DOCUMENTS

- 1.1 Drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements, and other Division-1 Specification Sections, apply to this Section.

ARTICLE 2: SUMMARY

- 2.1 This Section specifies administrative and procedural requirements for Project Meetings including but not limited to:
 - .1 Pre-Construction Conference.
 - .2 Pre-Installation Conferences.
 - .3 Coordination Meetings.
 - .4 Progress Meetings.
- 2.2 Construction schedules are specified in another Division-1 Section.

ARTICLE 3: PRE-CONSTRUCTION CONFERENCE

- 3.1 Schedule a pre-construction conference and organizational meeting at the Project Site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.
- 3.2 Attendees: The Owner, Engineer and their consultants, the Contractor and their superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- 3.3 Agenda: Discuss items of significance that could affect progress including such topics as:
 - .1 Tentative construction schedule.
 - .2 Critical work sequencing.
 - .3 Designation of responsible personnel.
 - .4 Procedures for processing field decisions and Change Orders.
 - .5 Procedures for processing Applications for Payment.
 - .6 Distribution of Contract Documents.
 - .7 Submittal of Shop Drawings, Product Data and Samples.
 - .8 Preparation of record documents.
 - .9 Use of the premises.
 - .10 Parking availability
 - .11 Office, work and storage areas.
 - .12 Equipment deliveries and priorities.

- .13 Safety procedures.
- .14 First aid.
- .15 Security.
- .16 Housekeeping.
- .17 Working hours.

ARTICLE 4: PRE-INSTALLATION CONFERENCES

- 4.1 Conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Engineer of scheduled meeting dates.
 - .1 Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
 - .1 Contract Documents.
 - .2 Options.
 - .3 Related Change Orders.
 - .4 Purchases
 - .5 Deliveries.
 - .6 Shop Drawings, Product Data and quality control Samples.
 - .7 Review of mockups
 - .8 Possible conflicts.
 - .9 Compatibility problems.
 - .10 Time schedules.
 - .11 Weather limitations.
 - .12 Manufacturer's recommendations.
 - .13 Warranty requirements.
 - .14 Compatibility of materials.
 - .15 Acceptability of substrates.
 - .16 Temporary facilities.
 - .17 Space and access limitations.
 - .18 Governing regulations.
 - .19 Safety.
 - .20 Inspection and testing requirements.
 - .21 Required performance results.
 - .22 Recording requirements.
 - .23 Protection.
- 4.2 Record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Engineer.
- 4.3 Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

ARTICLE 5: COORDINATION MEETINGS

- 5.1 Conduct Project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

- 5.2 Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- 5.3 Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

ARTICLE 6: PROGRESS MEETINGS

- 6.1 Conduct progress meetings at the Project Site at regularly scheduled intervals. Notify the Owner and Engineer of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- 6.2 Attendees: In addition to representatives of the Owner and Engineer, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
- 6.3 Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
 - .1 Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind 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.
 - .2 Review the present and future needs of each entity present, including such items as:
 - .1 Interface requirements.
 - .2 Time.
 - .3 Sequences.
 - .4 Deliveries.
 - .5 Off-site fabrication problems.
 - .6 Access.
 - .7 Site utilization.
 - .8 Temporary facilities and services.
 - .9 Hours of work.
 - .10 Hazards and risks.
 - .11 Housekeeping.
 - .12 Quality and work standards.
 - .13 Change Orders.
 - .14 Documentation of information for payment requests.
 - .15 Submittals and other items affecting progress of work.
- 6.4 Reporting: No later than 5 days after each progress meeting date, the Owner will distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - .1 Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

END OF SECTION 01200 - PROJECT MEETINGS

SECTION 01300 - SUBMITTALS**TABLE OF ARTICLES**

1. REQUIREMENTS INCLUDED
2. PROCEDURES
3. CONSTRUCTION PROGRESS SCHEDULES
4. SCHEDULE OF VALUES
5. SHOP DRAWINGS
6. PRODUCT DATA
7. MANUFACTURERS' INSTRUCTIONS
8. SAMPLES
9. FIELD SAMPLES
10. ITEMS TO BE SUBMITTED AT CONTRACT SIGNING
11. COLOR SELECTION
12. SUBMITTAL SCHEDULE

ARTICLE 1: REQUIREMENTS INCLUDED

- 1.1 Procedures.
- 1.2 Construction Progress Schedules.
- 1.3 Schedule of Values.
- 1.4 Shop Drawings.
- 1.5 Product Data.
- 1.6 Samples.
- 1.7 Manufacturers' Instructions.
- 1.8 Manufacturers' Certificates.

ARTICLE 2: PROCEDURES

- 2.1 Deliver submittals to Owner at 89 Kings Highway, Dover, Delaware.
- 2.2 Transmit each item under a transmittal. Identify Project, Contractor, subcontractor, major supplier; identify pertinent Drawing sheet and detail number, and Specification section number, as appropriate. Identify deviations from Contract Documents. Provide space for Contractor and Engineer review stamps. Allow 2 weeks for Engineer's initial processing of submittals requiring review and return. Submittals will be returned without action when received indirectly (not through the Contractor).
- 2.3 Submit initial progress schedules and schedule of values in duplicate within fourteen (14) days after award of Contract. After review by Engineer, revise and resubmit as required. Submit revised schedules reflecting changes since previous submittal.
- 2.4 Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.
- 2.5 After Engineer's review of submittal, revise and resubmit as required, identifying changes made since previous submittal.
- 2.6 Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

ARTICLE 3: CONSTRUCTION PROGRESS SCHEDULES

- 3.1 Submit horizontal bar chart with separate bar for each major trade or operation identifying first work day of each week.

ARTICLE 4: SCHEDULE OF VALUES

- 4.1 Submit typed schedule on AIA Form G703. Contractor's standard form or media-driven printout will be considered on request.
- 4.2 Format: Table of Contents of this Project Manual. Identify each line item with number and title of the major Specification sections.
- 4.3 Include in each line item amount of Allowances specified in Section 01020. For Unit Cost Allowances, give quantities measured from Contract Documents multiplied by the unit cost equal to the total for the item.
- 4.4 Include in each line item a directly proportional amount of Contractor's overhead and profit.
- 4.5 Revise schedule to list Change Orders, for each application for payment.

ARTICLE 5: SHOP DRAWINGS

- 5.1 Submit the number of opaque reproduces which Contractor requires, plus two (2) copies which will be retained by Engineer.

ARTICLE 6: PRODUCT DATA

- 6.1 Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work. Include manufacturers' installation instructions when required by the Specification Section.
- 6.2 Submit the number of copies which Contractor requires, plus two (2) copies which will be retained by Engineer.
- 6.3 Product data must be submitted for every material used to complete the Work.

ARTICLE 7: MANUFACTURERS' INSTRUCTIONS

- 7.1 When required in individual Specification Section, submit manufacturer's printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, in quantities specified for product data.

ARTICLE 8: SAMPLES

- 8.1 Submit full range of manufacturers' standard colors, textures, and patterns for Architect's selection. Submit samples for selection of finishes within thirty (30) days after date of Contract.
- 8.2 Submit Samples to illustrate functional characteristics of the Product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.
- 8.3 Include identification of each Sample, giving full information.
- 8.4 Submit the number specified in respective Specification Section; one will be retained by Engineer. Reviewed Samples which may be used in the Work are indicated in the Specification Section.

ARTICLE 9: FIELD SAMPLES

- 9.1 Provide field samples of finishes at Project as required by individual Specifications Section. Install sample complete and finished. Acceptable samples in place may be retained in completed Work.

ARTICLE 10: ITEMS TO BE SUBMITTED AT CONTRACT SIGNING

- 10.1 Performance and Labor and Material Payment Bonds: One (1) copy of each bond for each copy of the Agreement, submit simultaneously with the signed Agreement.
- 10.2 Policies or Certificates of Insurance: One (1) copy of each policy or certificate for each copy of the Agreement, submit simultaneously with the signed Agreement.

ARTICLE 11: COLOR SELECTION

- 11.1 Submit all items requiring color selection together (at one time) to facilitate color coordination by Architect.

ARTICLE 12: SUBMITTAL SCHEDULE

- 12.1 Provide the following information:
- .1 Scheduled date for the first submittal.
 - .2 Related Section number.
 - .3 Submittal category (Shop Drawings, Product Data, or Samples).
 - .4 Name of Subcontractor.
 - .5 Description of the part of the Work covered.

END OF SECTION 01300 - SUBMITTALS

NOT FOR BIDDING

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SECTION 01400 - QUALITY CONTROL**TABLE OF ARTICLES**

1. REQUIREMENTS INCLUDED
2. RELATED REQUIREMENTS
3. QUALITY CONTROL, GENERAL
4. WORKMANSHIP
5. MANUFACTURER'S INSTRUCTIONS
6. MANUFACTURER'S CERTIFICATES
7. MOCK-UPS
8. MANUFACTURER'S FIELD SERVICES
9. TESTING LABORATORY SERVICES

ARTICLE 1: REQUIREMENTS INCLUDED

- 1.1 General Quality Control.
- 1.2 Workmanship.
- 1.3 Manufacturer's Instructions.
- 1.4 Manufacturer's Certificates.
- 1.5 Mock-ups.
- 1.6 Manufacturer's Field Services.
- 1.7 Testing Laboratory Services.

ARTICLE 2: RELATED REQUIREMENTS

- 2.1 Section 00700 - General Conditions and Section 00710 - General Requirements: Inspection and testing required by governing authorities.

ARTICLE 3: QUALITY CONTROL, GENERAL

- 3.1 Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

ARTICLE 4: WORKMANSHIP

- 4.1 Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- 4.2 Perform Work by persons qualified to produce workmanship of specified quality.
- 4.3 Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

ARTICLE 5: MANUFACTURER'S INSTRUCTIONS

- 5.1 Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Architect before proceeding.

ARTICLE 6: MANUFACTURER'S CERTIFICATES

- 6.1 When required by individual Specifications Section, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

ARTICLE 7: MOCK-UPS

- 7.1 When required by individual Specifications Section, erect complete, full-scale mockup of assembly at Project Site.

ARTICLE 8: MANUFACTURER'S FIELD SERVICES

- 8.1 When specified in respective Specification Sections, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to make appropriate recommendations.
- 8.2 Representative shall submit written report to Owner listing observations and recommendations.

ARTICLE 9: TESTING LABORATORY SERVICES

- 9.1 Contractor shall employ and pay for services of an Independent Testing Laboratory to perform inspections, tests, and other services required by various Specification Sections.
- 9.2 Contractor shall submit documentation that materials proposed for the project meet all requirements listed in the Specification Sections.
- 9.3 Contractor shall employ and pay for services required for independent verification that installation requirements listed in the Specification Sections have been met. Independent verification shall be conducted by a qualified firm approved by the Architect. These services will include, but are not limited to field verification of soil compaction.
- 9.4 Services will be performed in accordance with requirements of governing authorities and with specified standards.
- 9.5 Reports will be submitted to Owner and Architect in triplicate giving observations and results of tests, indicating compliance or noncompliance with specified standards and with Contract Documents.
- 9.6 Contractor shall cooperate with Testing Laboratory personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.
- .1 Notify Owner and Testing Laboratory 24 hours prior to expected time for operations requiring testing services.
- .2 Make arrangements with Testing Laboratory and pay for additional samples and tests for Contractor's convenience.
- 9.7 Any item found unsatisfactory by the testing agency shall be removed, replaced and retested at no additional cost to the Owner.

END OF SECTION 01400 - QUALITY CONTROL

SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**TABLE OF ARTICLES**

1. GENERAL PROVISIONS
2. REQUIREMENTS INCLUDED
3. GENERAL
4. MATERIALS
5. TEMPORARY ELECTRICITY AND LIGHTING
6. TEMPORARY TELEPHONE SERVICE
7. TEMPORARY WATER
8. TEMPORARY SANITARY FACILITIES
9. CONSTRUCTION AIDS
10. BARRIERS
11. HEAT, VENTILATION
12. ENCLOSURES
13. PROTECTION OF INSTALLED WORK
14. WATER CONTROL
15. CLEANING DURING CONSTRUCTION
16. PROJECT IDENTIFICATION
17. FIELD OFFICES AND SHEDS
18. REMOVAL OF CONSTRUCTION FACILITIES AND RESTORATION OF SITE
19. SECURITY
20. ACCESS ROADS AND PARKING AREAS
21. TEMPORARY CONTROLS
22. TRAFFIC REGULATION

ARTICLE 1: GENERAL PROVISIONS

- 1.1 The general provisions of the Contract, including the conditions of the Contract (General Conditions, Supplementary General Conditions, General Requirements, and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.

ARTICLE 2: REQUIREMENTS INCLUDED

- 2.1 Temporary Electricity and Lighting
- 2.2 Temporary Telephone Service
- 2.3 Temporary Water
- 2.4 Temporary Sanitary Facilities
- 2.5 Construction Aids
- 2.6 Barriers
- 2.7 Temporary Heat and Ventilation
- 2.8 Temporary Enclosures
- 2.9 Protection of Installed Work
- 2.10 Water Control
- 2.11 Cleaning During Construction
- 2.12 Project Identification
- 2.13 Field Offices and Sheds
- 2.14 Removal of Construction Facilities and Restoration of Site
- 2.15 Security
- 2.16 Access Roads and Parking Areas
- 2.17 Temporary Controls
- 2.18 Traffic Regulation

ARTICLE 3: GENERAL

- 3.1 Comply with National Electric Code.
- 3.2 Comply with Federal, State and local codes and regulations and with utility company requirements.
- 3.3 Coordinate Work with Owner's requirements.

ARTICLE 4: MATERIALS

- 4.1 Materials must be new and must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

ARTICLE 5: TEMPORARY ELECTRICITY AND LIGHTING

- 5.1 Provide temporary electric power and power distribution system as needed to perform the Work.

ARTICLE 6: TEMPORARY TELEPHONE SERVICE

- 6.1 Provide telephone service as necessary to properly conduct the Work and to comply with applicable regulations.
- 6.2 At each telephone, post a list of important telephone numbers.

ARTICLE 7: TEMPORARY WATER

- 7.1 Provide potable water for drinking and construction purposes.
- 7.2 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.
- 7.3 Take positive measures to preclude cross-connections and backflow.
- 7.4 The Contractor will assume the cost of water consumed.

ARTICLE 8: TEMPORARY SANITARY FACILITIES

- 8.1 Provide sanitary facilities in compliance with laws and regulations.
- 8.2 Service, clean and maintain facilities and enclosures.

ARTICLE 9: CONSTRUCTION AIDS

- 9.1 Each Subcontractor shall provide construction aids and equipment required by his personnel and to facilitate execution of his Work. Examples are scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes and other such facilities and equipment.
- 9.2 Mutual use may be arranged by the Contractor where applicable.

ARTICLE 10: BARRIERS

- 10.1 Materials at Contractor's option, as appropriate to serve required purpose.

ARTICLE 11: HEAT, VENTILATION

(Not Used)

ARTICLE 12: ENCLOSURES

(Not Used)

ARTICLE 13: PROTECTION OF INSTALLED WORK

- 13.1 Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
- 13.2 Prohibit traffic and storage on waterproofed and roofed surfaces, on lawn and landscaped areas.

ARTICLE 14: WATER CONTROL

- 14.1 Maintain excavations free of water. Provide and operate pumping equipment. Grade site to drain.

ARTICLE 15: CLEANING DURING CONSTRUCTION

- 15.1 Control accumulation of waste materials and rubbish; periodically dispose of legally off site.
- 15.2 Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

ARTICLE 16: PROJECT IDENTIFICATION

(Not Used)

ARTICLE 17: FIELD OFFICES AND SHEDS

- 17.1 Field offices and sheds are to be provided by the Contractor at the site to properly conduct the Work and associated activities such as progress meetings, maintaining as-built drawings, and storage of materials. Field office shall have office space dedicated to owner personnel and representatives. Dedicated space shall contain 2 desks with chairs, a drawing table, heating, air conditioning, electric services and internet access. Costs for utilities and internet service shall be the contractor's responsibility.

ARTICLE 18: REMOVAL OF CONSTRUCTION FACILITIES AND RESTORATION OF SITE

- 18.1 Remove temporary materials, equipment, services, and construction prior to Substantial Completion Inspection.
- 18.2 Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations to a depth of two (2) feet; grade site as indicated.

ARTICLE 19: SECURITY

- 19.1 Security of persons and property in areas under control of the Contractor shall be the Contractor's exclusive responsibility.
- 19.2 The Contractor, at this own expense, shall initiate whatever programs that are necessary to execute his responsibility.
- 19.3 Control of access to the areas under his 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.

ARTICLE 20: ACCESS ROADS AND PARKING AREAS

- 20.1 Provide and maintain uninterrupted vehicular access to site and within it:
 - .1 To temporary construction facilities, storage and work areas.
 - .2 For use by persons and equipment involved in construction of project.
- 20.2 Maintain traffic areas free as possible of excavated materials, construction equipment, products, snow, ice and debris.
- 20.3 Keep fire hydrants and water control valves free from obstruction and accessible for use.
- 20.4 Designated areas of existing parking facilities may be used for parking of construction personnel's private vehicles and of Contractor's light-weight vehicles.

ARTICLE 21: TEMPORARY CONTROLS

- 21.1 Provide the following Temporary Controls:
 - .1 Control of noise.
 - .2 Control of dust, both on site and within building.
 - .3 Control of surface water to prevent damage to the project, the site or adjacent properties.
 - .4 Control of pests and rodents to prevent infestation of construction or storage areas.
 - .5 Control of debris.
 - .6 Control of pollution of soil, water or atmosphere in accordance with applicable laws.
 - .7 Control of erosion in accordance with applicable laws.
 - .8 Control of mud and snow, including removal where necessary to construction operations.
Remove any mud tracked from site onto public roads or streets.

ARTICLE 22: TRAFFIC REGULATION

- 22.1 Obtain all temporary 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.
- 22.2 Provide all markers, signs, lights and barriers on, and near the site to safely control construction traffic and public access.

END OF SECTION 01500 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

SECTION 01600 - MATERIALS AND EQUIPMENT**TABLE OF ARTICLES**

1. GENERAL CONDITIONS
2. REQUIREMENTS INCLUDED
3. MANUFACTURER'S INSTRUCTIONS
4. TRANSPORTATION AND HANDLING
5. STORAGE AND PROTECTION
6. SUBSTITUTIONS AND PRODUCT OPTIONS

ARTICLE 1: GENERAL CONDITIONS

- 1.1 The general provisions of the Contract, including the conditions of the Contract (General Conditions, Supplementary General Conditions, General Requirements, and other Conditions, if any) and Division 1 as appropriate, apply to the Work specified in this Section.
- 1.2 Where Work is to be executed under Separate Prime Contracts, the provisions of this Section apply to each contract.

ARTICLE 2: REQUIREMENTS INCLUDED

- 2.1 All material and equipment incorporated into the Work shall:
 - .1 Conform to applicable specifications and standards.
 - .2 Comply with size, make, type and quality specified, or as specifically approved in writing by the Architect.
- 2.2 Manufactured and Fabricated Products shall conform to the following requirements:
 - .1 Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - .2 Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - .3 Two or more items of the same kind shall be identical, by the same manufacturer.
 - .4 Products shall be suitable for service conditions.
 - .5 Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
- 2.3 Do not use material or equipment for any purpose other than that for which it is designated or is specified.
- 2.4 Materials removed from existing structures shall not be re-used in the completed Work unless specifically indicated or specified.
- 2.5 For material and equipment specifically indicated or specified to be re-used in the Work:
 - .1 Use special care in removal, handling, storage and reinstallation, to assure proper function in the completed Work.

- .2 Arrange for transportation, storage and handling of products which require off-site storage, restoration or renovation. Pay all costs for such work.

ARTICLE 3: MANUFACTURER'S INSTRUCTIONS

- 3.1 When Contract Documents require that installation of Work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Engineer.
 - .1 Maintain one set of complete instructions at the job site during installation and until completion.
- 3.2 Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
 - .1 Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions.
 - .2 Do not proceed with Work without clear instructions.
- 3.3 Perform Work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

ARTICLE 4: TRANSPORTATION AND HANDLING

- 4.1 Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with Work and conditions at the site.
 - .1 Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - .2 Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.
- 4.2 Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

ARTICLE 5: STORAGE AND PROTECTION

- 5.1 Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
 - .1 Store products subject to damage by the elements in weather-tight enclosures.
 - .2 Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- 5.2 Exterior Storage.
 - .1 Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
 - .2 Store loose granular materials in a well-drained area on solid surfaces to prevent mixing

with foreign matter.

- 5.3 Arrange storage in a manner to provide easy access for inspection. Make periodic inspection of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.
- 5.4 Store flammable materials so as to prevent contact with flames and fire. Conform with manufacturer's recommendations and local laws. Pay particular attention to storage of:
 - .1 Paint materials.
 - .2 Cleaning and other solvents.
 - .3 Fuels.
- 5.5 Protection After Installation:
 - .1 Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

ARTICLE 6: SUBSTITUTIONS AND PRODUCT OPTIONS

- 6.1 Product List.
 - .1 Within 14 days after date of Owner-Contractor Agreement, submit a complete list of major products proposed for use, with the name of the manufacturer, trade name, and model number of each product and the installing subcontractor.
- 6.2 Contractor's Options.
 - .1 For products specified only by reference standard, select any product meeting that standard.
 - .2 For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with the specifications.
 - .3 For products specified by naming one or more products or manufacturers and "or equal", bidders must, during the bidding period, submit a request for substitutions for any product or manufacturer not specifically named. See provisions in Article 6, paragraph 6.3.
 - .4 For products specified by naming only one product and manufacturer, there is no option.
- 6.3 Substitutions.
 - .1 Requests for substitutions shall be made in writing and received by the Owner before 4:30 p.m., 10 calendar days prior to bid opening. Subsequently, substitutions will be considered only when a Product becomes unavailable due to no fault of the Contractor. The Architect will review requests and will notify bidders in an Addendum if the requested substitution is acceptable.
 - .2 Submit a separate request for each product, supported with complete data, with drawings and samples as appropriate, including:
 - .1 Comparison of the qualities of the proposed substitution with that specified.
 - .2 Changes required in other elements of the work because of the substitution.
 - .3 Effect on the construction schedule.
 - .4 Cost data comparing the proposed substitution with the product specified.
 - .5 Any required license fees or royalties.

- .6 Availability of maintenance service, and source of replacement materials.
- .3 Engineer shall be the judge of the acceptability of the proposed substitution.
- .4 A request for a substitution constitutes a representation that Bidder:
 - .1 Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.
 - .2 Will provide the same warranties or bonds for the substitution as for the product specified.
 - .3 Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects.
 - .4 Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

END OF SECTION 01600 – MATERIALS AND EQUIPMENT

SECTION 01700 - CONTRACT CLOSEOUT**TABLE OF ARTICLES**

1. REQUIREMENTS INCLUDED
2. RELATED REQUIREMENTS
3. CLOSEOUT PROCEDURES
4. FINAL CLEANING
5. OPERATION AND MAINTENANCE DATA
6. WARRANTIES AND BONDS
7. SPARE PARTS AND MAINTENANCE MATERIALS

ARTICLE 1: REQUIREMENTS INCLUDED

- 1.1 Closeout Procedures.
- 1.2 Final Cleaning.
- 1.3 Operation and Maintenance Data.
- 1.4 Warranties and Bonds.
- 1.5 Spare Parts and Maintenance Materials.

ARTICLE 2: RELATED REQUIREMENTS

- 2.1 Drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements, and other Division-1 Specification Sections, apply to this Section.
 - .1 Fiscal provisions, legal submittals, and other administrative requirements.
- 2.2 Section 00600 - Bonds, Certificates and Administrative Forms (AIA Documents), applies to this Section.

ARTICLE 3: CLOSEOUT PROCEDURES

- 3.1 Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.
- 3.2 When Contractor considers Work has reached final completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Owner's inspection.
- 3.3 In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.
- 3.4 Owner will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order.

ARTICLE 4: FINAL CLEANING

- 4.1 Execute prior to final inspection.
- 4.2 Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum soft surfaces. Clean equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment.

Clean roofs, gutters, downspouts, and drainage systems.

- 4.3 Clean site: Sweep paved areas, rake clean other surfaces.
- 4.4 Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the Site. Provide final cleaning.

ARTICLE 5: OPERATION AND MAINTENANCE DATA

- 5.1 Provide data for:
 - .1 Mechanical equipment and controls.
 - .2 Electrical equipment and controls.
- 5.2 Submit three (3) sets prior to final inspection, bound in 8-1/2 x 11 inch (216 x 279 mm) three-ring side binders with durable plastic covers.
- 5.3 Provide a separate volume for each system, with a table of contents and index tabs for each volume.
- 5.4 Part 1: Directory, listing names, addresses, and telephone number of: Suppliers and Contractor.
- 5.5 Part 2: Operation and maintenance instructions, arranged by Specification Division. For each Specification give names, addresses, and telephone number of Subcontractors and Suppliers.
 - List:
 - .1 Appropriate design criteria.
 - .2 List of equipment.
 - .3 Parts list.
 - .4 Operating instructions.
 - .5 Maintenance instructions, equipment.
 - .6 Maintenance instructions, finishes.
 - .7 Shop Drawings and Product Data.
 - .8 Warranties.

ARTICLE 6: WARRANTIES AND BONDS

- 6.1 Provide duplicate, notarized copies. Execute Contractor's submittals and assemble documents executed by subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in binder with durable plastic cover.
- 6.2 Submit material prior to final application for payment. For equipment put into use with Owner's written permission during construction, submit within seven (7) days after first operation. For items of work delayed materially beyond date of Substantial Completion, provide updated submittal within ten (10) days after acceptance, listing date of acceptance as start of warranty period.

ARTICLE 7: SPARE PARTS AND MAINTENANCE MATERIALS

- 7.1 Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of Work. Coordinate with Owner, deliver to Project Site and obtain receipt prior to final payment.

END OF SECTION 01700 - CONTRACT CLOSEOUT

SECTION 01720 - PROJECT RECORD DOCUMENTS**TABLE OF ARTICLES**

1. REQUIREMENTS INCLUDED
2. MAINTENANCE OF DOCUMENTS AND SAMPLES
3. MARKING DEVICES
4. RECORDING
5. SUBMITTAL

ARTICLE 1: REQUIREMENTS INCLUDED

- 1.1 Maintain at the site for the Owner one (1) record copy of:

- .1 Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other Modifications to the Contract.
- .5 Engineer Field Orders or Written Instructions.
- .6 Approved Shop Drawings, Product Data and Samples.
- .7 Field Test Records.

ARTICLE 2: MAINTENANCE OF DOCUMENTS AND SAMPLES

- 2.1 Store documents and samples in Contractor's field office apart from documents used for construction.
- 2.2 File documents and samples in accordance with CSI format.
- 2.3 Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- 2.4 Make documents and samples available at all times for inspection by Owner's representative.

ARTICLE 3: MARKING DEVICES

- 3.1 Provide felt tip marking pens for recording information in the code designated by Owner's representative.

ARTICLE 4: RECORDING

- 4.1 Label each document "PROJECT RECORD" in neat large printed letters.
- 4.2 Record information concurrently with construction progress.
 - .1 Do not conceal any work until required information is recorded.
- 4.3 Drawings: Legibly mark to record actual construction:
 - .1 Depths of various elements of foundation in relation to finish first floor datum.
 - .2 Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

- .3 Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
 - .4 Field changes of dimension and detail.
 - .5 Changes made by Change Order.
 - .6 Details not on original Contract Drawings.
- 4.4 Specifications and Addenda: Legibly mark each Section to record:
- .1 Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - .2 Changes made by Change Order.

ARTICLE 5: SUBMITTAL

- 5.1 Prior to contract close-out, Contractor shall submit record documents as specified for Owner's review and acceptance, Contractor shall submit a set of reproducible sepia's for Owner's use.
- 5.2 Accompany submittal with transmittal letter in duplicate, containing:
- .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Title and number of each record document.
 - .5 Signature of Contractor or his authorized representative.

END OF SECTION 01720 – PROJECT RECORD DOCUMENTS

017419 - CONSTRUCTION WASTE MANAGEMENT**PART 1 – GENERAL****1.1 SUMMARY**

- A. Section includes: Administrative and procedural requirements for construction waste management activities.

1.2 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.
- B. Salvage: Recovery of materials for on-site reuse, sale or donation to a third party.
- C. 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 as mulch.
- D. Recycling: The process of sorting, cleaning, treating, and reconstituting materials for the purpose of using the material in the manufacture of a new product.
- E. 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.
- F. 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.
- G. 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, is used to recover recyclable materials.

1.3 SUBMITTALS

- A. Contractor shall develop a Waste Management Plan: Submit 3 copies of plan within 14 days of date established for the **Notice to Proceed**.
- B. Contractor shall provide Waste Management Report: Concurrent with each Application for Payment, submit **3** copies of report.

1.4 PERFORMANCE REQUIREMENTS

A. General: Divert a minimum of **75%** 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 Acoustical ceiling tiles
- 2 Asphalt
- 3 Asphalt shingles
- 4 Cardboard packaging
- 5 Carpet and carpet pad
- 6 Concrete
- 7 Drywall
- 8 Fluorescent lights 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 Wood
- 16 Field office waste, including office paper, aluminum cans, glass, plastic, and office cardboard.

1.4 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. Preconstruction Conference: Schedule and conduct meeting at Project site prior to construction activities.

1. Attendees: Inform the following individuals, whose presence is required, of date and time of meeting.

- a. Owner
- b. Architect
- c. Contractor's superintendent
- d. Major subcontractors
- e. Waste Management Coordinator
- f. Other concerned parties

2. Agenda Items: Review methods and procedures related to waste management including, but not limited to, the following:
 - a. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - b. Review requirements for documenting quantities of each type of waste and its disposition.
 - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - e. Review waste management requirements for each trade.
3. Minutes: Record discussion. Distribute meeting minutes to all participants.
Note: If there is a Project Architect, they will perform this role.

1.5 WASTE MANAGEMENT PLAN – Contactor shall develop and document the following:

- A. Develop a plan to meet the requirements listed in this section at a minimum. Plan shall consist of waste identification, waste reduction plan and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight throughout the plan.
- B. Indicate anticipated types and quantities of demolition, site-cleaning and construction waste generated by the project. List all assumptions made for the quantities estimates.
- C. List each type of waste and whether it will be salvaged, recycled, or disposed of in a landfill. The plan should 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.

CONSTRUCTION WASTE MANAGEMENT 01 74 19-4 3.3 CO-MINGLED RECYCLING

WASTE MANAGEMENT PROGRESS REPORT				
MATERIAL CATEGORY	DISPOSED IN MUNICIPAL SOLID WASTE LANDFILL	DIVERTED FROM LANDFILL BY RECYCLING, SALVAGE OR REUSE		
		Recycled	Salvaged	Reused
1. Acoustical Ceiling Tiles				
2. Asphalt				
3. Asphalt Shingles				
4. Cardboard Packaging				
5. Carpet and Carpet Pad				
6. Concrete				
7. Drywall				
8. Fluorescent Lights 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)				

A. General: Do not put CDL waste that will be disposed in a landfill into a co-mingled CDL waste recycling container.

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.

END OF SECTION - CONSTRUCTION WASTE MANAGEMENT

NOT FOR BIDDING

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SECTION 02410 – DEMOLITION AND DECONSTRUCTION

PART 1: GENERAL

1.1. SUMMARY.

- A. Do not begin demolition or deconstruction until authorization is received from the Owner. The work of this section is to be performed in a manner that maximizes salvage and recycling of materials. Remove rubbish and debris from the project site; do not allow accumulations inside or outside the buildings. The work includes demolition, deconstruction, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Owner's Representative. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition.

1.2. SUBMITTALS.

- A. OSHA TRAINING: Prior to beginning work contractor shall provide documentation that all personnel involved with demolition work have received OSHA 1910.120 40-hour HAZWOPER training with current 8 hour refreshers and medical monitoring.
- B. DEMOLITION PLAN: Contractor shall prepare a Demolition Plan and submit proposed salvage, demolition, deconstruction and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress, a disconnection schedule of utility services, and a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Demolition Plan will state the Contractor will be responsible for producing disposal manifests, certified by the contractor, for all removed materials indicating type, quantities, condition, destination, and end use. Coordinate with Waste Management Plan. Demolition Plan will include Contractor's procedures inspecting facilities and determining suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers, state provisions for securing the safety of the workers throughout the performance of the work.

Plan shall be approved by Owner's representative prior to work beginning. Owner's representative assumes no liability regarding the plan.

- C. DISPOSAL MANIFESTS: Contractor will produce, certify and submit disposal manifests for all materials being transported from the site. Manifests shall indicate, type of material, quantity of material, material hauler, and end use/disposal facility. Manifests shall be submitted on a daily basis for the previous days work.
- D. EXISTING CONDITIONS: Contractor shall inspect work areas and submit documentation of facilities to remain which are in questionable condition prior to beginning work in that area. Documentation shall be in accordance with paragraph 1.8 of this specifications section.

1.3. REFERENCES.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

- A. AIR-CONDITIONING, HEATING AND REFRIGERATION INSTITUTE (AHRI)
AHRI Guideline K (2009) Guideline for Containers for Recovered Non-Flammable Fluorocarbon Refrigerants
- B. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
AASHTO M145 (1991; R 2004) Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
AASHTO T 180 (2009) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm(18-in.)
- C. AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
ASSE/SAFE A10.6 (2006) Safety Requirements for Demolition Operations
- D. CARPET AND RUG INSTITUTE (CRI)
CRI 104 (2002) Standard for Installation Specification of Commercial Carpet
- E. U.S. ARMY CORPS OF ENGINEERS (USACE)
EM 385-1-1 (2008) Safety and Health Requirements Manual
- F. U.S. DEFENSE LOGISTICS AGENCY (DLA)
DLA 4145.25 (June 2000) Storage and Handling of Liquefied and Gaseous Compressed Gases and Their Full and Empty Cylinders
- G. US DEPARTMENT OF DEFENSE (DOD)
DOD 4000.25-1-M (2004) Military Standard Requisitioning and Issue Procedures
MIL-STD-129 (2007; Rev P; Change 4) Military Marking for Shipment and Storage
- H. U.S. FEDERAL AVIATION ADMINISTRATION (FAA)
FAA AC 70/7460-1 2007; Rev K) Obstruction Marking and Lighting
- I. U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
40 CFR 61 National Emission Standards for Hazardous Air Pollutants
40CFR 82 Protection of Stratospheric Ozone
49 CFR 173.301 Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

1.4. ITEMS TO REMAIN IN PLACE

- A. Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Owner. Repair or replace damaged items as approved by the Owner/Engineer. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the Owner's Representative prior to performing such work.
- B. EXISTING CONSTRUCTION LIMITS AND PROTECTION: Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.
- C. TREES. Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place. Replace any tree damaged during the work under this contract with like-kind or as approved by the Owner's Representative.
- D. UTILITY SERVICE: Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to start of work, utilities serving each area of the site to be demolished will be disconnected and sealed by the Contractor.
- E. FACILITIES: Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the Owner/Engineer. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this contract.

1.5. QUALITY ASSURANCE

- A. Furnish timely notification of demolition projects to State authorities in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSE/SAFE A10.6. Comply with the Environmental

Protection Agency requirements specified. Use of explosives will not be permitted.

1.6. DUST AND DEBRIS CONTROL

- A. Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

1.7. PROTECTION

- A. **TRAFFIC CONTROL SIGNS:** Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights meeting DelDOT standards for products and configuration. Anchor barricades in a manner to prevent displacement by wind or other weather conditions. Notify the Owner's Representative prior to beginning such work.
- B. **PROTECTION OF PERSONNEL:** Before, during and after the demolition and deconstruction work continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the project site. No area, section, or component of floors, roofs, walls, columns, pilasters, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.8. EXISTING CONDITIONS

- A. Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Owner's Representative showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4 inch will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to before starting work. It is the Contractor's responsibility to arrange, verify and document all required outages which will be required during the course of work, and to note these outages on the record document.

PART 2: PRODUCTS

NOT USED

PART 3: EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

- A. Inspect and evaluate existing structures onsite for reuse. Existing construction scheduled to be removed for reuse shall be disassembled. Dismantled and removed materials are to be separated, set aside, and prepared for delivery to a collection point

for reuse, remanufacture, recycling, or other disposal, as specified. Materials shall be designated for reuse onsite whenever possible, as indicated by Contract Documents and as approved by the Owner/Engineer.

- B. STRUCTURES: The existing building foundation that is indicated to be removed shall be removed in its entirety, including all associated reinforcement and other structural components.

Remove existing structures indicated to be removed to a minimum depth of 36 inches below proposed grade. Foundations greater than 36 inches below proposed grade, may remain in place provided they are destroyed to condition that will prevent collection of groundwater.

Demolish structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed. Demolish concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods as approved by the Owner/Engineer.

Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

Building, or the remaining portions thereof, not exceeding 80 feet in height may be demolished by the mechanical method of demolition except for the Administration Building as identified on the plans. The Administration Building shall be demolished systematically and may not be demolished by mechanical methods.

C. UTILITIES AND RELATED EQUIPMENT

1. General Requirements: Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Owner/Engineer. Do not interrupt existing utilities serving facilities occupied and used by the Owner except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.
2. Disconnecting Existing Utilities: Remove existing utilities as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility, as required by utility provider's requirements and approved by the Owner's Representative. When utility lines are encountered but are not indicated on the drawings, notify the Owner's Representative prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Owner's Representative.

- D. PAVING AND SLABS: Remove within the limit of disturbance the entire depth of concrete and asphaltic concrete paving and slabs including aggregate base. Provide neat sawcuts at limits of pavement removal. Pavement and slabs shall be removed from the Site at the Contractor's expense.

- E. MASONRY: Sawcut and remove masonry so as to prevent damage to materials being salvaged.
- F. CONCRETE: Saw concrete along straight lines to a depth of a minimum 4 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete. Salvage removed concrete to the most practical levels.
- G. STRUCTURAL STEEL: Dismantle structural steel at field connections and in a manner that will prevent bending or damage. Salvage for recycle structural steel, steel joists, girders, angles, plates, columns and shapes. Do not use flame-cutting torches. Transport steel joists and girders as whole units and not dismantled. Transport structural steel shapes to a recycling facility, designated by the contractor protected from the weather.
- H. MISCELLANEOUS METAL: Salvage shop-fabricated items such as access doors and frames, steel gratings, metal ladders, wire mesh partitions, metal railings, metal windows and similar items as whole units. Salvage light-gage and cold-formed metal framing, such as steel studs, steel trusses, metal gutters, roofing and siding, metal toilet partitions, toilet accessories and similar items. Scrap metal shall become the Contractor's property. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility.
- I. CARPENTRY: When possible salvage for reuse lumber, millwork items, and finished boards, and sort by type and size.

END OF SECTION 02410 – DEMOLITION AND DECONSTRUCTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
 - 1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5 and Section 7, "Lightweight Concrete."
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests.
- E. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
1. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class I or Class II zinc coated after fabrication and bending.
 2. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

- A. Portland Cement: For all cast-in-place cement curbs, refer to DELDOT 812, **Type B** for concrete material specifications.

<i>Class of Concrete</i>		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
Design Compressive Strength, f'_c at 28 days, (Note 1)	psi (MPa)	4500 (30)	3000 (20)	2000 (15)	4500 (30)
Design Cement Content Minimum (Note 2)	sacks/yd ³	7 1/2	6	4 1/2	7 1/2
	(sacks/m ²)	(9.8)	(7.8)	(5.9)	(9.8)
	lb/yd ³ (kg/m ³)	705 (418)	564 (334)	423 (251)	705 (418)
Design Water to Cement Ratio, W/C = <u>Weight Cement</u> (Note 3)		0.4	0.45	0.6	0.4

<i>Class of Concrete</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
Required Air Content (Note 4)	4-7	4-7	4-7	4-7
Required Slump (Note 5)	2 - 4 (50 - 100)	2 - 4 (50 - 100)	2 - 4 (50 - 100)	2 - 4 (50 - 100)
Required Admixtures (AASHTO M 194) (Notes 6 and 7)	A, D, F, G	A, D, E, F, G	A, D, E, F, G	A, D, F, G
Notes 8, 9, 10, and 11 refer to all classes of concrete.				

Note 1: In addition to meeting the specified f'_c design compressive strength, Class D concrete shall achieve f_{cr} , which is the required average compressive strength for f'_c . The required average compressive strength, f_{cr} , shall be the minimum compressive strength required for mix approval and shall be in excess of the 4500 psi (30 MPa) design compressive strength, f'_c . The degree of excess compressive strength necessary shall depend on expected uniformity of concrete production as per criteria established in the ACI Standard 214. Upon establishment of standard deviation data, the following ACI 318M required average compressive strength values shall govern acceptance of the trial mix proportions:

f_{cr} = 4900 psi (33.8 MPa) if standard deviation is less than 300 psi (2.1 MPa)
 = 5050 psi (34.8 MPa) if standard deviation is within 300 to 400 psi (2.1 to 2.8 MPa)
 = 5200 psi (35.8 MPa) if standard deviation is within 400 to 500 psi (2.8 to 3.5 MPa)
 = 5400 psi (37.2 MPa) if standard deviation is within 500 to 600 psi (3.5 to 4.1 MPa)

If the standard deviation exceeds 600 psi (4.1 MPa), the concrete production facility shall be unacceptable for Class D concrete production. A probability of not more than one in ten tests falling below the specified compressive strength will be used to compute the required compressive strength. The average 28-day compressive strength of two companion molded 6 by 12" (152 by 305 mm) or 4 by 8" (102 by 203 mm) cylinders prepared from the same batch of concrete shall be considered a "test".

Note 2: For Class D concrete, the average compressive strength and coefficient of variations shall be computed upon the availability of 28-day compressive strength data comprising a minimum of 15 tests from the concrete production plant. Should these determinations indicate an excessive margin of safety, the concrete mix may be modified to produce a lower average compressive strength as approved by the Department's Materials and Research Section, but in no case shall the cement content be reduced to less than 7 sacks/yd³ (658 lb/yd³) [9.2 sacks/m³ (390 kg/m³)]. Should determination indicate a lower average compressive strength or a higher coefficient of variation than anticipated, the quality of the concrete will be evaluated, and mix proportions adjusted as required; however, cement content may not exceed 8 sacks/yd³ (752 lb/yd³) [10.5 sacks/m³ (446 kg/m³)].

Note 3: Water to cement ratio may be expected to vary $\pm 5\%$ depending on varying atmospheric and other related conditions.

Note 4: Water reducing admixtures shall be required in all concrete. The quantity and AASHTO type or combination of AASHTO types of admixtures shall be determined by the Contractor depending on the ambient temperature, concrete temperature, time of day, thickness of concrete, concrete mix proportions, etc. and the amount and proper type of superplasticizer and/or retarder necessary. The Contractor shall be responsible for the quality of the concrete placed in any weather or atmospheric condition. Failure to achieve a satisfactory product shall be corrected as directed by the Engineer at the Contractor's expense.

Note 5: If a Type F or G admixture is used, the maximum slump shall be 8" (200 mm).

Note 6: The total chloride content of concrete mixtures, when tested in accordance with the requirements of AASHTO T 260, shall not exceed the following:

- a) Prestressed concrete: 0.06%.

- b) Conventionally reinforced concrete in a moist environment and exposed to chloride deicing salts or marine conditions:0.10%.
- c) Conventionally reinforced concrete in a moist environment or areas with potential moisture condensation but not exposed to chloride:0.15%.

Limits are expressed as a percentage of the total weight of the portland cement and fly ash in the concrete mix.

Note 7: In calculating the "Water to Cement Ratio" for mixes containing cementitious materials other than portland cement, the weight of the portland cement plus the weight of the cementitious material represents the weight of cement. Note 8: Consistency of the mix shall be determined by AASHTO T 119. Air content shall be determined by AASHTO T 152, Modified, or AASHTO T 196. Making and curing concrete test specimens shall be in accordance with AASHTO T 23 and it shall be the responsibility of the Contractor to ensure that the seven- and 28-day cylinders are cured for the first 24 to 48 hours in an environment to provide satisfactory moisture and temperature control as per AASHTO T 23.

Note 9: Concrete shall be placed only if the surface evaporation rate, as affected by ambient air temperature, concrete temperature, relative humidity, and wind velocity is less than or equal to 0.15 lb/ft² (0.73 kg/m²) per hour. The Contractor shall determine and document the evaporation rate at the site of the concrete placement, subject to verification by the Engineer. The chart contained in "Plastic Cracking of Concrete" by Delmar Bloem for the National Ready Mixed Concrete Association and published in ACI 305R-89 shall be used to determine the loss of surface moisture for the concrete. The chart may be obtained from the Department's Materials and Research Section.

Note 10: Fixed-form concrete shall meet all requirements of Class B except the 28-day compressive strength shall be 3500 psi (24 MPa).

Note 11: The Contractor has the right to modify their mix design for any class of concrete. The modified mix design will be reviewed by the Engineer prior to approval. The approval will be based upon tests performed by the Contractor and approved by the Engineer.

Note 12: Class D concrete shall have fiber reinforcement added at the rate of 1.5 lb/yd³ (0.90 kg/m³).

- B. Chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

2.4 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: Expansion joint material of 0.5" nominal thickness and shall conform to the requirements of AASHTO M 153, Type II or Type III. Preformed expansion joint material of other types may be used for portland cement concrete curb and integral curb and gutter provided they are approved by the Architect.
- CONCRETE MIXTURES
- B. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- C. Admixtures: Use admixtures according to DelDOT Standard Specifications for Road and Bridge Construction Section 812 for Type B Portland Cement Concrete..
 - 1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.6 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Integral PCC Curb and Gutter Joints (Fixed Forms): Expansion joints shall be formed in curb and in integral curb and gutter at 40' (12 m) intervals. When constructed adjacent to concrete pavement, expansion joints shall coincide with the expansion joints in the pavement. Materials for Portland cement concrete curb and integral curb and gutter shall be preformed expansion joint material of 1/2" (13 mm) nominal thickness and shall conform to the requirements of AASHTO M 153, Type II or Type III. Preformed expansion joint material of

other types may be used for portland cement concrete curb and integral curb and gutter provided they are approved by the Engineer.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.

3.7 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall

within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.8 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 034100 - PRECAST STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes precast structural concrete.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each precast concrete mixture.
- C. Shop Drawings:
 - 1. Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
 - 2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator, and testing agency.
- B. Material certificates.
- C. Material Test Reports: For aggregates.
- D. Source quality-control reports.
- E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 - 1. Designated as a PCI-certified plant as follows:

- a. Group C, Category C1 - Precast Concrete Products (no prestressed reinforcement).
- 2. Fabricator is located within 100 miles of Project site.
- B. Quality-Control Standard: For manufacturing procedures, testing requirements, and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."

1.6 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design Standards: Comply with ACI 318 and with design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 ASTM A 706/A 706M, deformed bars, assembled with clips.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel or galvanized-steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M or ASTM A 1064/A 1064M, flat sheet.
- E. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.3 CONCRETE MATERIALS

- A. Regional Materials: Precast structural concrete shall be manufactured from aggregates and cement that have been extracted or recovered, as well as manufactured, within 500 miles of Project site.
- B. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray, unless otherwise indicated.

- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33/C 33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.4 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Carbon-Steel-Headed Studs: ASTM A 108, Grade 1010 through 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. Carbon-Steel Plate: ASTM A 283/A 283M, Grade C.
- D. Malleable-Iron Castings: ASTM A 47/A 47M, Grade 32510 or Grade 35028.
- E. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30.
- F. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
- G. Carbon-Steel Structural Tubing: ASTM A 500/A 500M, Grade B or Grade C.
- H. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65.
- I. Deformed-Steel Wire or Bar Anchors: ASTM A 496/A 496M or ASTM A 706/A 706M.
- J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563; and flat, unhardened steel washers, ASTM F 844.
- K. High-Strength Bolts and Nuts: ASTM A 325 or ASTM A 490 Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563; and hardened carbon-steel washers, ASTM F 436.
 - 1. Do not zinc coat ASTM A 490 bolts.

2.5 BEARING PADS

- A. Provide bearing pads for precast structural concrete units as recommended by precast fabricator for application.

2.6 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150/C 150M, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.
- B. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218/C 1218M.
- C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion face and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: Limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C 642, except for boiling requirement.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
- H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.8 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.
- D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
- F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses and specified in-place loads.
- G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
- H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- I. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
- J. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.
- K. Comply with PCI MNL 116 procedures for hot- and cold-weather concrete placement.
- L. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that does not show in finished structure.
- M. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

- N. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

2.9 CASTING INSULATED WALL PANELS

- A. Cast, screed, and consolidate wythe supported by mold.
- B. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.
- C. Cast, screed, and consolidate top wythe to meet required finish.

2.10 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 116 product dimension tolerances as well as position tolerances for cast-in items.

2.11 COMMERCIAL FINISHES

- A. Commercial Grade: Remove fins and protrusions larger than 1/8 inch and fill holes larger than 1/2 inch. Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to 3/16 inch.
- B. Standard Grade: Normal plant-run finish produced in molds that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are permitted. Fill air holes greater than 1/4 inch in width that occur more than once per 2 sq. in.. Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Limit joint offsets to 1/8 inch.
- C. Grade B Finish: Fill air pockets and holes larger than 1/4 inch in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than 1/8 inch in width that occur more than once per 2 sq. in.. Grind smooth form offsets or fins larger than 1/8 inch. Repair surface blemishes due to holes or dents in molds. Discoloration at form joints is permitted.
- D. Grade A Finish: Repair surface blemishes and fill air holes with the exception of air holes 1/16 inch in width or smaller, and form marks where the surface deviation is less than 1/16 inch. Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.
- E. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.
- F. Smooth, steel trowel finish unformed surfaces. Consolidate concrete; bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

- G. Apply roughened surface finish according to ACI 318 to precast concrete units that receive concrete topping after installation.

2.12 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements and ASTM C 1610/C 1610M, ASTM C 1611/C 1611M, ASTM C 1621/C 1621M, and ASTM C 1712/C 1712M.
- B. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.
- B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, shoring, and bracing as required to maintain position, stability, and alignment of units until permanent connections are complete.
 - 1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 2. Remove projecting lifting devices and use plastic patch caps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - 3. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
- D. Field cutting of precast units is not permitted without approval of Architect.
- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.
- F. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.4/D1.4M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
- G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

- H. Grouting or Dry-Packing Connections and Joints: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled.

3.2 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.
- B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Visually inspect field welds and test according to ASTM E 165 or to ASTM E 709 and ASTM E 1444. High-strength bolted connections are subject to inspections.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.4 REPAIRS

- A. Repair precast structural concrete units if permitted by Architect.
 - 1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780/A 780M.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.

- E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

3.5 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034100

NOT FOR BIDDING

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SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for future piping passing through sanitary sewer manhole walls in-between SS MH 0101 and SS MH 0102

3.2 SLEEVE SCHEDULE

A. Use sleeves for the following piping-penetration applications:

1. 24-inch diameter sleeve to be installed so that SS MH 0101 and SS MH 0102 will be connected at the inverts shown on the construction drawings. Steel sleeve shall be installed at the invert elevations stated on the Contract Drawings. The sleeve shall be installed in the walls of the precast sanitary sewer manholes and sealed with grout.

END OF SECTION 220517

NOT FOR BIDDING

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing site utilities.
7. Temporary erosion- and sedimentation-control measures.

1.2 MATERIAL OWNERSHIP

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

1.3 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises as directed by the owners representative
- C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place. Contractor shall comply with the prepared Delaware Department of Natural Resources and Environmental Control (DNREC) Erosion & Sediment Control (E&SC) Plan in accordance with the requirements of the Contractor. All site activities shall comply with the approved E&SC Plan for the Site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
1. Obtain approved borrow soil material off-site. Satisfactory soil material is not available on-site.
- B. Standard Silt Fence
1. Stakes: (either T or U) or 2''x2'' hardwood
 2. Geosynthetic Fabric: Type GD-1
 3. Reinforcing Strip: Wooden lath, plastic strip or other approved equivalent
- C. Super Silt Fence
1. Fencing: Fencing shall be 42 inches in height and constructed in accordance with the latest DelDOT Specifications for Chain Link Fencing (Section 728). The DelDOT specification for a 6 foot fence shall be used, substituting 42 inch fabric and 6 foot length posts
 2. Fabric: Type GD-1
- D. Site Pollution Prevention Plan and Dust Control
1. Refer to DNREC Erosion and Sediment Control Handbook Detail No. DE-ESC-3.6.1
- E. Modified Cofferdam
1. Refer to Section 312319 – Dewatering and pumping system
- F. Geotextile Dewatering bag
1. Refer to Section 312319 - Dewatering
- G. Erosion Control Blanket
1. Type SSM-1: NAG S75 or approved equivalent
- H. Inlet Protection – Type 1
1. Wooden frame is to be constructed of 2''x4'' construction grade lumber
 2. Wire mesh must be of sufficient strength to support filter fabric with water fully impounded against it
 3. Fabric: Type GD-II
- I. Orange Barrier Fence
1. 48'' High density orange polyethylene safety fence
 2. Stakes: 72'' T-post driven 20'' minimum below grade and set 12' maximum on center
 3. Wire or zip ties to secure safety fence to posts
- J. Riprap Stilling Basin
1. Refer to Section 312319 - Dewatering
- K. Stabilized Construction Entrance
1. Stone: Use DE #3 stone

2. Geotextile: Type GS-1, placed over the entire area prior to placing stone
- L. Nonwoven Separation Geotextile Fabric
 1. DNREC Type GS-1
 - a. Mirafi 600x or approved equivalent
- M. Nonwoven Drainage Geotextile Fabric
 1. DNREC Type GD-2
 - a. Mirafi 140N or approved equivalent
- N. Coir Fiber Matting
 1. Control Mat OCF 30 (Granite Environmental) or approved equivalent
- O. Live Wattle Bundles
 1. Live branches tied together to a total of 4-5 inch diameter bundles
 2. Branches to be native to the area. To be approved by the Architect.
 - a. Black Willow – *Salix nigra* or approved equivalent

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- C. Removal of underground utilities is included in earthwork sections and with applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security and utilities sections and Section 02410 "Demolition and Deconstruction".

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches, whichever is greater in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

3.8 DEMOLITION NOTES

1. The contractor is responsible for identifying all permits applicable to demolition and is responsible for obtaining all permits applicable to demolition.
2. The contractor is responsible for securing areas of open excavations to prevent public access until excavations are filled or otherwise no longer present a hazard to the public. The contractor's procedure/method shall be reviewed by, and coordinated with, the owner's representative prior to the start of work.
3. Maintenance of traffic - all work shall be performed in accordance with the DelDOT safety permit and approved maintenance of traffic plan obtained by the owner (DNREC, parks & rec) for this project and in a manner that will ensure the least practicable obstruction to the traveling public consistent with safety and shall comply with the DelDOT manual entitled "Delaware manual on uniform traffic control devices, part 6, temporary traffic control and with NCHRP report 350 as defined in section 'a' of the traffic control manual. The most current version of this manual in effect at the time of advertisement for bids shall be used.
4. The contractor is responsible for removal of abandoned items, trash, and debris that are on site at the time of bid opening, regardless of whether or not specifically shown in the bid documents. No trash or debris shall be buried or burned on site.
5. The contractor shall protect all features not designated to be removed. Damaged items shall be repaired or replaced as directed by the owner at the contractor's expense.
6. Before work is started, the contractor shall notify 'miss utility' tel. (800) 282-8555. The contractor is advised that many utilities on site are privately owned and miss utility may refuse to locate them. The contractor shall verify the locations of all active and tentative utilities in the field by employing a professional utility locator to field locate existing active utilities prior to any excavation. Existing utilities are shown on these drawings based on the best information available, however this information has not been field verified and is not guaranteed. All existing utilities, not designated to be demolished or abandoned, shall be protected and temporarily supported or relocated as necessary to complete the work in accordance with the owner and pertinent utility company requirements. Any utilities not to be abandoned or demolished that are damaged by the contractor shall be promptly and fully restored to the satisfaction of the owner and the utility company. All costs shall be incidental to the contractor.
7. For all utility poles designated for demolition, contractor shall remove adjacent overhead electrical power lines and support poles to a minimum 36" below proposed grade.
8. Within the limit of disturbance, remove overhead pipe support posts, and electrical power support poles, and bollards/posts at various locations on site to a min. 36" below proposed grade.

9. These drawings do not include necessary elements of construction safety. All construction must be completed in accordance with the rules and regulations of the occupational safety and health act, and all federal, state, and local rules, regulations, and requirements.
10. The limit of disturbance shall be as shown on plans. The contractor shall not work or trespass outside the limit of disturbance as shown on the plans. Demolition includes all associated structures/pipe connected to the outside the building.
11. After removing utilities within the limits of disturbance, all underground pipes which are currently inactive or to become as part of the work are to remain in place and be plugged with a minimum 36" of 3000 psi concrete at the exposed end unless noted otherwise. See sheet c-153, detail 1.
12. All items indicated to be removed in the demolition plan shall be disposed of off-site by the contractor.
13. Contractor shall be responsible for testing of all items to be removed that may contain materials hazardous to public health.
14. Contractor shall remove all concrete structures and foundations to a minimum 36" below proposed grade. Concrete structures and foundations greater than 36" below proposed grade may remain in place provided they are destroyed to a condition that will not impede the flow of ground or surface water except as otherwise noted. Owner's representative to approve prior to backfilling.
15. Contractor shall maintain existing gun club road, including bridge, during construction.
16. All buildings and portions of buildings being demolished as part of this work shall be certified as free of asbestos by others at the start of demolition.
17. Known hazardous waste materials have been removed from the buildings and portions of the buildings being demolished as part of this work. Contractor shall be aware of potential for additional hazardous waste materials to be encountered during demolition.
18. All personnel involved with demolition work must have received OSHA 40 hour 1910.120 training, with current 8 hours refresher courses and medical monitoring.
19. The contractor shall follow the approved erosion and sediment control plan and DNREC standards prior to demolition, during demolition, and remove E&S controls after receiving DNREC, sediment and stormwater, approval.
20. Prior to de-energizing and removing the overhead electrical lines, the contractor shall coordinate with the owner and Delmarva power to ensure that the new power supplies to the facilities along gun club road are operational and that any power outages scheduled are to have minimal impact. Existing electrical poles shown on existing conditions plan, sheet c-102.
21. Active water, gas, and electric lines will be removed and capped at the LOD. All other utilities will be capped and abandoned in place unless noted otherwise in the utility demolition legend. The existing sanitary sewer will remain in place.
22. All paved and unpaved areas indicated to be demolished to include a minimum of 6 inches of topsoil and seed.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparing subgrades for pavements, turf and grasses.
2. Excavating and backfilling for structures.
3. Subbase course for pavements.
4. Excavating and backfilling for utility trenches.

- B. All personnel involved with intrusive work at the site shall have received OSHA 1910.120 40-hour HAZWOPER training with current 8 hour refreshers and medical monitoring. Evidence of such shall be submitted to the Engineer prior to beginning any intrusive work.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Unit Price No. 1
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 QUALITY ASSURANCE

- A. Pre-excavation Conference: Conduct conference at Project site.
- B. Contractor shall provide Engineer with a minimum of 1 week notice before beginning excavation in area indicated on Sheet C-111 so Engineer can have a Geotechnical Engineer onsite to determine suitability as road subgrade. No excavation shall be performed in this area unless the Geotechnical Engineer is present. Geotechnical Engineer shall determine if over-excavation and backfill is required to support the proposed road. Over-excavation in this area shall be covered by the Unit Price bid item identified in the specifications. Backfill shall consist of suitable soil compacted to 95% maximum density as required by the specifications for fill used as road subgrade.

1.4 PROJECT CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Suitable Soils: The uses, classifications, characteristics, and definitions of terms for borrow materials shall be in accordance with the requirements of AASHTO M 57, Modified; M 145, Modified; and M 146 and M 147, Modified.
- C. Unsuitable Soils: Unless otherwise directed, all materials having the following properties shall be excluded from use:
 - o Material with a maximum dry weight less than 90lb/ft³ (1440 kg/m³).
 - o Material with a liquid limit greater than 50.

- Material containing frozen material, rubbish, boulders in excess of 6" (150 mm) in any direction, or organic matter such as leaves, roots, grass, or sewage.
- D. Graded Aggregate Base Course: The material used to construct graded aggregate base course shall conform to the requirements of Section 813 and Section 821, Type B.

WEIGHT PERCENTAGE PASSING (Section 821)		
Sieve Size	Type A	Type B
2 1/2" (63 mm)	100	---
1 1/2" (37.5 mm)	---	100
1" (25.0 mm)	50 - 80	---
3/4" (19.0 mm)	---	50 - 95
No. 4 (4.75 mm)	20 - 50	20 - 50
No. 10 (2.00 mm)	---	15 - 40
No. 20 (850 μ m)	10 - 30	---
No. 100 (150 μ m)	2 - 20	2 - 20

The percentage of wear as determined by the Los Angeles machine shall not exceed 45%.

- E. Non-woven Geotextile Fabric (Type GS-1 and GD-2): Requirements for Type GS-1 and GD-2 Geotextile Fabric shall be determined as follows (from the Delaware Erosion and Sediment Control Handbook):

Criteria (Governing Standard)	Geotextile Fabric Type GS-1	Geotextile Fabric Type GD-2	
Minimum Grab Tensile Strength (ASTM D-4632)	315 lbs	80 lbs	Acceptable Materials for use as Type of GS-1 Fabric: 1. Mirafi 600x 2. Amoco 2006 3. Geotex 315ST 4. Other Approved Equivalent
Maximum Grab Tensile Elongation (ASTM D-4632)	15%	50%	
Minimum Trapezoidal Tear Strength (ASTM D-4533)	120 lbs	35 lbs	
Minimum Mullen Burst Strength (ASTM D-3786)	600 psi	160 psi	
Minimum Puncture Strength (ASTM D-4833)	120 lbs	45 lbs	Acceptable Materials for use as Type of GD-2 Fabric: 1. Mirafi 140N 2. Other Approved Equivalent
Apparent Opening Size (ASTM D-4751)	40-80 US Sieve Size	40-80 US Sieve Size	
Minimum UV Resistance after 500 hours (ASTM D-4355)	70%	70%	
Flow-thru Rate (ASTM D-4491)	5 gal/min/sqft maximum	110 gal/min/sqft minimum	

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. Excavated materials shall be considered to be contaminated and work must be performed by OSHA 1910.120 trained personnel. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
 - 1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.4 EXCAVATION FOR PAVEMENTS

- A. Excavate surfaces under pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 18 inches minimum of each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.6 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.7 STORAGE OF SOIL MATERIALS

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

3.8 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in "Cast-in-Place Concrete."

- D. Place and compact initial backfill of subbase material or suitable soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Place and compact final backfill of suitable soil to final subgrade elevation.

3.9 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use suitable soil material.
 - 2. Under pavements, use suitable soil material.
 - 3. Under footings suitable fill.

3.10 SOIL MOISTURE CONTROL

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

3.11 COMPACTION OF SOIL BACKFILLS, FILLS, AND SUBGRADES

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.12 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 2. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.13 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 1. Shape subbase course and base course to required crown elevations and cross-slope grades.
 2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.14 NON-WOVEN GEOTEXTILE INSTALLATION

- A. Installation of geotextile material shall be per manufacturer's recommendations.

3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified geotechnical engineering testing agency to perform the tests and inspections listed above. Contractor is responsible for collecting samples and determining the max compaction per ASTM D 1557.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Testing agency shall perform a minimum of one in-place field density and moisture test per 100 linear feet per lift under Gun Club Road and Yorklyn Road, and a minimum of one in-place field density and moisture test per 5,000 square feet per lift for satisfactory soils and engineered soils placed

elsewhere on the site. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.16 PROTECTION

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

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus suitable soil, unsuitable soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property. Materials being disposed of off-site should be considered to be contaminated for bidding purposes.
- B. Contractor is responsible for all testing and properly disposing of waste materials as directed by the waste facility.

END OF SECTION 312000

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SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes construction dewatering.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground and surface water and permit excavation and construction to proceed on dry, stable subgrades.
- B. A Pumping System to divert base flow with a minimum capacity of 29,500 gpm.
- C. Pumping System shall provide continuous 24-hour operation during the removal of the existing 48" culverts and installation of the proposed 48" culverts, and 2nd mobilization for the demolition of the existing Gun Club Road Bridge. Contractor shall have the appropriate personnel on site to monitor the pumping system.
- D. Noise attenuation shall be provided while the pump system is in operation. Sound levels shall be less than or equal to 70dBA (as measured by an IEC 61672-1 Compliant Class 1 Sound Level Meter) to the nearest the residence during normal working hours, weekend, and evening hours.
- E. Modified Cofferdams
 - 1. Cofferdam shall be formed with riprap, sheet metal, sand bags, or wood planks around the work area.
- F. Geotextile dewatering bag
 - 1. Geotextile fabric shall be a Type GD-IV
 - 2. The dewatering bag shall be sewn with double needle machine using high strength thread. All structural seams will be sewn with high strength, double stitched "J" type. Seam strength will have the following minimum average roll values:
 - a. Type: Heavy Duty
 - b. Test Method: ASTM D-4884
 - c. Test Result: 100 lb/in

3. The dewatering bag shall have an opening large enough to accommodate the discharge pipe with attached strap to tie off the hose to prevent the pumped water from escaping from the bag without being filtered.

G. Riprap Stilling basin gravel:

1. R-5 Riprap; 18" minimum depth
2. Geotextile beneath riprap shall be Type GS-1.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide temporary grading to facilitate dewatering and control of surface water.
- B. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 311000 "Site Clearing," during dewatering operations

3.2 INSTALLATION

- A. Install dewatering system complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 1. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Place dewatering system into operation to lower water to specified levels before excavating for culvert.
- C. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

3.3 OPERATION

- A. Operate system continuously until existing culverts have been removed, proposed culverts have been constructed and fill materials have been placed or until dewatering is no longer required.
- B. Operate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
 2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 3. Maintain piezometric water level a minimum of 24 inches below bottom of excavation.
- C. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

END OF SECTION 312319

SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes temporary excavation support and protection systems.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 INFORMATIONAL SUBMITTALS

- A. Contractor Calculations: For excavation support and protection system. Include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Record Drawings: Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions.

1.4 FIELD CONDITIONS

- A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide, design, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting earth and hydrostatic pressures and superimposed and construction loads.
 - 1. Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer.

PART 3 - EXECUTION

3.1 SOLDIER PILES AND LAGGING

- A. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
- B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.
- C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

3.2 SHEET PILING

- A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock vertical edges to form a continuous barrier.
- B. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.
- C. Cut tops of sheet piling to uniform elevation at top of excavation.

3.3 TIEBACKS

- A. Drill, install, grout, and tension tiebacks.
- B. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
 - 1. Have test loading observed by a qualified professional engineer responsible for design of excavation support and protection system.
- C. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.4 BRACING

- A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
 - 1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Architect.
 - 2. Install internal bracing if required to prevent spreading or distortion of braced frames.

3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 FIELD QUALITY CONTROL

- A. Survey-Work Benchmarks: Resurvey benchmarks regularly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

3.6 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
 1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
- B. Leave excavation support and protection systems permanently in place.

END OF SECTION 315000

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SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. The Section references the DELDOT Standards Specifications "Specifications for Road and Bridge Construction" dated August 2001, DIVISION 300 – BASES, DIVISION 400 – BITUMINOUS PAVEMENTS, SECTION 401 – HOT-MIX, HOT-LAID BITUMINOUS CONCRETE, and DIVISION 800 – MATERIALS. Additions and revisions to the DELDOT specification shall also be adhered to. If either specification section is contradictory then the more stringent specification will be used.
- B. Section Includes:
 - 1. Cold milling of existing asphalt pavement.
 - 2. Hot-mix asphalt paving.
- C. Related Requirements:
 - 1. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each paving material. Include statement that mixes containing recycled materials will perform equal to mixes produced from all new materials.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or DelDOT.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of DelDOT for asphalt paving work.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. Coarse Aggregate: Coarse aggregate shall be all material retained on the No. 8 sieve and shall conform to the requirements of DelDOT Section 805.
- B. Fine Aggregate: Fine aggregate is defined as all material passing the No. 8 sieve and shall consist of clean, hard, durable crushed stone. Job Mix Formula Type C which is defined below and in DelDOT Specifications Subsections 823.19, 823.20, and 823.21, up to 15% of the fine aggregate may be washed concrete sand, conforming to the requirements of Section 804. If the stability, as determined by the Laboratory Marshall Method in accordance with AASHTO T 245, is less than 1200 lb, the fine aggregate sand percentage shall be reduced or excluded.
- C. Mineral Filler: ASTM D 242/D 242M or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: Asphalt cement shall be prepared by the refining of crude petroleum using methods conforming to industry standards. The asphalt cement shall conform to the requirements of AASHTO M 226, Table 2. When tested by ignition, the inorganic insoluble residue content of the asphalt cement shall not exceed 0.25% by weight.
- B. Tack Coat: Emulsified asphalt shall conform to the requirements of AASHTO M 140 for anionic emulsions or AASHTO M 208 for cationic emulsions.

2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled tires, asphalt shingles, or glass from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.
- C. Separation Geotextile Fabric
 - 1. DNREC Type GS-1
 - a. Mirafi 600x or approved equivalent

2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by DelDOT and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Standard Yorklyn Road and Gun Club Road Section
 - a. Refer to Section 401800- WMA Superpave
3. Pervious Bituminous Asphalt Pavement Gun Club Road Section
 - a. Refer to Section 401574 - Pervious Bituminous Asphalt Pavement
4. Standard Trail Asphalt Section from the bottom to top of asphalt surface is as follows:
 - a. Compacted Subgrade: 95% compaction with modified proctor
 - b. Base Course: 8 inch depth Graded Aggregate Base Course (GABC)
 - 1) Refer to Section 312000 "Earth Moving" for gradation and material details.
 - c. Surface Course: 3 inch depth Hot Mix Asphalt Type C Superpave, PG 64, 160 Gyration (Carbonate Stone)
 - 1) Refer to Section 4010801 (WMA, Superpave, Type C) for material details.

PART 3 - EXECUTION

3.1 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 1. Mill to a depth of 2 inches.
 2. Patch surface depressions deeper than 1 inch after milling, before wearing course is laid.

3.2 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
- D. Place geotextile separation fabric on proof-rolled subgrade prior to placing GABC.
- E. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..
 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Spread mix at a minimum temperature of 250 deg F.
 - 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.5 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.

- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.6 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch provided it does not hold water for more than 12 hours after a rain event.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Replace and compact hot-mix asphalt where core tests were taken.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.8 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 321216

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SECTION 321400 - PERMEABLE PAVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete Permeable pavers set in aggregate setting beds.
 - 2. Concrete edge restraints.

1.2 ACTION SUBMITTALS

- A. Product Data: For materials other than water and aggregates.
- B. Samples for unit pavers, joint materials and edge restraints.

1.3 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or build on frozen subgrade or setting beds.
- B. Weather Limitations for Bituminous Setting Bed: Install bituminous setting bed only when ambient temperature is above 40 deg F and when base is dry.
- C. Weather Limitations for Mortar and Grout:
 - 1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Do not apply mortar to substrates with temperatures of 100 deg F and higher.

PART 2 - PRODUCTS

2.1 CONCRETE PERMEABLE PAVERS

- A. Regional Materials: Provide concrete pavers that have been manufactured within 100 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. Concrete Permeable Pavers: Solid interlocking paving units complying with ASTM C-936.
 - 1. Compressive strength – the average compressive strength shall not be less than 8000 P.S.I.
 - 2. Resistance to Freeze Thaw Cycle – dry weight loss not be greater than 1% of weight when subject to 50 cycles of freezing and thawing

3. Absorption: the average absorption of test samples shall not be greater than 5 lbs/cubic foot.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - a. Concrete Stone and Tile (CST) Corp.
 - 1) Roman Cobble Green Pavers (Shape: 6" x 9" x 3-1/8") or,
 - 2) Aqua Bricloc Pavers (Shape: 4-1/2" x 9" x 3-1/8")
 - b. Or approved equivalent
5. Thickness: 3-1/8 inches
6. Face Size and Shape: Refer to dimensions of each approved paver or equivalent above.
7. Cement - ASTM C150 Portland Cement Type I
8. Aggregates – ASTM C33 Washed graded sand and 100% crushed natural aggregate.
9. Manufacturing - Shall take place on Hess Multi-Layer or Board Machines
10. Color: As selected by Owner from manufacturer's full range.
 - a. Shall be color iron oxide pigment

2.2 EDGE RESTRAINTS

- A. Concrete Curb edge Restraints: Refer to "Section 033000: Cast in place concrete" for curb specifications.
 1. The proposed integral PCC curb and gutter will be the permeable paver edge restraint.

2.3 AGGREGATE SETTING-BED MATERIALS

- A. Refer to the materials section of Section 401574 – "Bituminous Asphalt Pavement" for the stone base materials and geotextile fabric.
- B. Gravel for Joints: Crushed stone – Del No. 9 stone and No. 10 stone. Refer to Section DelDOT 813.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- B. Cut unit pavers with motor-driven masonry saw equipment to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible.
 1. For concrete pavers, a block splitter may be used.
- C. Joint Pattern Herringbone

- D. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.
- E. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

3.2 AGGREGATE SETTING-BED APPLICATIONS

- A. Refer to the construction methods section of Section 401574 – “Pervious Bituminous Asphalt Pavement” for stone layers.
- B. Set pavers together without leaving joint space, being careful not to disturb leveling base. (The openings will be created by the natural shape of the pavers) If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed [3/8 inch] with pieces cut to fit from full-size unit pavers.
- C. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz.
- D. Spread dry gravel and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add gravel until joints are completely filled, then remove excess gravel. Leave a slight surplus of gravel on the surface for joint filling.

END OF SECTION 321400

NOT FOR BIDDING

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SECTION 321723 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes painted markings applied to asphalt pavement.
- B. The Section references the DELDOT Standard Specifications, Division 700, Section 748 "Pavement Markings". Additions and revisions to the DELDOT specification shall also be adhered to. If either specification section is contradictory then the more stringent specification will be used.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

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:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product by one of the following:
 - 1. Aexcel Inc.
 - 2. Benjamin Moore & Co.
 - 3. Color Wheel Paints & Coatings.
 - 4. Columbia Paint & Coatings.
 - 5. Conco Paints.
 - 6. Coronado Paint; Division of INSL-X Products Corporation.
 - 7. Diamond Vogel Paints.
 - 8. Dunn-Edwards Corporation.
 - 9. Ennis Traffic Safety Solutions, Inc.
 - 10. Frazee Paint.
 - 11. General Paint.
 - 12. Kwal Paint.
 - 13. M.A.B. Paints.
 - 14. McCormick Paints.

15. Miller Paint.
16. Parker Paint Mfg. Co. Inc.
17. PPG Industries.
18. Pratt & Lambert.
19. Rodda Paint Co.
20. Rohm and Haas Company; a subsidiary of The Dow Chemical Company.
21. Scott Paint Company.
22. Sherwin-Williams Company (The).
23. Approved equivalent.

2.2 PAVEMENT-MARKING PAINT

- A. PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 8"
 1. Traffic Stop bar (16'')
- B. PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 12"
 1. Crosswalk (24'')
- C. PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, EPOXY RESIN PAINT
 1. Symbols: Bike path
- D. PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"
 1. Typical road striping.

PART 3 - EXECUTION

3.1 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils. Apply paint so that it cannot run beneath the stencil.
 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal..

END OF SECTION 321723

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.

1.2 DEFINITIONS

- A. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Certification of grass seed.

1. Certification of each seed mixture for turfgrass sod.

- B. Product certificates.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

- B. Seed Species: (References the approved DNREC specifications and Erosion and Sediment Control Plan)
1. Temporary Stabilization Seed: Rye
 2. Permanent Stabilization Seed: Tall Fescue (Turf-type) or Strong Creeping Red Fescue or Perennial Ryegrass
 - a. Plus Flatpea
- C. Grass-Seed Mix: Proprietary seed mix as follows:
1. Temporary Stabilization Seed Mix, Rye:
 - a. Seeding Rate: 125 lb/acre; 4 lb/1,000 square feet
 - b. Optimum Seeding Dates (in the Coastal Plain Region)
 - 1) 2/1 to 4/30 and 8/15 to 10/31; optimum
 - 2) 5/1 to 8/14; acceptable
 - c. Planting depth: 1-2 inches (2-3inch in sandy soil)
 2. Permanent Stabilization Seed Mix, Tall Fescue (Turf-type) or Strong Creeping Red Fescue or Perennial Ryegrass, plus Flatpea
 - a. Seeding Rate: (the same rate for each type) 50 lb/acre; 1.15 lb/1,000 square feet
 - 1) Plus Flatpea seeding rate: 15 lb/acre; 0.34 lb/1,000 square feet
 - b. Optimum seeding Dates (in the Coastal Plain Region)
 - 1) 2/1 to 4/30 and 8/15 to 10/31; optimum
 - 2) 5/1 to 8/14; acceptable
 3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Approved equivalent.

2.2 TOPSOIL

- A. Topsoil: Friable and loamy meeting the requirements of DelDOT Section 732 and meeting the requirements for loam, sandy loam, silt loam, sandy clay loam, or clay loam as defined by the USDA soil classification system. Topsoil shall be free of debris, trash, stumps, rocks, roots, and noxious weeds, and shall be able to support healthy vegetation. It shall contain no substance that is potentially toxic to plant growth.

2.3 FERTILIZERS

- A. Fertilizer: 10--20-20, dry formulation, meeting the requirements of DelDOT Standard Specifications Section 734 added at a rate of 15.6 pounds per 1000 square feet.

2.4 MULCHES

- A. Mulch: Hay or straw mulch, meeting the requirements of DelDOT Section 735, added at a rate of 133 lbs per 1000 square feet. Mulch shall be free of weed seeds, foreign material, coarse stems, and any substances toxic to plant growth.

PART 3 - EXECUTION

3.1 TURF AREA PREPARATION

- A. General: Scarify the topsoil to a minimum depth of 2 inches prior to seeding.
- B. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
 - 3. Permanent seeding shall only be performed between March 15 and October 1 unless written permission is provided by the owner.
 - 4. Permanent seeding shall only be done when weather and soil conditions are suitable. No planting shall be done during severe drought, high winds, excessive moisture, or frozen ground. Permanent seeding shall not be started in any area until earthwork has been substantially completed. Backfills and fills shall be compacted, topsoil spread and finish grading completed and accepted prior to commencing seeding in any area.
- B. Sow seed at a total rate of:
 - a. Temporary Seed: 125 lb/acre; 4 lb/1,000 square feet
 - b. Permanent Seed: 50 lb/acre; 1.15 lb/1,000 square feet
 - 1) Plus Flatpea seeding rate: 15 lb/acre; 0.34 lb/1,000 square feet
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
- E. Protect seeded areas from hot, dry weather or drying winds by applying mulch, within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.3 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll,

regrade, and replant bare or eroded areas and mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

3.4 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
 - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
 - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

END OF SECTION 329200

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Manholes.
3. Nonpressure transition couplings.
4. Expansion joints.
5. Catch basins.
6. Pipe outlets.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- B. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- C. Product Certificates: For each type of soil pipe and fitting, from manufacturer.
- D. Field quality-control reports.

1.4 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Architect's or Owner's written permission.

PART 2 - PRODUCTS

2.1 PE PIPE AND FITTINGS

- A. Pervious Pavement Underdrain – Refer to Section “715517 – Perforated Corrugated HDPE Pipe Underdrain 6" and 4" ” for details concerning materials and installation of these underdrains.

2.2 CONCRETE PIPE AND FITTINGS.

- A. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.
 1. Bell-and-spigot or tongue-and-groove ends and gasketed joints with ASTM C 443, rubber gaskets.
 2. Class III.

2.3 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.4 CLEANOUTS

- A. Plastic Cleanouts:
 1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.5 MANHOLES

- A. Standard Precast Concrete Manholes:
 1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 2. Diameter: 48 inches minimum unless otherwise indicated.
 3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
 4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
 5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
 6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.

7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
10. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile or ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

2.6 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

1. Portland Cement: AASHTO M 85, Type II.

All cement used in any one Contract item shall be of a single brand, from a single mill, unless otherwise authorized in writing by the Architect.

2. Fine Aggregate: AASHTO M 6, sand, except the grading shall be:

1) Sieve Size	Percent Passing
3/8"	100
No. 4	95-100
No. 50	5-30
No. 100	1-10
No. 200	0-4

Fineness Modulus: 2.3 to 3.1. The organic impurities requirement will be waived for fine aggregate specified for uses other than in portland cement concrete.

3. Coarse Aggregate: Shall conform to the requirements of AASHTO M 80 except no gravel, crushed gravel, or crushed concrete shall be used.
4. Water: Water used in mixing, curing, or other designated applications shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water will be tested in accordance with AASHTO T 26. Water known to be of potable quality may be used without testing. Where the source of water is relatively shallow, the intake shall be enclosed to exclude silt, mud, grass, or other foreign materials

- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
 - 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 2 percent through manhole.
 - 2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 4 percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
 - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
 - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.7 CATCH BASINS

- A. Standard Precast Concrete Catch Basins:
 - 1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - 2. Base Section: 6-inch minimum thickness for floor slab and 6-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
 - 3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
 - 4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
 - 5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
 - 6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
 - 7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and grate.
 - 8. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.

9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- B. Frames and Grates: ASTM-A-48, Class 35B gray iron or ASTM A536 Grade 80-55-06 ductile iron.
 1. Frame Size
 - a. Inlet 0101: 30 by 54 inches minimum unless otherwise indicated.
 - b. Inlet 0201: 42 by 54 inches minimum unless otherwise indicated
 2. Grate Size:
 - a. Inlet 1010: 25-3/4 by 49-3/4 inches minimum unless otherwise indicated
 - b. Inlet 0201: 36 by 48 inches minimum unless otherwise undicated
 3. Grate Free Area: Approximately 50 percent unless otherwise indicated.

2.8 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to the Nation Stone Association Number (NSA)
 1. Average Size: NSA R-4, d50 = 6 inches
 2. Average Size: NSA R-5, d50 = 9 inches
 3. Average Size: NSA R-6, d50 = 12 inches

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."
- B. Final backfilling for concrete storm drains shall use Type C Backfill material as defined in Section 209.4 of the DelDOT Standard Specifications for Road and Bridge Construction (2001).

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow.
 - 2. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
 - 2. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 15 by 15 by 6 inches deep. Set with tops 2 inches above surrounding earth grade.

3.5 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.6 CATCH BASIN INSTALLATION

- A. Set frames and grates to elevations indicated.

3.7 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

3.8 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.9 CONNECTIONS

- A. Make connections to underground manholes.
 - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 - 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.10 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Leaks and loss in test pressure constitute defects that must be repaired.
- C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 334100

SECTION 334713 - POND AND RESERVOIR LINERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes geomembrane liners for ponds and reservoirs.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide geomembrane liners that prevent the passage of water.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for geomembrane liners. Show panel layout, seams, penetrations, perimeter anchorage, and methods of attachment and sealing to other construction. Differentiate between factory and field seams and joints.
- C. Samples: For each type of geomembrane panel, provide not less than one 12-inch seam length for factory-bonded sheets, and one 12-inch seam length for field-bonded sheets.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products and an employer of workers trained and approved by manufacturer.

- B. Preinstallation Conference: Conduct conference at Project site.

1.7 WARRANTY

- A. Special Warranty: Specified form in which geomembrane manufacturer, geomembrane liner fabricator, and geomembrane liner Installer agree to repair or replace geomembrane liner that fail(s) in materials or workmanship or that deteriorate(s) under conditions of normal weather within specified warranty period. Warranty does not include deterioration or failure of geomembrane liner due to exposure to harmful chemicals, gases or vapors, abnormal and severe weather phenomena, fire, earthquakes, floods, vandalism, or abuse by persons, animals, or equipment.

1. Failures include, but are not limited to, the following:
 - a. Leaks in geomembrane liner.
 - b. Defects in seams.
 - c. Cracks and holes in floating cover.
2. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PE SHEET MATERIALS

- A. PE Sheet: Formulated from virgin PE, compounded for use in hydraulic structures, and formed into uniform sheets.
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. Agru America, Inc.
 - b. Carlisle SynTec Incorporated.
 - c. Cooley Group.
 - d. GSE Lining Technology, Inc.; Div. of Gundle/SLT Environmental, Inc.
 - e. Integra Plastics, Inc.
 - f. Plastic Fusion Fabricators, Inc.
 - g. Poly-Flex, Inc.
 - h. Raven Industries, Inc.
 - i. Reef Industries, Inc.
 - j. Yunker Plastics, Inc.
 - k. Approved equivalent.
 2. Sheet Texture: One side smooth; other side smooth or textured.
 3. Nominal Density: High density, 0.940 to 0.959 g/cu. cm, per ASTM D 1505.
 4. Nominal Thickness: 80-mil- thick sheet per ASTM D 5199.
 5. Melt Flow Index: Not more than 0.035 oz./10 minutes per ASTM D 1238, Condition 190/2.16.

6. Carbon Black Content: 2 to 3 percent per ASTM D 1603 or ASTM D 4218.
7. Carbon Black Dispersion: Per ASTM D 5596, Category 1 and 2.
8. Oxidation Induction Time: Not less than 100 minutes per ASTM D 3895.
9. Tensile Properties: Not less than indicated for each direction, per ASTM D 638, Type IV or ASTM D 6693, Type IV.
 - a. Strength at Yield: Not less than 176 lbf/in. minimum average.
 - b. Strength at Break: Not less than 320 lbf/in. minimum average.
 - c. Elongation at Yield: Not less than 13 percent minimum average.
 - d. Elongation at Break: Not less than 700 percent minimum average.
10. Tear Resistance: Not less than 60 minimum average per ASTM D 1004.
11. Puncture Resistance: Not less than 160 minimum average per ASTM D 4833.
12. Dimensional Stability, Reinforced Sheet: Not more than plus or minus 2 percent per ASTM D 1204.
13. Low-Temperature Brittleness: Four hours at minus 76 deg F per ASTM D 746.
14. Environmental Stress Cracking Resistance: Not less than 1500 hours per ASTM D 1693, Condition B.

2.2 MISCELLANEOUS MATERIALS

- A. Adhesives: Provide types of adhesive primers, compounds, solvents, and tapes recommended in writing by geomembrane liner manufacturer
- B. Penetration Assemblies: Provide manufacturer's standard factory-fabricated assemblies for sealing penetrations. Include joint sealant recommended in writing by geomembrane liner manufacturer and compatible with geomembrane liner, containment conditions, and materials.
- C. Battens: Manufacturer's standard. Fabricate battens with sharp projections removed and edges eased and then predrilled or punched for anchors. Provide anchors, or other type of attachment, of type and spacing recommended in writing by geomembrane liner manufacturer for attaching geomembrane liner system to substrate and as indicated.
- D. Sand: ASTM C 33; fine aggregate, natural or manufactured sand.

2.3 FABRICATION

- A. Fabricate geomembrane liner panels from sheets in sizes as large as possible with factory-sealed seams, consistent with limitations of weight and installation procedures. Minimize field seaming.
- B. Fabricate flotation blocks, wrap in geomembrane, and attach to underside of floating cover according to manufacturer's written instructions.
- C. Fabricate ballast tubes of sand-filled geomembrane and attach to top surface of floating cover according to manufacturer's written instructions.
- D. Install built-in accessories, hatches, access panels, vents, and walkways on geomembrane floating cover.

2.4 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate geomembrane seams.
- B. Destructive Testing: Test for bonded seam strength and peel adhesion every 3000 feet or once per panel, whichever is more frequent.
- C. PE Liner: Test and inspect factory seams, according to ASTM D 4545, for peel adhesion and for bonded seam strength indicated.
 - 1. Peel Adhesion/Extrusion: Film tear bond and not less than 78 lbf/in. of extrusion-bonded seam width.
 - 2. Peel Adhesion/Fusion: Film tear bond and not less than 90 lbf/in. of fused seam width.
 - 3. Bonded Seam Strength: Not less than 120 lbf/in. of seam width for seams constructed from two scrim-reinforced sheets, each with nominal sheet thickness of not less than 80 mils.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates, with Installer present, for compliance with requirements for soil compaction and grading; for subgrade free from angular rocks, rubble, roots, vegetation, debris, voids, protrusions, and ground water; and for other conditions affecting performance of geomembrane liner.
- B. Examine anchor trench excavation and concrete perimeter, where geomembrane liner will be secured, for substrate conditions indicated above and for correct location and configuration.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Provide temporary ballast, until edges are permanently secured, that does not damage geomembrane liner or substrate, to prevent uplift of geomembrane liner in areas with prevailing winds.
- E. Prepare surfaces of construction penetrating through geomembrane liner according to geomembrane liner manufacturer's written instructions.
- F. Remove curing compounds and coatings from concrete surfaces to be sealed to geomembrane liner.
- G. Place geomembrane liner over prepared surfaces to ensure minimum handling. Install according to Shop Drawings and in compliance with geomembrane liner manufacturer's written instructions. Begin placing geomembrane liner at Project's upwind direction and proceed downwind. Install geomembrane liner in a relaxed condition, free from stress and with minimum wrinkles, and in full contact with subgrade. Do not bridge over voids or low areas in the subgrade. Fit closely and seal around inlets, outlets, and other projections through geomembrane liner. Permanently secure edges.
- H. Field Seams: Comply with geomembrane liner manufacturer's written instructions.

- I. Installation in Anchor Trench: Install geomembrane liner in trench according to manufacturer's written instructions. Backfill and compact to lock liner into trench.
- J. Attachment to Concrete: Use manufacturer's standard system to suit Project conditions. Support adhesive and geomembrane on minimum 8-inch- wide concrete substrate unless otherwise indicated.
- K. Protect installed geomembrane liner according to manufacturer's written instructions. Repair or replace areas of geomembrane liner damaged by scuffing, punctures, traffic, rough subgrade, or other unacceptable conditions.
- L. Before initial filling of pond or placement of earth cover, inspect seams and patched areas to ensure tight, continuously bonded installation. Repair damaged geomembrane and seams and reinspect repaired work.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Nondestructive Testing: Visually inspect seams and patches. Comply with ASTM D 4437 for Air Lance Test, Vacuum Box Testing, or Ultrasonic (High Frequency) Pulse Echo Testing or with GRI Test Method GM6, as applicable to geomembrane liner and seam construction. Record locations of failed seams and patches. Individually number and date occurrences and details of leak and remedial action. Repair leaking seams and patches.
- C. Prepare test and inspection reports.

END OF SECTION 334713

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109.13- ASPHALT CEMENT COST ADJUSTMENT

For DelDOT Standards Specifications Sections 304, 401, 402, 403, 404, and 405, payments to the Contractor shall be adjusted to reflect increases or decreases in the Delaware Posted Asphalt Cement Price when compared to the Project Asphalt Cement Base Price, as defined in these Special Provisions.

The Delaware Posted Asphalt Cement Price will be issued monthly by the Department and will be the industry posted price for Asphalt Cement, F.O.B. Philadelphia, Pennsylvania.

The Project Asphalt Cement Base Price will be the anticipated Delaware Posted Asphalt Cement Price expected to be in effect at the time of receipt of bids.

All deviations of the Delaware Posted Asphalt Cement Price from the Project Asphalt Cement Base Price are eligible for cost adjustment. No minimum increases or decreases or corresponding percentages are required to qualify for cost adjustment.

Actual quantity of asphalt cement qualifying for any Asphalt Cement Cost Adjustment will be computed on the basis of weight tickets and asphalt percentage from the approved job mix formula.

For Recycled Hot-Mix the asphalt percentage eligible for cost adjustment shall be only the new asphalt cement added to the mix.

There shall be no separate payment per ton (metric ton) cost of asphalt cement. That cost shall be included in the various unit prices bid per ton (metric ton) for those bid items that contain asphalt cement (mentioned above).

The Asphalt cement cost adjustment will be calculated on grade PG 64-22 asphalt regardless of the actual grade of asphalt used. The Project Asphalt Cement Base Price for the project will be \$600 per ton (\$661.39 per metric ton).

If the Contractor exceeds the authorized allotted completion time, the price of asphalt cement on the last authorized allotted work day, shall be the prices used for cost adjustment during the time liquidated damages are assessed. However, if the industry posted price for asphalt cement goes down, the asphalt-cement cost shall be adjusted downward accordingly.

NOTE

Application of Asphalt Cement Cost Adjustment requirements as indicated above shall apply only to those contracts involving items related to bituminous base and pavements, and with bitumen, having a total of 1,000 tons (1,000 metric tons) or more of hot-mix bid quantity in case of Sections 401, 402 and 403; and 15,000 gallons (60 000 liters) or more in case of DelDOT Standard Specifications Sections 304, 404 and 405.

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401574 - PERVIOUS BITUMINOUS ASPHALT PAVEMENT**Description:****A. GENERAL**

1. This specification is intended to be used for Pervious bituminous asphalt pavement.
 - a. Also known as Pervious Pavement (PP) on Contract Drawings.
2. The work of this Section includes subgrade preparation, installation of the underlying pervious media beds, and pervious asphalt mix design, production, and installation. Pervious media beds refer to the material layers underlying the pervious asphalt pavement. Pervious asphalt pavement refers to the compacted mix of modified asphalt, aggregate, and additives.
3. The primary requirements for the specifications of the mix are performance grade (PG) asphalt binder, binder content, binder drain down, aggregate gradation, air void content, retained tensile strength (TSR).
4. Pervious Pavement installation shall be performed by a contractor or subcontractor that has successfully completed a minimum of 1,500 tons of a similar Pervious Pavement material. Installation of the Pervious Pavement should have occurred within the past 3 years. Documentation of the successful completion of this work must be submitted at the time of bidding. Documentation should include a project description and contact information for the Owner's Representative on the project.
5. The manufacturer for the Pervious Pavement material must have manufactured a minimum of 1,500 tons of a similar Pervious Pavement material within the past 3 years.
6. The work of this Section also includes pavement-marking paint.

B. SUBMITTALS

1. Material Certificates: For each paving material, from manufacturer.
2. Material Test Reports: For each paving material.

C. QUALITY ASSURANCE

All the quality assurance shall be done in accordance to DelDOT's quality assurance specifications.

D. DELIVERY, STORAGE, AND HANDLING

1. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
2. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

E. PROJECT CONDITIONS

1. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - a. Asphalt Course: Minimum surface temperature of 60 °F at time of placement or actual ground above 50 °F.
2. Imprinted Asphalt Paving: Proceed with coating imprinted pavement only when air temperature is at least 50F and rising and will not drop below 50F within 8 hours of coating application. Proceed only if no precipitation is expected within two hours after applying the final layer of coating.

Materials:

A. PERVIOUS MEDIA INFILTRATION BEDS

1. Below the pervious asphalt itself are located the Pervious media infiltration beds as shown in the Contract Documents from top to bottom: a 2 inch thick layer of choker course of DelDOT No. 8 pervious pavement graded aggregate; a 5.75 inch thickness layer of DelDOT No. 57 pervious pavement base course; and a 25.25 inch thick layer of DelDOT No. 2 pervious pavement graded stone reservoir.
2. Choker Course (Pervious Pavement Graded Aggregate): Material for the Choker Course PP Graded Aggregate shall meet DE No. 8 gradation shown below:
3. Pervious Pavement Base Course: Material for the PP Base course shall meet the DE No. 57 gradation below:
 - a. Maximum Wash Loss of 0.5%
 - b. Minimum Durability Index of 35
 - c. Maximum Abrasion Loss of 10% for 100 revolutions, and maximum of 50% for 500 revolutions.
4. Pervious Pavement Graded Stone Reservoir: Material for the PP Graded Stone Reservoir shall meet the following DE No. 2 gradation below.
 - a. 4-in. (minimum) thickness of reservoir course to acts as a capillary barrier for frost heave protection.
 - b. 8-in. (30 cm) minimum thickness if sub drains are installed.
 - c. Sub drains are elevated a minimum of 4-in. from the reservoir course bottom to provide storage and infiltration for the water quality volume.

Table 1. Gradation Requirements for Crushed Stone Material

Crushed Stone Properties															
DE No.	d50 (in)	Sieve Size (square openings), inches													
		4"	3-1/2"	3"	2-1/2"	2"	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 100
2	2			100	90-100	35-70	0-15		0-5						
57	0.5						100	95-100		25-60		0-10	0-5		
8	0.375									100	85-100	10-30	0-10	0-5	
Source -DelDOT Standard Specifications - August 2001 - Section 813															

B. PERVIOUS BITUMINOUS ASPHALT MIX

1. Bituminous surface course for pervious paving shall be a minimum of 4 inches thickness with a bituminous mix of 5.75% to 6% by weight dry aggregate. In accordance with ASTM D6390, drain down of the binder shall be no greater than 0.3%. If more absorptive aggregates, such as limestone, are used in the mix, then the amount of bitumen shall be based on the testing procedures outlined in the National Asphalt Pavement Association's Information Series 131 – "Pervious Asphalt Pavements for Stormwater Management" (2008).
2. Use neat asphalt binder modified with an elastomeric polymer to produce a binder meeting the requirements of PG 76-22 as specified in AASHTO MP-1. The elastomer polymer shall be styrene-butadiene-styrene (SBS), or approved equal, applied at a rate of 3% by weight of the total binder. The composite materials shall be thoroughly blended at the asphalt refinery or terminal prior to being loaded into the transport vehicle. The polymer modified asphalt binder shall be heat and storage stable.
3. Hydrated lime shall be added at a dosage rate of 1.0% by weight of the total dry aggregate to mixes containing granite. Hydrated lime shall meet the requirements of ASTM C 977. The additive must be able to prevent the separation of the asphalt binder from the aggregate and achieve a required tensile strength ratio (TSR) of at least 80% on the asphalt mix when tested in accordance with NAPA IS131. The asphaltic mix shall be tested for its resistance to stripping by water in accordance with ASTM D 1664. If the estimated coating area is not above 95 percent, anti-stripping agents shall be added to the asphalt.
4. Pervious pavement shall not be installed on wet surfaces or when the ambient air temperature is 50 °F or lower. The temperature of the bituminous mix shall be between 300 °F and 350 °F (based on the recommendations of the asphalt supplier).
5. Coarse Aggregate.

Coarse aggregate shall be that part of the aggregate retained on the No. 4 sieve; it shall consist of clean, tough, durable fragments of crushed stone, or crushed gravel of uniform quality throughout. Coarse aggregate shall be crushed stone or crushed gravel and shall have a percentage of wear as determined by AASHTO T96 of not more than 40 percent. In the mixture, at least 75 percent, by mass (weight), of the material coarser than the 4.75 mm (No. 4) sieve shall have at least two fractured faces, and 90 percent shall have one or more fractured faces (ASTM D5821). Coarse aggregate shall be free from clay balls, organic matter, deleterious substances, and a not more than 8.0% of flat or elongated pieces as specified in ASTM D4791 with a value of 5:1.

6. Fine Aggregate.

The fine aggregate shall be that part of the aggregate mixture passing the No. 4 sieve. Fine aggregate shall consist of clean, sound, durable, angular shaped particles produced by crushing stone, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter and shall contain no clay balls. The fine aggregate, including any blended material for the fine aggregate, shall have a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.

7. Pervious Asphalt Mix Design Criteria.
- The Contractor shall submit a mix design at least 10 working days prior to the beginning of production. The Contractor shall make available samples of coarse aggregate, fine aggregate, mineral filler, fibers and a sample of the Performance Graded Asphalt Binder (PGAB) that will be used in the design of the mixture. A certificate of analysis (COA) of the PGAB shall be submitted with the mix design. The COA shall be certified by a laboratory meeting the requirements of AASHTO R18. The Laboratory will be certified by the Delaware DOT or qualified under ASTM D3666. HMA Plant/Field Technicians shall be certified by the Mid-Atlantic Region Technician Certification Program (MARTCP) and the Delaware Technician Certification Program.
 - Bulk specific gravity (SG) used in air void content calculations shall not be determined and results will not be accepted using AASHTO T166 (saturated surface dry), since it is not intended for open graded specimens (>10% AV). Bulk SG shall be calculated using AASHTO T275 (paraffin wax) or ASTM D6752 (automatic vacuum sealing). Air void content shall be calculated from the bulk SG and maximum theoretical SG (AASHTO T209) using ASTM D3203.
 - The materials shall be combined and graded to meet the composition limits by mass (weight) as shown in the Table 2 below.

Table 2. Pervious Asphalt Mix Design Criteria

Sieve Size (inch)	Percent Passing (%)
0.75	100
0.5	85-100
0.375	55-75
No.4	10-25
No.8	5-10
No.200	2-4
Binder Content (AASHTO T164)	5.75-6.00%
Fiber Content by Total Mixture Mass	0.3% cellulose or 0.4% mineral
Rubber Soilds (SBR) Content by Weight of the Bitumen	1.5-3.0% or TBA
Air Void Content (ASTM D6752/AASHTO T275)	16.0-22.0%
Draindown (ASTM D6390)*	≤ 0.3%
Retained Tensile Strength (AASHTO 283)**	≥ 80%
Cantabro Abrasion Test on Unaged Samples	≤ 20%
Cantabro Abrasion Test on Aged Samples	≤ 30%

*Cellulose or mineral fibers may be used to reduce draindown.

** If the TSR (retained tensile strength) values fall below 80% when tested per NAPA IS 131 (with a single freeze thaw cycle than 5), then in Step 4, the contractor shall employ an antistripping additive, such as hydrated lime (ASTM C977) or a fatty amine, to raise the TSR value above 80%.

C. PERVIOUS ASPHALT MIX PRODUCTION

1. The pervious asphalt mix production shall meet the criteria set forth in DelDOT's specifications and plant manufacturer's recommendations.

D. AUXILIARY MATERIALS

1. Sand: ASTM D 1073, Grade Nos. 2 or 3.
2. Geotextile Fabric DNREC Type GD – 2: nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.
3. Joint Sealant: ASTM D 6690 hot-applied, single-component, polymer-modified bituminous sealant.
4. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.
 - a. Color: White and Yellow (5'')

Construction Methods:

The construction methods shall follow the DelDOT's specifications except as noted below.

A. Subgrade Establishment

1. No work shall be performed in this section until subgrade is 100% completed and accepted by the Architect.
2. Finished subgrade shall be compacted to a minimum 95% (modified proctor) maximum dry density.
3. Subgrade shall be established to within the tolerance of +0.00' or -0.10' of the design subgrade elevation.
4. Where erosion of the native material subgrade has caused accumulation of fine materials and/or surface ponding, this material shall be removed with light equipment and the underlying soils scarified to a minimum depth of 6 inches with a York rake or equivalent and light tractor.
5. Bring subgrade to line, grade, and elevations indicated. Fill and lightly regrade any areas damaged by erosion, ponding, or traffic compaction before the placing of the stone subbase.
6. All bed bottoms shall be as level as feasible to promote uniform infiltration. For pavements subbases constructed on grade, soil or fabric barriers shall be constructed along equal elevation for every 6" of grade change to act as internal check dams. This will prevent erosion within the subbase on slope. After establishment of the subgrade but before placement of any aggregate, install geotextile fabric type GD – 2. Geotextile fabric shall be installed in accordance with The Delaware Erosion and Sediment Control Handbook specifications for type GD – 2 geotextile fabric.

B. Aggregate Placement

1. Moisture Content: Aggregate shall contain 3.5% to 4.0% moisture content to ensure that fines do not migrate and to facilitate proper compaction. The Contractor must ensure that aggregate leaving the source plant meets this requirement and is required to apply water to aggregate on site to attain and maintain this minimum moisture content in stockpile and during all placement operations.
2. Prior to aggregate placement, remove any excess or contaminated backfill from the subsurface drainage trenches.
3. Surface must be free of standing water and subgrade stabilized prior to placement.
4. Materials to be placed in layers not exceeding 6" bulk and 4" compacted in depth. Each layer shall be spread uniformly with equipment that will not cause perceptible separation in gradation (segregation), preferably a self-propelled paving machine.
5. Should there occur, during any stage of the spreading or stockpiling, a separation of the material particles, the Contractor must immediately remove and dispose of segregated material and correct or change handling procedures to prevent further separation.

C. Aggregate Compaction

1. Use Static Tandem Drum-type roller of not less than five tons weight.
2. Each layer shall be compacted to a minimum density of not less than 95% of maximum dry density as determined by ASTM D698.
 - a. Test rolling shall be performed with self-propelled, pneumatic-tired equipment which shall be of the size, type, and weight that will reveal any soft, yielding, or spongy areas. The equipment shall be run longitudinally with less than 18" (500 mm) of unrolled area between tire strips.
 - b. Acceptance of the test roll by the Engineer will be a requirement prior to placement of subsequent lifts.
 - c. The Architect shall be present for and shall approve aggregate compaction for each of these 3 layers.
 - d. The test roll shall be performed with a fully loaded, ten-wheel dump truck or other equipment approved by the Engineer. The test roll shall serve to verify the stability of the lift in question, and no compaction tests will be taken until the stability of the lift is determined to be satisfactory by the Engineer.
3. The density of aggregate courses shall be determined by AASHTO T 191 (Sand-Cone Method), AASHTO T 204 (Drive Cylinder Method), or AASHTO T 238 (Nuclear Methods) or other approved methods at the discretion of the Architect.
4. The infiltration rate of the compacted aggregate courses shall be determined by ASTM D3385 or approved alternate at the discretion of the Architect. The infiltration rate shall be no less 5-30 ft/day.

D. Aggregate Tolerances

1. The Contractor shall utilize a laser plane system for grade control.
2. The surface of the PERVIOUS MEDIA INFILTRATION BEDS in areas to be paved with Pervious asphalt shall not deviate from designated compacted grade within the range of -0.50" and 0.00".

E. Upon completion of fine grading, compaction, and Contractor confirmation of conformance with the tolerances, the Contractor shall notify the Architect and schedule an inspection for approval. The Contractor shall have a laser plane system available to the Architect for the inspections. The Contractor shall not be authorized to pave over the PERVIOUS MEDIA INFILTRATION BEDS until it has been inspected and approved by the Architect.

F. Pervious Asphalt Concrete Paving Installation

1. Spreading and Finishing

- a. The Pervious asphalt shall be placed either in a single application at 4 inches thick or in two lifts. If more than one lift is used, sufficient care shall be taken to insure that the Pervious asphalt layer join completely by keeping the time between layer placements minimal, keeping the first layer clear from dust and moisture, and minimizing traffic on the first layer.
- b. The Contractor shall protect all exposed surfaces that are not to be treated from damage during all phases of the pavement operation.
- c. No material shall be produced so late in the day as to prohibit the completion of spreading and compaction of the mixture during daylight hours, unless night paving has been approved for the project.
- d. No traffic shall be permitted on material placed until the material has been thoroughly compacted and has been permitted to cool to below 100 °F. The use of water to cool the pavement shall not be permitted. The Architect reserves the right to require that all work adjacent to the pavement, such as guardrail, cleanup, and turf establishment, is completed prior to placing the wearing course when this work could cause damage to the pavement. On projects where traffic is to be maintained, the Contractor shall schedule daily pavement operations so that at the end of each working day all travel lanes of the roadway on which work is being performed are paved to the same limits. Suitable aprons to transition approaches, where required, shall be placed at side road intersections and driveways as directed by the Architect.

2. Compaction

- a. Any mixture that becomes loose and broken, mixed with dirt, or is in any way defective shall be removed and replaced with fresh hot mixture. The mixture shall be compacted to conform to the surrounding area. Any area showing an excess or deficiency of binder shall be removed and replaced. These replacements shall be at the Contractor's expense.
- b. The Contractor assumes full responsibility for the cost of repairing all damages that may occur to roadway or parking lot components and adjacent property if vibratory compaction equipment is used. After final rolling, no vehicular traffic of any kind shall be permitted on the surface until cooling and hardening has taken place, and in no case within the first 48 hours. For small batch jobs, curing can be considered to have occurred after the surface temperature is less than 100 °F. Curing time is preferably one week, or until the entire surface temperature cools below 100 °F. Provide barriers as necessary at no extra cost to the Owner to prevent vehicular use; remove at the discretion of the Architect.

3. Surface Tolerances

- a. The surface will be tested by the Architect using a straightedge at least 10 feet in length at selected locations parallel with the centerline. Any variations exceeding 1/8 inch between any two contact points shall be satisfactorily eliminated. A straightedge at least 10 feet in length may be used on a vertical curve. The straightedges shall be provided by the Contractor.
- b. Work shall be done expertly throughout, without staining or injury to other work. Transition to adjacent Pervious asphalt pavement shall be merged neatly with flush, clean line. Finished pavement shall be even, without pockets, and graded to elevations shown on drawing.
- c. Pervious pavement beds shall not be used for equipment or materials storage during construction, and under no circumstances shall vehicles be allowed to deposit soil on paved pervious surfaces.

4. Repair of Damaged Pavement

- a. Any existing pavement on or adjacent to the site that has been damaged as a result of construction work shall be repaired to the satisfaction of the Architect without additional cost to the Owner.

5. Striping Paint

- a. Vacuum and clean surface to eliminate loose material and dust. Striping shall be performed in accordance with the DelDOT specifications. Paint shall be applied with mechanical equipment to produce uniform straight edges. Apply in two coats at manufacturer's recommended rates. Provide clear, sharp lines using white and yellow traffic paint

G. Field Quality Control for Paving Operations

1. The full permeability of the pavement surface shall be tested by application of clean water at the rate of at least 5 gpm (23 lpm) over the surface, using a hose or other distribution device. Water used for the test shall be clean, free of suspended solids and deleterious liquids and will large puddle formation or surface runoff, and shall be observed by the Architect.
2. Testing and Inspection: At Contractor's expense and as approved by the Architect, soil inspection services, staking and layout control, and testing and inspection of site grading and pavement work shall be performed. Inspection and list of tests shall be submitted by the Contractor and reviewed and approved in writing by the Architect prior to starting construction. All test reports must be signed by a licensed Professional Architect in the State of Delaware.
3. Test in-place base and surface course for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable work as directed by the Architect.
4. Surface Smoothness: Test finished surface for smoothness using a 10 foot straightedge applied parallel with and at right angles to the centerline of the paved area. Surface will not be accepted if gaps or ridges exceed 3/16 of an inch.

END OF SECTION 401574

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401699 - QUALITY CONTROL/QUALITY ASSURANCE OF BITUMINOUS CONCRETE**1 Description.**

This item shall govern the Quality Control/Quality Assurance Testing for supplying hot-mix asphalt plant materials and constructing hot-mix asphalt pavements.

The Contractor shall be responsible for providing the quality level of materials and construction incorporated into the Contract that will meet the requirements of the Contract. The Contractor shall perform all necessary quality control inspection, sampling, and testing. The Architect will evaluate all materials and construction for acceptance. The procedures for Quality Control and Acceptance are described in this Section.

2 Definitions.

- **Acceptable Quality Level (AQL):** That level of percent within limits (PWL) to which the Architect will consider the work completely acceptable.
- **Acceptance Plan:** Factors that comprise the Architect's determination of the degree of compliance with contract requirements and value of the product. These factors include the Architect's sampling, testing, and inspection.
- **Delaware Asphalt Pavement Association (DAPA):** The organization representing the interests of hot-mix asphalt producers and Contractors. The Architect has a copy of the DAPA officers' names and point(s) of contact.
- **Dispute Resolution:** The procedure used to resolve conflicts resulting from discrepancies between the Architect's and the Contractor's results of sufficient magnitude to impact payment. The testing will take place at a location and time mutually agreeable by both the Architect and the Contractor.
- **Full Depth Construction** – Construction of an adequate pavement box on a subgrade and subbase prepared by the contractor
- **Independent Assurance:** An unbiased and independent verification of the Quality Assurance system used and the reliability of the test results obtained in regular sampling and testing activities. The results of Independent Assurance are not to be directly used as a basis of material acceptance.
- **Job Mix Formula (JMF)/Mixture Identification (ID):** The target values for individual aggregate size gradation percentages and the asphalt percentage, the sources of each of the component materials, the proposed proportions of component materials to be used to meet those target values, the asphalt proportion, and the mixing temperature. The Architect will assign uniquely individual mixture identification for each JMF submitted and approved.
- **Lower Quality Index (QL):** The index reflecting the statistic related to the lower boundary to which a sample (or sample statistic) may deviate from the target value and still be considered acceptable.
- **Mean:** A statistical measure of the central tendency – the average value.
- **Operational Day:** A day in which the Architect has approved a lane closure for the Contractor to perform work within an approved MOT plan.
- **Percent Within Limits (PWL):** That amount of material or workmanship that has been determined, by statistical method, to be within the pre-established characteristic boundary(ies).
- **Qualified Laboratory:** A laboratory mutually agreed upon by both DAPA and the Architect as having proper test equipment that has been calibrated in accordance to AASHTO.
- **Qualified Technician:** Personnel mutually agreed upon by both DAPA and the Architect as having adequate training, experience, and abilities to perform the necessary testing. The minimum qualifications are either a recognized nationally accredited or certified Superpave testing certificate or been working in hot-mix asphalt testing for at least one year.
- **Quality Assurance (QA):** All those planned and systematic actions necessary to provide adequate

confidence that a product or service will satisfy given requirements for quality.

- **Quality Control (QC):** The sum total of the activities performed by the Contractor in order to assure that the product meets contract requirements.
- **Quality Control (QC) Plan:** The detailed description of the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties governed by the Specifications. The QC Plan must address the actions needed to keep the process in control, detect when the process is going out of control, and responses to correct the situation(s).
- **Quality Level Analysis:** A statistical procedure that provides a method for estimating the percentage of each lot or subplot of material, product, item of construction, or completed construction that may be expected to be within specified tolerances.
- **Standard Deviation:** A term used in statistics to indicate the value calculated from the square root of the difference between the individual measurements in a group and their average. Standard deviation is calculated by taking the square root of the sum of the squares of the differences of each of n values and the mean value, this sum first divided by (n-1).
- **Target Value:** The acceptable value for a controlling characteristic of a product. The JMF will establish each of these values for the material.
- **Test Methods:** Shall be AASHTO test methods. Copies of these test methods shall be available at each qualified laboratory.
- **Upper Quality Index (QU):** The index reflecting the statistic related to the upper boundary to which a sample (or sample statistic) may deviate from the target value and still be considered acceptable.
- **Volumetric Properties:** Air voids, voids in mineral aggregates (VMA), voids filled with asphalt (VFA), and dust to effective asphalt.

3 Equipment.

a) Material Production Test Equipment.

The Contractor shall establish, maintain, and operate a qualified testing laboratory at the production plant site of sufficient size and layout that will accommodate the testing operations of both the Contractor and the Architect. The Contractor shall maintain all the equipment used for handling, preparing, and testing materials in proper operating condition. For any laboratory equipment malfunction, the Contractor shall remedy the situation within one working day or the Architect may reject production. In the case of an equipment malfunction, and while waiting for repairs to equipment, the Architect may elect to test the material at either another production facility or the Architect's laboratory to obtain payment factors.

The following shall be the minimum calibrations for the referenced equipment:

- -SUPERPAVE[®] Gyratory Compactor: once every year; verified once every month by the Architect.
- -Ovens: once every three months, verified once every month.
- -Vacuum Container and Gauge (Rice Bowls): once every three months, verified once every month.
- -Balances and Scales: once every year, verified once every month.
- -Thermometers: once a year; verified once every month.
- -Gyratory Compactor molds and base plates: once every year
- -Mechanical Shakers: once every year
- -Sieve Verifications: once every year

All calibrations shall be documented and on file for review by the Architect at any time.

b) Pavement Construction Test Equipment.

The Contractor shall furnish and use in-place density gauges, or coring equipment, or both, as necessary to meet the requirements of these Specifications.

4 Quality Control (QC) Plan.

(a) Material Production QC.

(1) Job Mix Formula – Material Production.

The Contractor shall submit for approval to the Architect the job mix formula (JMF) design of the component materials and target characteristic values for each mixture proposed for use. Once the JMF is submitted to the Architect, the Architect will have up to three weeks to review the submitted information. However, a provision for a more timely approval is available to the Contractor; first, the Contractor shall submit the proper documentation on Pine pave mixture design software for the Architect's approval. After that approval from the Architect, the Contractor shall produce the new mixture for a non-Department project. The Architect will test the material, by taking three series per the specifications. If the Architect's test results are within the specifications, then the mixture will be approved by the Architect for Department projects.

The component materials design shall include designating the source and the expected proportion (within 1 percent for the aggregate components and within 0.1 percent for the other components) of each component to be used in order to produce workable hot-mix asphalt having the specified properties. For plant component feed adjustments, RAP can be considered in the same manner as an individual aggregate component. The JMF target characteristic values include the mixing temperature range, core temperature range for gyration, the percentage of the asphalt cement component (both total and virgin), and the percentages of the aggregate amounts retained on the sieves to be addressed by the JMF as shown in Table 1.

The Contractor shall provide an ignition oven correction number for each JMF. The Contractor shall also supply to the Architect weighed material of each JMF so correction numbers can be established for the Architect's equipment for Dispute Resolution samples.

Prior to starting production of a new mixture, the Contractor shall submit a JMF. For any mixture that has a 20% or greater failure rate on any combined volumetric criteria, the JMF will not be approved for use on Department contracts. In order to be approved, a re-design of the mixture will have to be completed by the Contractor for review and approval by the Architect. The Contractor shall uniquely title each JMF. The Contractor shall submit test data with each JMF and tests performed by a Qualified Laboratory on representative materials, verifying the adequacy of the design. Refer to the specifications for each mix type in order to determine the design requirements. The JMF sieve percentage values shall conform to the ranges shown in Table 1.

If there is a change in the source of any of the component materials, other than asphalt, if there is a change in the proportions of the aggregate components or the percent passing for each sieve by more than 5 percent from the submitted JMF, or if there is a change in the percentage of the asphalt cement component by 0.2 percent or more, which causes the volumetrics to change from the originally submitted JMF, a new JMF is required. Also, if the asphalt cement target percentage is lowered, all volumetric criteria must still be achieved.

According to the Contractor's QC Plan, the Contractor shall inform the Architect of any proposed changes to an existing JMF. The Contractor shall notify the Architect by electronic mail of the proposed changes. The Architect will reply to the proposed changes within one operational day and notify the Contractor of the effective date of the changes.

Although a new JMF is not required, the Contractor must notify the Architect of any change in the proportions of the components. This notification shall include the total change made from the approved JMF proportions, and the effective time of the change.

All submitted JMF's shall correspond to the Pine pave mixture design software. The Architect, for evaluation of the submitted JMF, will use the first three test samples. These test results acquired during production shall be within the following range compared to the submitted JMF on the Pine pave mixture design software: $G_{mm} : + / - 0.030$ and $G_{mb} : + / - 0.040$

Table 1- Aggregate Gradation - JMF and Control Point Information

Sieves to be addressed by JMF/Range values are percentages passing by weight										
Sieve Size mm (inch)	4.75 mm	4.75 mm Range	9.5 mm	9.5mm Range	12.5 mm	12.5mm Range	19.0 mm	19.0mm Range	25.0 mm	25.0mm Range
37.5(1.5)	No		No		No		No		Yes	100
25.0(1.0)	No		No		No		Yes	100	Yes	90-100
19.0 (3/4)	No		No		Yes	100	Yes	90-100	Yes	20-90
12.5(1/2)	Yes	100	Yes	100	Yes	90-100	Yes	23-90	Yes	
9.5 (3/8)	Yes	95-100	Yes	90-100	Yes	28-90	Yes		Yes	
4.75(#4)	Yes	90-100	Yes	32-90	Yes		Yes		Yes	
2.36(#8)	Yes		Yes	32-67	Yes	28-58	Yes	23-49	Yes	19-45
(#16)	Yes	30-60	Yes		Yes		Yes		Yes	
(#30)	Yes		Yes		Yes		Yes		Yes	
#50	Yes		Yes		Yes		Yes		Yes	
#100	Yes		Yes		Yes		Yes		Yes	
0.075 (#200)	Yes	12-Jun	Yes	10-Feb	Yes	10-Feb	Yes	8-Feb	Yes	7-Jan

(2) Process Control – Material Production.

The Contractor shall submit in writing (letter or electronic mail) a QC Plan from each proposed production plant to the Architect; no hot-mix asphalt material will be accepted until the Architect approves the QC Plan. This plan must be submitted to the Architect on an annual basis for review and approval prior to material production. The Architect will send a signed copy back to the Contractor stating that it is approved. The approved QC Plan shall govern contractor operations.

The following are considered significant violations to the Contractor's QC Plan:

- Using testing equipment that is knowingly out of calibration or is not working properly.
- Reporting false information such as test data, JMF information, or any info requested by DelDOT
- When the Contractor fails to comply to their approved QC Plan in reference to materials testing
- Substantial deviations to AASHTO or DelDOT procedures when running tests, sampling stockpiles, or testing hot mix.

- The use of any material not listed in the JMF.
- The use of the wrong PG graded asphalt.
- If samples fall within the Contractors action points in the QC Plan but the Contractor fails to take the corrective action in the approved QC Plan

If a Contractor is found in violation of any of these items, they will receive a written warning for their first violation. If the Contractor is found in violation a second time on any of the criteria, they will forfeit any bonus from that day's production. If the Contractor is found in violation a third time on any of the criteria, they will receive a five percent (5%) deduction for that day's production. If the Contractor is found in violation a fourth time, the plant will not be approved for production until such time that the Contractor addresses the violation of the QC plan to the satisfaction of the Architect. If the Architect approves the changes in advance, the Contractor may make changes to the QC Plan. All changes shall be submitted and approved in writing by the Architect.

The QC Plan shall include actions that will assure all materials and products will conform to the specifications, whether manufactured or processed by the Contractor, or procured from suppliers, subcontractors, or vendors. The Contractor shall perform the inspection and tests required to substantiate product conformance to contract requirements. The Contractor shall document QC inspections and tests, and provide copies to the Architect when requested. The Contractor shall maintain records of all inspections and tests for at least one year. The records shall include the date, time, and nature of deficiency or deficiencies found; the quantities of material involved until the deficiency was corrected; and the date, time, and nature of corrective actions taken.

In the QC Plan, the Contractor shall detail the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties of material and construction governed by the Specifications. The QC Plan shall include the following elements as a minimum:

- Production Plant – make, type, capacity, and location.
- Production Plant Calibration – components and schedule; address documentation.
- Personnel – include name and telephone number for the following individuals:
 - Person responsible for quality control.
 - Qualified technician(s) responsible for performing the inspection, sampling, and testing.
 - Person who has the authority to make corrective actions on behalf of the Contractor.
- Testing Laboratory – state the frequency of accuracy checks and calibrations of the equipment used for testing; address documentation.
- Locations where samples will be obtained and the sampling techniques for each test
- Load number of QC samples (1-10 if QA sample is not within trucks 1-10)
- Tests to be performed and their normal frequency; the following, at a minimum, shall be conducted:
 - Mixture Temperature: each of the first five trucks, and each load that is sampled for QC or acceptance testing.
 - Gradation analysis of aggregate (and RAP) stockpiles – one washed gradations per week for each aggregate stockpile; RAP: five gradations and asphalt cement contents for dedicated stockpiles where new material is not being added; one gradation and asphalt cement content test per week for stockpiles where material is continually being added to the stockpile.

- Gradation analysis of non-payment sieves
- Dust to effective asphalt calculation
- Moisture content analysis of aggregates – daily.
- Gradation analysis of the combined aggregate cold feed – one per year per mixture.
- Bulk specific gravity and absorption of blended material – one per year per mixture.
- Ignition Oven calibration – one per year per mixture.
- Hot-Bins: one per year per mixture.
- Others, as appropriate.
- Procedures for reporting the results of inspection and tests (include schedule).
- Procedures for dealing with non-compliant material or work.
- Presentation of control charts. The Contractor shall plot the results of testing on individual control charts for each characteristic. The control charts shall be updated within one working day as test results for each subplot become available. The control charts shall be easily and readily accessible at the plant laboratory. The following parameters shall be plotted from the testing:
 - Asphalt cement content.
 - Volumetrics (air voids, voids in mineral aggregates [VMA])
 - Gradation values for the following sieves:
 - 4.75 mm (#4).
 - 2.36 mm (#8).
 - 0.075 mm (#200)
- Operational guidelines (trigger points) to address times when the following actions would be considered:
 - Increased frequency of sampling and testing.
 - Plant control/settings/operations change.
 - JMF adjustment.
 - JMF change (See Section .04(a)(1)).
 - Change in the source of the component materials.
 - Calibration of material production equipment (asphalt pump, belt feeders, etc.).
 - Rejection of material.

When any point of non-compliance with the QC plan, or material not meeting the Specifications, comes to the attention of either the Contractor or the Architect, the other party shall be notified immediately, and the Contractor shall take appropriate corrective actions. Failure to take corrective actions immediately shall be cause for rejection of material or work by the Architect.

(b) Pavement Construction – Process Control.

The Contractor shall perform Quality Control of pavement compaction by testing in-place pavement with a density gauge or by testing cores extracted from the pavement. The use of the nuclear density gauge shall conform to ASTM D2950; the use of other density gauges shall be as per the manufacturer's recommendations and approved by the Architect. The Contractor may use any method to select locations for the Quality Control.

5 Acceptance Plan.

(a) Material Production – Tests and Evaluations.

The Architect will conduct acceptance tests. The Architect will directly base acceptance on the acceptance test results, the asphalt cement quality, the Contractor's QC Plan work, and the comparisons of the acceptance test results to the QC test results. The Architect may elect to utilize test results of the Contractor in some situations toward judging acceptance. All acceptance tests shall be performed by qualified technicians at qualified laboratories following AASHTO or DelDOT procedures, and shall be evaluated using Quality Level Analysis.

The Contractor shall supply, capture, and mark samples, as directed, from delivery trucks before the trucks leave the production plant. The sample shall represent the material produced by the Contractor, and shall be of sufficient size to allow the Architect to complete all required acceptance tests. The Architect will direct the Contractor when to capture these samples, on a statistically random, unbiased basis, established before production begins each day based upon the anticipated production tonnage. The captured sample shall be from the Architect specified delivery truck; if the Contractor visually observes the specified delivery truck sample and does not want this sample to be sampled and tested for acceptance that delivery truck will not be sent to a Department project. The next visually acceptable delivery truck to the Contractor shall be sampled for acceptance testing.

The first sample of the production day will be randomly generated by the Architect between loads 0 and 12 (0-250 tons). Subsequent samples will be randomly generated by the Architect on 500-ton sub-lots for the production day. Unacceptable samples may be a basis for rejection of material if the QC plan is not followed as approved for sample retrieval. If the Contractor wishes to perform parallel tests with the Architect, or to capture samples to be retained for possible Dispute Resolution, each of the samples for these purposes shall be obtained at the same time and location as the acceptance test sample. Either splitting a large sample or getting multiple samples that equally represent the material is acceptable. The Architect will perform all splitting and handling of samples after they are obtained by the Contractor.

The Architect will evaluate and accept the material on a lot basis. All the material within a lot shall have the same JMF (mixture ID). The lot size shall be targeted for 2000 tons or a maximum period of three days, whichever is reached first. If the 2000th ton target lot size is achieved during a production day, the lot size shall extend to the end of that production day. The Contractor may interrupt the production of one JMF in order to produce different material; this type of interruption will not alter the determination of the size or limits of material represented by a lot. The Architect will evaluate each lot on a subplot basis. The size for each subplot shall be 100 to 500 tons and testing for the sub lots will be completed on a daily basis. For each subplot, the Architect will evaluate one sample.

The target size of sub-lots within each lot, except for the first sample of the production day, is equal-sized 500 ton sub lots and will be based upon anticipated production, however, more or fewer sublots, with differing sizes, may result due to the production schedule and conditions. If the actual production is less than anticipated, and it's determined a sample will not be obtained (based upon the anticipated tonnage), a new sample location will be determined on a statistically random, unbiased basis based upon the new actual production. If the actual production is going to be 50 tons or greater over the anticipated sub lot production, a new sample location will be determined on a statistically random, unbiased basis based upon the new actual production. The Architect will combine the evaluation and test results for all of the applicable sublots in order to evaluate each individual lot.

If the Architect is present, and the quantity exceeds 25 tons, a statistically random sample will be used for analysis. When the anticipated production is less than 100 tons and greater than 25 tons, and the Architect is not present, the contractor shall randomly select a sample using the Architect's random

location program. The captured sample shall be placed in a suitable box, marked to the attention of the Architect, and submitted to the Architect for testing. A box sample shall also be obtained by the contractor at the same time and will be used as the Dispute Resolution sample if requested by the Architect. The contractor shall also obtain one liquid asphalt sample (1 pint) per grade of asphalt used per day and properly label it with all pertinent information.

The Architect will conduct the following tests in order to characterize the material for the pavement compaction quality and to judge acceptance and the pay adjustment for the material:

- C AASHTO T312 – Preparing a mixture samples using a gyratory compactor.
- C AASHTO T166, Method C (Rapid Method) – Bulk specific gravity of compacted samples.
- C AASHTO T308 – Asphalt cement content.
- C AASHTO T30 – Aggregate gradations, using samples from the asphalt cement content test.
- C AASHTO T209 – Theoretical maximum specific gravity.
- C ASTM Provisional Test Method – Rapid Drying of Compacted and Loose Bituminous Asphalt Specimens using Vacuum Drying Method

(b) Pavement Construction – Tests and Evaluations.

The Architect will directly base acceptance on the compaction acceptance test results, and on the inspection of the construction, the Contractor's QC Plan work, ride smoothness as referenced in the contract documents, lift thickness as referenced in the contract documents, joint quality as referenced in the contract documents, surface texture as referenced in the contract documents, and possibly the comparisons of the acceptance test results to the independent test results. For the compaction acceptance testing, the Architect will sample the work on a statistically random basis, and will test and evaluate the work using lots.

Prior to paving a road segment, the Contractor shall notify the Architect of any locations within that road segment that may not be suitable to achieve minimum (93%) compaction due to existing conditions. The Contractor shall schedule and hold a meeting in the field with the Architect in order to discuss all areas that may potentially be applicable to Table 5a before paving starts. Areas that will be considered for Table 5a will be investigated in accordance to the method described in Appendix B. If this meeting is not held prior to paving, no areas will be considered for Table 5a. Areas of allowable exemptions that will not be cored include the following: partial-depth patch areas, driveway entrances, paving locations of less than 100 tons, areas around manholes and driveway entrances, and areas of paving that are under 400 feet in continuous total length and/or 5 feet in width.

The exempt areas around manholes will be a maximum of 4 feet transversely on either side from the center of the manhole, and 20 feet longitudinally on either side from the center of the manhole. The exempt areas around driveway entrances shall be the entire width of the driveway, and 3 feet from the edge of the longitudinal joint next to the driveway. Areas of exemption that will be cored for informational purposes only shall include: areas where the mat thickness is less than three times the nominal maximum aggregate size as directed by the Architect, violations of Section 401.08 in the Standard Specifications as directed by the Architect, and areas shown to contain questionable subgrade properties as proven by substantial yielding under a fully legally loaded truck. Failure to obtain core samples in these areas will result in zero payment for compaction regardless of the exempt status.

The Architect will evaluate and accept the compaction work on a daily basis. Payment for the compaction will be calculated by using the material production lots as referenced in **.05 Acceptance Plan (a) Material Production – Tests and Evaluation** and analyzing the compaction results over the

individual days covered in the material production lot. The compaction results will be combined with the material results to obtain a payment for this item.

The minimum size of a compaction lot shall be 100 tons. If the compaction lot is between 101 and 1000 tons, the Architect shall randomly determine four compaction acceptance test locations. If the compaction lot is between 1001 and 1500 tons, the Architect shall randomly determine six compaction acceptance test locations. If the compaction lot is between 1501 and 2000 tons, the Architect shall randomly determine eight compaction acceptance test locations. If the compaction lot is greater than 2000 tons, the Architect shall randomly determine two compaction acceptance test locations per 500 tons.

If a randomly selected area falls within an Architect approved exemption area, the Architect will select one more randomly generated location to be tested per the requirements of this Specification. If that cannot be accomplished, or if an entire location has been declared exempt, the compaction testing shall be performed as per these Specifications but a note will be added to the results that the location was an Architect approved exempt location.

Testing locations will be a minimum of 1.5 feet from the newly placed longitudinal joint and 50 feet from a new transverse joint. If the Contractor chooses to cut companion cores, they shall be located within one foot of the Architects cores along the longitudinal direction and in-line with the Architects cores in the longitudinal plane.

Exactly at the locations marked by the Architect, the Contractor shall cut a core, 6 inches in diameter, through the full lift depth. Cores submitted that are not from the location designated by the Architect will not be tested and will be paid at zero pay.

The Contractor shall notify the Architect prior to starting paving operations with approximations of the tonnage to be placed. The Contractor is then responsible for notifying the appropriate Architect test personnel within 12 hours of material placement. The Architect will then have 24 hours to mark the core locations. After determination of locations, the Contractor shall complete testing within two operational days of the locations being marked. If the cores are not cut within two operational days, the area in question will be paid at zero pay for compaction testing.

The Contractor shall provide any traffic control required for the structural number investigation, sampling, and testing work at no additional cost to the Department.

The Contractor shall cut each core with care in order to prevent damaging the core. The pavement shall have a maximum temperature of 140°F when cores are cut from it. Immediately upon removal of a core from the roadway, the Contractor shall adequately label it. The Contractor shall protect the core by supplying a 6-inch plastic concrete cylinder mold, or an approved substitute, and placing the core in it. If more than one core is in the same mold, the Contractor shall place paper between them. The Contractor shall attach a completed QC test record for the representative area to the corresponding core. The Architect will also complete a test record for areas tested for the QA report and provide to Materials & Research. At the end of every production day, the Contractor shall deliver the cores to the Architect for testing, processing, and report distribution.

The Contractor shall repair the core hole per Appendix A, Repairing Core Holes in Hot-Mix Asphalt Pavements. Core holes shall be filled immediately. Failure to repair core holes at the time of coring will result in zero pay for compaction testing for the area in question.

The Architect will conduct the following tests on the applicable portion of the cores in order to evaluate their quality:

- AASHTO T166, Method C (Rapid Method) – to determine the bulk specific gravity of the cores.
- AASHTO T209 – to calculate the theoretical maximum specific gravity and the density of the non-compacted mixtures.
- ASTM Provisional Test Method – Rapid Drying of Compacted and Loose Bituminous Asphalt Specimens using Vacuum Drying Method.

The Architect will use the average of the last five test values of the same JMF (mixture ID) material at the production plant in order to calculate the average theoretical maximum specific gravity of the cores. The average will be based on the production days test results and as many test results needed from previous days production to have an average of five samples. If there are less than five values available, the Architect will use the JMF design value in addition to the available values to calculate the average theoretical maximum specific gravity.

Appendix A - Repairing Core Holes in Hot-Mix Asphalt Pavement**Description.**

This appendix describes the procedure required to acceptably repair core holes in a bituminous concrete pavement.

Materials and Equipment.

The following material shall be available to complete this work:

- Patch Material – A DelDOT approved High Performance Cold Patch material shall be used.

The following equipment shall be available to complete this work:

- Sponge or other absorbent material – Used to extract water from the hole.
- Compaction Hammer – Shall be mechanical, with a flat, circular tamping face smaller than inches in diameter. The tamping head shall be connected to an electrical, pneumatic, or gasoline driven tamping device.

Construction Method.

After core removal from the hole, remove all excess water from within the hole, and prevent water from re-entering the hole.

Place the patch material in lifts no greater than 3 inches. If the hole is deeper than 3 inches, use two lifts of approximately equal depths so that optimum compaction is achieved. Make sure that the patch surface matches the grade of the existing roadway. Make every effort to achieve the greatest possible compaction.

Performance Requirements.

The Architect will judge the patch on the following basis:

- The patch shall be well compacted
- The patch surface shall match the grade of the surrounding roadway surface.

Basis of Payment.

No measurement or payment will be made for the patching work. The Contractor must gain the Architect's acceptance of the patching work before the Architect will accept the material represented by the core.

Appendix B - Method for Obtaining Cores for Determination of Roadway Structure

The Contractor is responsible for obtaining cores in areas that they propose are eligible for compaction price adjustments according to Table 5a in this specification. Table 5a is not applicable for new full-depth pavement box construction. Cores submitted for this process shall be obtained according to the following process.

- 1 Contact Materials & Research (M&R) personnel to determine if information about the area is already available. If M&R has already obtained cores in the location that is being investigated, the contractor may opt to use the laboratory information for the investigation and not core the area on their own.
- 2 If M&R does not have information concerning the section of the roadway, the contractor needs to contact M&R to arrange for verification of coring operations. Arrangements shall be made to allow for an individual from M&R to be on the site when the cores are obtained. Cores will be turned over to M&R for evaluation.
- 3 The contractor is responsible for providing all traffic control and repairing core holes in accordance to 401699 Appendix A – Repairing Core Holes in Hot-Mix Asphalt Pavements.
- 4 Cores are to be taken throughout the entire project for the area in question. Cores will be spaced, from the start of the project in increments determined based on field and project specifics. Cores will be evenly distributed throughout the project location. The cores will be taken in the center of the lane in question.
- 5 Additional cores may be taken at other locations, if surface conditions indicate that there may be a substantial difference in the underlying section. The location of these cores should be documented and submitted to M&R.
- 6 Cores shall be full depth and include underlying materials. If there is a stone base included in the pavement section, at a minimum 1 core must have information concerning the thickness of the base. This is determined by augering to the subgrade surface.
- 7 The calculations used to determine the structural capacity of the roadway is as follows. If the contractor finds, upon starting the coring process, that the areas are of greater thickness than applicable to Table 5a, they may terminate the coring process on their own and retract the request.

Structural Number Calculations

Each pavement box material is assigned a structural coefficient based upon AASHTO design guides. The structural coefficient is used to determine the total strength of the pavement section.

Materials used in older pavement sections are assigned lower structural coefficients to compensate foraging of the materials. The coefficients used to determine the structural number of an existing pavement are:

Existing Material	Structural Coefficient
HMA	0.32
Asphalt Treated Base	0.26
Soil Cement	0.16
Surface Treatment (Tar & Chip)	0.10
GABC	0.14
Concrete	0 - 0.7*

* The Structural Coefficient of Concrete is dependent upon the condition of the concrete. Compressive strengths & ASR analysis are used to determine condition – contact the Architect if this situation arises.

Newly placed materials use a different set of structural coefficients. They are as follows:

New Material	Structural Coefficient
HMA	0.40
Asphalt Treated Base(BCBC)	0.32
Soil Cement	0.20
GABC	0.14

Example:

Location includes placement of a 1.25" Type C overlay on 2.25" Type B. Existing roadway is cored and is shown to consist of 2" HMA on 7" GABC.

Calculation:

For the Type B lift the calculation would be:

Existing HMA	$2 * 0.32$	=	0.64
GABC	$7 * 0.14$	=	<u>0.98</u>
			1.62

For the Type C lift the calculation would be:

Newly Placed B	$2.25 * 0.4$	=	0.90
Existing HMA	$2 * 0.32$	=	0.64
GABC	$7 * 0.14$	=	<u>0.98</u>
			2.52

401801 - WMA, SUPERPAVE, TYPE C, 160 GYRATIONS, PG 64-22 (CARBONATE STONE)**401810 - WMA, SUPERPAVE, TYPE B, 160 GYRATIONS, PG 64-22****401819 - WMA, SUPERPAVE, BITUMINOUS CONCRETE BASE COURSE, 160 GYRATIONS, PG 64-22****Description:**

Warm mix asphalt (WMA) is the generic term used to describe the reduction in production, paving, and compaction temperatures achieved through the application of one or more WMA technologies.

WMA may be produced by one or a combination of several technologies involving asphalt foaming processes and equipment or additives that facilitate the reduction of the temperature at which the mix can be placed and satisfactorily compacted thereby permitting the mix to be produced at reduced temperatures from a comparable mix without the Warm Mix Technology.

The following Subsections of the Standard Specifications shall be applicable: 401.01, 401.03 - 401.10, 401.12, and 401.13. All other subsections have been modified herein.

The Contractor shall read and thoroughly understand the requirements of the QA/QC specification as defined in item 401699. It is the responsibility of the Contractor to determine all costs associated with meeting these requirements and to include them in the per ton bids for the various Superpave bituminous concrete items. The Contractor shall also be aware that the pay adjustment factors in item 401699 will be applied to the Superpave item payments to determine the bonus or penalty for the item.

Materials:

If the Contractor proposes to use a combination of materials that are not covered by this Specification, the mix design shall be submitted and reviewed by the Architect 30 calendar days prior to use.

Conform to the requirements of DelDOT Standard Specifications Subsections 823.01, 823.05-823.17, and 823.25 - 823.28 of the Standard Specifications and the following for bituminous materials:

Asphalt Binder:

The asphalt binder shall meet the requirements of Superpave performance-grade asphalt binder, as referenced in the Plans, according to M 320¹, Table 1 and tested according to AASHTO R29 with the following test ranges:

TEST PROCEDURE	AASHTO REFERENCE	SPECIFICATION LIMITS
Temperature, °C	M 320	Per Grade
Original DSR, $G^*/\sin(\delta)$	T 315	1.00 - 2.20 kPa
RTFO DSR, $G^*/\sin(\delta)$	T 315	≥ 2.20 kPa
PAV DSR, $G^* \sin(\delta)$	T 315	≤ 5000 kPa
BBR Creep Stiffness, S	T 313	≤ 300.0 kPa
BBR m -value	T 313	≥ 0.300

Note 1: The exception to M 320 is that the original DSR shall be 1.00 to 2.20 kPa

Substitution of a higher temperature grade will require prior approval by the

Architect. The highest low temperature grade virgin binder to be used is -22.

Depending on the level of RAP used, the low temperature properties, per T 313, may be different than stated in M 320 or the previous table.

Bituminous Concrete Base Course:

Mix and gradation requirements for the base course shall be as follows:

Mix Requirements:

Asphalt Content	3.0% - 4.5% of total mixture weight
Air Voids	3.0 - 6.0
Stability	1000 lb, minimum
Flow-	8.0 -18.0 (0.01 in)

Gradation Requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
1-1/2"	100
3/4"	75-100
3/8"	48-80
No. 8	20-48
No. 30	10-30
No. 50	7-25
No. 200	3-10

During production of the base course mixture, the gradation of the aggregates may vary between the specified limits, but such variations shall be gradual. Sudden variation from coarse to fine and fine to coarse on any sieve will not be tolerated.

Recycled Materials:

The percentage allowance of recycled asphalt pavement shall be controlled through the use of the Materials & Research recycled mixture program available through the Materials & Research Section. The program can be used by the Contractor to determine which materials and combinations of materials can be used to meet the specified material on the contract.

No recycled asphalt shingles shall be used in WMA.

Mineral Aggregate:

Conform to Section 805 and the following criteria. These criteria apply to the combined aggregate blend:

DESIGN ESAL'S (MILLIONS)	COARSE AGGREGATE ANGULARITY ¹ (% MIN)		FINE AGGREGATE ANGULARITY ² (% MIN)		CLAY CONTENT ³ (% - MIN)	FLAT AND ELONGATED ⁴ (% - MAX)
	≤ 100 mm	> 100 mm	≤ 100 mm	> 100 mm		
< 0.3	55/-	-/-	-	-	40	-
0.3 to < 3	75/-	50/-	40	40	40	10
3 to < 10	85/80 ⁵	60/-	45	40	45	
10 to < 30	95/90	80/75	45	40	45	
≤ 30	100/100	100/100	45	45	50	

¹ Coarse Aggregate Angularity is tested according to D5821.

² Fine Aggregate Angularity is tested according to TP33.

³ Clay Content is tested according to T176.

⁴ Flat and Elongated is tested according to D4791 with a 5:1 aspect ratio.

⁵ 85/80 denotes that 85% of the coarse aggregate has one fractured face and 80% has two or more fractured faces.

TEST METHOD	SPECIFICATION LIMITS
Toughness, T96 Percent Loss, Maximum	40
Soundness, T104 Percent Loss, Maximum for five cycles	20
Deleterious Materials, T112 Percent, Maximum	10
Moisture Sensitivity, T283 Percent, Minimum	80

The following source properties apply to the individual aggregates in the aggregate blend for the proposed JMF.

Supply all polish values to the Architect upon request. The polish value of the composite aggregate blend for any roadway with a minimum average daily traffic volume (ADT) of 8000 vehicles and a posted speed of 35 mph (60 kph) or greater shall be greater than 8.0 when tested according to Maryland State Highway Administration 'MSMT 411 - Laboratory Method of Predicting Frictional Resistance of Polished Aggregates and Pavement Surfaces'. RAP shall be assigned a value of 4.0.

Mineral Filler:

Conform to M17.

Warm Mix Additives:

For any WMA technology requiring addition of any material by the producer during production, the following information will be submitted with the proposed JMF for review and approval at least 30 calendar days prior to production:

1. WMA technology and/or additive information.
2. WMA technology manufacturer's recommendation for usage.
3. WMA technology target dosage rate and tolerance envelope. Support tolerance envelope with test data demonstrating acceptable mix production properties conforming to all sections of this specification.
4. WMA technology manufacturer's material safety data sheets (MSDS).
5. Documentation of past WMA technology field application including points of contact.
6. Temperature ranges for mixing and compacting.
7. Laboratory test data, samples, and sources of all mix components, and asphalt binder viscosity-temperature relationships.

The contractor shall follow the manufacturer's recommendation for incorporating additives and WMA technologies into the mix. The contractor shall also comply with the manufacturer's recommendation regarding receiving, storage, and delivery of additives.

If the producer performs blending of the WMA technology in their tank, a separate Quality Control plan shall be submitted by the producer to the Department for review and approval at least 30 calendar days prior to production.

Mixture Requirements:

Mix Design. Develop and submit a job mix formula for each mixture according to R35. Each mix design shall be capable of being produced, placed, and compacted as specified. Apply all mix design requirements for Superpave to the development of the WMA mix design.

Gradation: The FHWA Superpave 0.45 Power Chart shall be used to define permissible gradations for the specified mixture. Type C shall be either a No.4 (4.75 mm), 3/8" (9.5 mm), or 1/2" (12.5 mm) Nominal Maximum Aggregate Size Hot-Mix. Unless otherwise noted in the Plans, the Type C shall meet the 3/8" (9.5mm) Nominal Maximum Aggregate Size. Type B Hot-Mix shall be the 3/4" (19.0 mm) Nominal Maximum Aggregate Size and the Bituminous Concrete Base Course (BCBC) shall be the 1" (25.0 mm) Nominal Maximum Aggregate Size. Target values for percent passing each standard sieve for the design aggregate structure shall comply with the Superpave control points and should avoid the restricted zone. Percentages shall be based on the washed gradation of the aggregate according to T11.

Thin WMA, Type C shall be a No. 4 (4.75 mm) Nominal Maximum Aggregate Size Only.

In addition to the results of the material requirements specified above, the following material properties shall be provided by the Contractor: bulk specific gravity G_{sb} , apparent specific gravity G_a , and the absorption of the individual aggregate stockpiles to be used, tested according to T84 and T85 and reported to three decimal places along with the specific gravity of the mineral filler to be used, tested according to T100 and reported to three decimal places.

Superpave Gyratory Compactive (SGC) Effort:

The Superpave Gyratory Compaction effort employed throughout mixture design, field quality control, or field quality assurance shall be as indicated below. All mixture specimens tested in the SGC shall be compacted to N_{Max} . Height data provided by the SGC shall be employed to calculate volumetric properties at N_{INITIAL} , N_{DESIGN} , and N_{MAX} .

Superpave Gyratory Compactive (SGC) Effort:

DESIGN TRAFFIC LEVEL (MILLION ESAL'S)	N_{INITIAL}	N_{DESIGN}	N_{MAX}
0.3 to < 3	7	75	115
3 to < 30	8	100	160
≥ 30	9	125	205

Volumetric Design Parameters:

The design aggregate structure at the target asphalt cement content shall satisfy the volumetric criteria below:

DESIGN ESALS'S (MILLION)	REQUIRED DENSITY (% OF THEORETICAL MAXIMUM SPECIFIC GRAVITY)			VOIDS-IN-MINERAL AGGREGATE (% - MINIMUM) NOMINAL MAX. AGGREGATE (mm)					VOIDS FILLED WITH ASPHALT (% - MINIMUM)	
	N _{INITIAL}	N _{DESIGN}	N _{MAX}	25.0	19.0	9.5	12.5	4.75		
	0.3 to <3	≥ 90.5	96	98	12.5	13.5	15.5	14.5		16.5
	3 to < 10	≥ 89.0								
	10 to < 30									
≥ 30										

Air voids (V_a) at N_{design} shall be 4.0% for all ESAL designs. Air voids (V_a) at N_{max} shall be a minimum of 2.0% for all ESAL designs.

The dust to effective binder ratio for the mix having aggregate gradations above the Primary Control Sieve (PCS) Control Points shall be 0.6-1.2. For aggregate gradations below the PCS Control Points, the dust to binder ratio shall be 0.8-1.6. For the No. 4 (4.75 mm) mix, the dust to binder ratio shall be 0.9-2.0 whether above or below the PCS Control Points.

For 3/8" (9.5 mm) Nominal Maximum Aggregate Size mixtures, the specified VFA range shall be 73.0% to 76.0% and for 4.75 mm Nominal Maximum Size mixtures, the range shall be 75 % to 78% for design traffic levels ≥ 3 million ESALs.

Gradation Control Points:

The combined aggregates shall conform to the gradation requirement specified in the following table when tested according to T11 and T27.

PCS CONTROL POINT FOR MIXTURE NOMINAL MAXIMUM AGGREGATES SIZE (% PASSING)					
Nominal maximum Aggregates Size	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.5 mm
Primary Control Sieve	4.75 mm	4.75 mm	2.36 mm	2.36 mm	1.18 mm
PCS Control Point	40	47	39	47	30-60

Note: The aggregate gradation for each sieve must fall within the minimum and maximum limits.

Nominal Maximum Aggregates Size Control Points, Percent Passing										
	25.0 mm		19.0 mm		12.5 mm		9.5 mm		4.75 mm	
SIEVE SIZE	MIN	MA X	MIN	MA X	MIN	MAX	MIN	MA X	MIN	MA X
37.5 mm	100	-	-	-	-	-	-	-	-	-
25.0 mm	90	100	100	-	-	-	-	-	-	-
19.0 mm	-	90	90	100	100	-	-	-	-	-
12.5 mm	-	-	-	90	90	100	100	-	100	-
9.5 mm	-	-	-	-	-	90	90	100	95	100
4.75 mm	-	-	-	-	-	-	-	90	90	100
2.36 mm	19	45	23	49	28	58	32	67	-	-
1.18 mm	-	-	-	-	-	-	-	-	30	60
0.075 mm	1	7	2	8	2	10	2	10	6	12

Gradation Classification:

The Primary Control Sieve (PCS) defines the break point of fine and coarse mixtures. The combined aggregates shall be classified as coarse graded when it passes below the Primary Control Sieve (PCS) control point as defined below. All other gradations shall be classified as fine graded.

Plant Production Tolerances:

Volumetric Property	Superpave Criteria
Air Voids (V_a) at (%) N_{max}	2.0 (min)
Air Voids (V_a) at N_{design} (%)	5.5 (max)
Voids in Mineral Aggregate (VMA) at N_{design}	
25.0 mm Bituminous Concrete Base Course	-1.2
19.0 mm Type B Hot-Mix	+2.0
12.5 mm Type C Hot-Mix	
9.5 mm Type C Hot-Mix	
4.5 mm Type C Hot-Mix	

Design Evaluation:

The contractor shall furnish a Job Mix Formula (JMF) for review and approval. The Architect may elect to evaluate the proposed JMF and suitability of all materials. All materials requested by the Architect shall be provided at the contractor's expense to the Central Laboratory in Dover in a timely manner upon request. To verify the complete mixture design and evaluate the suitability of all materials, the following approximate quantities are required:

5.25 gal (20 liters) of the asphalt binder;
 0.13 gal (0.5 liters) sample of liquid heat-stable anti-strip additive; 254 lb. (115 kg) of each coarse aggregate; 154 lb. (70 kg) of each intermediate and fine aggregate; 22 lb. (10 kg) of mineral filler; and 254 lb. (115 kg) of RAP, when applicable.

The proposed JMF shall include the following:

Plot of the design aggregate structure on the FHWA Superpave 0.45 power chart showing the maximum density line, Superpave control points, and recommended restricted zone.

Plot of the three trial asphalt binder contents at $\pm 0.5\%$ gyratory compaction curves where the percent of maximum specific gravity (% of G_{mm}) is plotted against the log base ten of the number of gyrations ($\log(N)$) showing the applicable criteria for $N_{initial}$, N_{design} , and N_{max} .

Plot of the percent asphalt binder by total weight of the mix (P_b) versus the following: (% of G_{mm}) at N_{design} , VMA at N_{design} , VFA at N_{design} , Fines to effective asphalt binder (P_{be}) ratio, and unit weight (kg/m³) at both N_{design} and N_{max} .

Summary of the consensus property standards test results for the design aggregate structure, summary of the source property standards test results for the individual aggregates in the design aggregate structure, target value of the asphalt binder content, and a table of G_{mm} of the asphalt mixture for the four trial asphalt binder contents determined according to T209.

The JMF shall also include the NCAT Ignition Oven calibration for the specific materials utilized for this mix.

Construction:**Bituminous Concrete Base Course:**

Prior to the delivery of the mixtures on the job, the underlying course shall have been brought to line, grade, and cross-section, and all excess patching material, joint material, dirt, and foreign material shall be removed. The mixtures shall be placed only upon a surface that is dry, and only when weather conditions are suitable.

Upon arrival, the mixture shall be dumped into the approved mechanical spreader, and immediately spread and struck off in a uniform layer to the full width required. The placed mixtures shall be of such depth that when the work is completed, it will have the thickness shown on the Plans or as specified in the Contract and will conform to the grade and surface contour required. Machine methods of spreading and screeding are required unless otherwise permitted.

Should unevenness of texture, tearing, or shoving occur during the paving operation due to unsatisfactory material, methods, or equipment, the Contractor shall immediately take action to correct such unsatisfactory work.

The outside edges of the pavement shall be in true alignment, parallel to the centerline of the roadway. On Contracts requiring multiple lifts or courses, the width of the individual lifts shall be arranged such that the longitudinal joints of each successive lift are offset from the previous lift approximately 6" (150 mm). The longitudinal joint in the surface course shall be at the lane line.

The placement of roadway bituminous concrete shall be as continuous as possible. Intersections and irregular areas shall be paved after the adjacent roadway has been paved. Hand spreading with lutes will be permitted where irregularities or obstacles make the use of pavers impractical. The use of garden rakes will not be permitted.

No bituminous concrete shall be placed when the ambient air temperature at the location of the paving operation is below the temperatures indicated for the various types of bituminous concrete mixtures in the following table:

Table 401-A
Minimum Ambient Air Temperature for Placement of Types of Bituminous Material

<i>Material Type</i>	<i>1" (25 mm) Lift or Less</i>	<i>1 to 2" (26 mm to 50 mm) Lift</i>	<i>Greater than 2" (50 mm) Lift</i>
A	65 °F (18 °C)	N/A	N/A
B	50 °F (10 °C)	40 °F (4 °C)	32 °F (0 °C)
C	50 °F (10 °C)	40 °F (4 °C)	N/A
D	50 °F (10 °C)	40 °F (4 °C)	N/A
E	N/A	N/A	32 °F (0 °C)

Note: Type A - Open graded plant mix wearing surface
 Type B - Dense graded base and binder course
 Type C - Dense graded surface course
 Type D - Fine, dense graded surface course
 Type E - Curb mix

No bituminous concrete shall be placed on any frozen surface or when, in the opinion of the Engineer, weather conditions, such as wind and low temperatures, prevent proper spreading, finishing, and compaction of the mixture. Subsequent lifts or courses shall not be placed over another lift or course placed on the same day while the temperature of the previously placed mix is 140 °F (60 °C) or greater. Traffic shall be kept off the bituminous concrete until the mat temperature is less than 140 °F (60 °C).

The Contractor shall fill low places in the base with a leveling material consisting of hot-mix bituminous concrete base course or surface course material. The locations along the base course to receive this leveling course material, the type of material to be used, and the method to be employed in each case shall be as directed. Hot-mix bituminous concrete material shall be placed as directed around all manholes, drainage inlets, valves, or similar features (with slopes 20:1 or flatter) when they are adjusted to the proposed grade. This material may be temporarily placed and shall be removed if directed.

After the hot-mix bituminous concrete base course is placed, it shall not lay exposed for a period longer than ten days. If, due to conditions of emergency, more than ten days elapse, a fog coat of RS-1 or CSS-1-h shall be sprayed uniformly on the exposed base course before placing the wearing course of hot-mix bituminous concrete. In addition, the Contractor shall plan the paving operation so that no bituminous base courses remain unsurfaced after the "winter shut-down" unless authorized by the Engineer.

The paving operation shall be conducted to minimize inconvenience to traffic and to protect existing and finished surfaces. Unless otherwise permitted, no single lane of any course shall be constructed to a length which cannot be completed to a full width of the pavement the following day. All

hot-mix resurfacing operations shall be properly signed at the Contractor's expense with notice of "Pavement Drop-Off" or "Uneven Pavement" in accordance with the approved traffic control plans.

At locations where the hot-mix is tapered to meet an existing roadway, a tack coat of bituminous material shall be uniformly applied on the tapered area at the rate of approximately 0.15 gal/yd² (0.70 L/m²).

Production Plants. The contractor shall modify and/or operate their production plant as required by the manufacturer to introduce the WMA technology.

Weather Limitations. Place mix only on dry, unfrozen surfaces.

The minimum ambient temperature shall be 32 degrees F.

The following table of ambient temperatures for various binder grades and lift thicknesses for placement with the following parameters:

- Minimum surface temperature of 32 degrees F
- Maximum production temperature of 275 degrees F
- Maximum wind speed of 8 miles per hour

Lift Thickness (in)	PG Binder		
	76-22	70-22	64-22
1.50	50F	45F	40F
2.00	40F	38F	35F
3.00	32F	32F	32F

Construction outside of these conditions will be at the discretion of the Architect.

Compaction:

Compaction shall be tested per Item 401699 - Quality Control/Quality Assurance of Bituminous Concrete .05 (b) Pavement Construction - Tests and Evaluations.

708512 - DRAINAGE INLET**Description:**

This work consists of furnishing all materials and constructing special drainage inlets (catch basins) in accordance with locations, notes, details on Plans and as directed by the Architect.

Materials and Construction Methods:

Materials and construction methods for special drainage inlets shall conform to the applicable requirements of Section 708 of the Standard Specifications, and notes with details on the Plans.

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715517 - PERFORATED CORRUGATED HDPE PIPE UNDERDRAIN, 6" AND 4"**Description:**

The item shall consist of fabricating and placing a 6" and 4" perforated corrugated HDPE underdrain system as shown on the Plans, and as directed by the Engineer.

Materials:

Perforated 6" HDPE pipe shall conform to the requirements of ASTM F2648, and pipe shall be of corrugated HDPE – dual wall, smooth interior. The perforated HDPE pipe shall have perforation patterns per the AASHTO Class II standard.

Nominal I.D. in	Perforation Type	Maximum Slot Length or Diameter in	Maximum Slot Width in	Minimum Inlet Area in ² /ft
4	Slot	0.875	0.125	1.0
6	Slot	0.875	0.125	1.0

Pipe shall be joined using a bell & spigot joint meeting ASTM F2648. The joint shall be soil-tight and gaskets, when applicable, shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

HDPE pipe fittings shall conform to the requirements of ASTM F 2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the soil-tight joint performance requirements of ASTM F 2306.

6" Underdrain shall be wrapped in a nonwoven separation geotextile "filter sock" and meet ASTM D6707 requirements.

Stone backfill for the 6" underdrain in the Pervious Bituminous Asphalt Pavement shall conform to Section 401574 - Pervious Bituminous Asphalt Pavement.

Stone backfill shall for the 4" underdrains and the 6" underdrains in the Standard Asphalt Section shall consist of DE No. 57 stone. Grading requirements are shown below:

Crushed Stone Properties															
DE No.	d50 (in)	Sieve Size (square openings), inches													
		4"	3-1/2"	3"	2-1/2"	2"	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 100
57	0.5						100	95-100		25-60		0-10	0-5		
Source -DelDOT Standard Specifications - August 2001 - Section 813															

Construction Methods:

The underdrain shall be constructed in accordance with the details shown on the Plans and at the locations shown on the Plans. All joints shall be finished in accordance with the manufacturer's recommendations. Stone backfill shall be placed in 6 inch lifts and compacted with a vibratory plate to the satisfaction of the Engineer.

NOT FOR BIDDING

743504 - WARNING SIGNS, STATIONARY**Description:**

This work consists of furnishing, installing and maintaining these traffic control devices in accordance with the "Delaware Traffic Controls for Streets and Highways Construction, Maintenance, Utility & Emergency Operations" (latest edition with all revisions made up to the date of the Advertisement of this Contract), and from hereon called as the Traffic Manual, notes and details on the Plans and as directed by the Architect.

As required under the section entitled "Certification" traffic control devices shall be certified as crashworthy in accordance with NCHRP Report 350. In case of conflict between the Traffic Manual and the requirements of NCHRP Report 350, the requirements of NCHRP Report 350 shall govern.

Materials and Construction Methods:

Materials and construction of all signs and barricades shall meet all requirements including reflectorization of the Traffic Manual.

Unless specified on the Plans, all traffic control devices shall be either new or restored to a satisfactory condition. All reconditioned and/or restored traffic control devices must be approved by the Architect before their use. Bases of warning signs, when required, shall be weighted with sandbags to resist overturning.

Traffic protection devices shall be suitably maintained at all times. Such maintenance shall include washing sign faces, replacing deficient batteries and lights, aligning lights properly, replacing reflective materials, relocating barriers, and any other maintenance of traffic protection devices deemed necessary by the Architect to maintain traffic in safe and effective manner.

Warning signs and temporary warning signs shall be retroreflective and shall have rounded corners as per FHWA publication "Standard Highway Signs".

For purposes of measurement and payment the following definitions for signs shall apply:

Warning Signs (Item 743504) are those signs that are generally permanently installed at the beginning of a project and remain in place for the duration of the project.

Temporary Warning Signs (Item 743525) are those signs erected for a particular operation or phase of the project and may remain in place just during working hours such as "Flagger Ahead" signs or may remain in place for several days or more such as "Right Lane Closed" signs.

All holes or trenches within paved roadways or sidewalks which could not be practically backfilled and paved prior to restoring the area to traffic, shall be covered by protective covers consisting of temporary steel plates, furnished, installed and secured in place by the Contractor at no extra cost to the Department.

All traffic control work and related items shall either be performed entirely by the Contractor's own organization or totally subcontracted. Maintenance of the equipment shall not be subject to this requirement.

Certification:

Temporary traffic control devices used on all highways open to the public in this State shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350 and the memorandum issued August 28, 1998 by The USDOT Federal Highway Administration **Information:** Crash Tested Work Zone Traffic Control Devices. It is the requirement of the Department that such certification be submitted for traffic control devices used on **all** projects, not just those involving the National Highway System.

In brief, certification of compliance with NCHRP report 350 is required for the following categories of traffic control devices:

Category I contains small and lightweight channelizing and delineating control devices which includes cones, tubular markers, flexible delineator post and drums, all without any accessories or attachments.

Category II includes traffic control devices that are not expected to produce significant vehicular velocity changes to impacting vehicles. These devices which shall weigh 100 pounds (45 kg) or less, include Type I, II and III barricades, portable sign supports with signs, and intrusion alarms. Also included are drums, cones, and vertical panels with accessories or attachments.

The schedule for implementation of certification is as follows:

Category I - Effective October 1, 1998, all devices shall be certified as conforming to NCHRP Report 350 criteria.

Category II - Effective October 1, 2000, all new devices shall be certified as conforming to NCHRP Report 350 criteria. Prior to October 1, 2002, the Contractor may use devices acquired before October 1, 2000, that have not been crash tested in accordance with NCHRP Report 350 criteria, provided the Contractor certified the such devices were acquired prior to October 1, 2000. If such devices are crash tested and fail, the Department reserves the right to have them replaced with approved devices. Effective October 1, 2002, all devices shall be certified as conforming to NCHRP Report 350 criteria.

For DelDOT administered projects the certification shall be submitted to the Architect prior to installation or use of traffic control devices. For Category I devices, the manufacturer may self-certify that the devices meet NCHRP-350 criteria. For Category II and Category III devices, the Contractor shall supply the Federal Highway Administration's NCHRP-350 acceptance letter for each type of device.

743525 - TEMPORARY WARNING SIGNS**Description:**

This work consists of furnishing, installing and maintaining these temporary traffic control devices in accordance with the contract documents and with the latest edition of the manual titled "Delaware Manual on Uniform Traffic Control Devices (MUTCD)," hereafter referred to as the "Delaware MUTCD", including all revisions as of the date of the advertisement of this Contract and as directed by the Architect.

As required under the section entitled "Certification" temporary traffic control devices shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350, the memorandum issued August 28, 1998 by The USDOT Federal Highway Administration, and/or in accordance with the latest edition of the Manual for Assessing Safety Hardware (MASH), published by the American Association of State Highway and Transportation Officials (AASHTO). In case of conflict between the Delaware MUTCD and the requirements of NCHRP Report 350 and/or MASH, the requirements of NCHRP Report 350 and/or MASH shall govern.

Materials and Construction Methods:

Materials and construction of all signs and barricades shall meet all requirements including retroreflectorization of the Delaware MUTCD.

Unless specified on the Plans, all temporary traffic control devices shall be either new or restored to a satisfactory condition. All reconditioned and/or restored temporary traffic control devices must be approved by the Architect before their use. Bases of warning signs, when required, shall be weighted with sandbags to resist overturning.

Temporary traffic protection devices shall be suitably maintained at all times. Such maintenance shall include washing sign faces, replacing deficient batteries and lights, aligning lights properly, replacing retroreflective materials, relocating barriers, and any other maintenance of traffic protection devices deemed necessary by the Architect to maintain traffic in a safe and effective manner.

Warning signs and temporary warning signs shall be retroreflective and shall have rounded corners as per FHWA publication "Standard Highway Signs". Warning signs shall be installed in accordance with the applicable sections of the Delaware MUTCD.

For purposes of measurement and payment the following definitions for signs shall apply:

Warning Signs (Item 743504) are those signs that are generally permanently installed at the beginning of a sustained construction phase (i.e., a construction phase exceeding 24 hours) and/or at the beginning of the project and shall remain in place for the duration of the sustained phase and/or project.

Temporary Warning Signs (Item 743525) are those signs erected for a particular operation or phases of the project that do not exceed 24 hours and may remain in place just during working hours such as "Flagger Ahead" signs.

Any permanent warning signs used on the project shall be securely mounted on break away

supports such that the supports are installed in the ground per the sign post manufacturers recommendations. Permanent warning signs shall not be mounted on portable sign stands except in the following situations:

-If a documented utility conflict exists and field adjustments to the sign location cannot be made, the sign may be mounted on a portable sign stand with proper ballasting material. Documentation of the utility conflict shall be provided to the Architect.

All holes or trenches within paved roadways or sidewalks which could not be practically backfilled and paved prior to restoring the area to traffic, shall be covered by protective covers consisting of temporary steel plates, furnished, installed and secured in place by the Contractor at no extra cost to the Department.

All temporary traffic control work and related items shall either be performed entirely by the Contractor's own organization or totally subcontracted. Maintenance of the equipment shall not be subject to this requirement.

Certification:

Temporary traffic control devices used on all highways open to the public in this State shall conform to the Delaware MUTCD. All devices shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350, the memorandum issued August 28, 1998 by The USDOT Federal Highway Administration, and/or in accordance with the latest edition of the Manual for Assessing Safety Hardware (MASH), published by the American Association of State Highway and Transportation Officials (AASHTO).

The Contractor shall submit certification for temporary traffic control devices used specifically on this project at or prior to the pre-construction meeting.

Certification of compliance with NCHRP report 350 and/or MASH is required for the following categories of temporary traffic control devices:

Category I contains small and lightweight channelizing and delineating devices, which includes cones, tubular markers, flexible delineator posts and drums, all without any accessories or attachments.

Category II includes temporary traffic control devices that are not expected to produce significant vehicular velocity changes to impacting vehicles. These devices, which shall weigh 45 kg (100 lbs.) or less, include Type III barricades, portable sign supports with signs, and intrusion alarms. Also included are drums, cones, and vertical panels with accessories or attachments.

For Category I devices, the manufacturer or Contractor may self-certify that the devices meet the NCHRP-350 and/or MASH criteria. The Contractor shall supply the Federal Highway Administration 2000, that have not been crash tested in accordance with NCHRP that falls under Category II and III devices.

- 748508 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 8"**
748509 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 12"
748510 - PERMANENT PAVEMENT STRIPING, SYMBOL/LEGEND, EPOXY RESIN PAINT
748548 - PERMANENT PAVEMENT STRIPING, EPOXY RESIN PAINT, WHITE/YELLOW, 5"

Description:

This work consists of furnishing and applying white or yellow, epoxy reflectorized pavement markings or black epoxy contrast pavement markings at the locations and in accordance with the patterns indicated on the Plans, or as directed by the Architect, and in accordance with these specifications.

The white/yellow epoxy marking material shall be hot-applied by spray methods onto bituminous and/or Portland cement concrete pavement surfaces as required by the Plans. Following an application of double drop glass beads of two sizes and upon curing, the resultant epoxy marking shall be an adherent reflectorized stripe of the specified thickness and width that is capable of resisting deformation by traffic. All marking materials shall be certified lead free and free of cadmium, mercury, hexvalent chromium, and other toxic heavy metals.

Materials Requirements:

A. White and Yellow Reflectorized Epoxy

1. Epoxy Composition Requirements:

The epoxy resin composition shall be specifically formulated for use as a pavement marking material and for hot-spray application at elevated temperatures. The type and amounts of epoxy resins and curing agents shall be at the option of the manufacturer, providing the other composition and physical requirements of this specification are met.

The epoxy marking material shall be a two-component (Part A and Part B), 100% solids type system formulated and designed to provide a simple volumetric mixing ratio (e.g. two volumes of Part A to one volume of Part B).

Component A of both white and yellow shall conform to the following requirements:

% BY WEIGHT		
	WHITE:	YELLOW:
Pigments	Titanium Dioxide - 18% Min. (ASTM D476, Type II)	Organic Yellow-6%-10%
Epoxy Resin	75% Min., 82% Max.	70% Min., 77% Max.

The entire pigment composition shall consist of either titanium dioxide and/or organic yellow pigment. No extender pigments are permitted. The white pigment upon analysis, shall contain a minimum of 16.5% TiO₂ (100% purity).

Epoxy Content-WPE (Component A) - The epoxy content of the epoxy resin will be tested in accordance with ASTM D1652 and calculated as the weight per epoxy equivalent (WPE)

for both white and yellow. The epoxy content will be determined on a pigment free basis. The epoxy content (WPE) shall meet a target value provided by the manufacturer and approved by the Department's Material and Research Section (from now on will be addressed as Department). A ± 50 tolerance will be applied to the target value to establish the acceptance range.

Amine Value (Component B) - The amine value of the curing agent shall be tested in accordance with ASTM D2074-66 to determine its total amine value. The total amine value shall meet a target value provided by the manufacturer and approved by the Department. A ± 50 tolerance will be applied to the target value to establish the acceptance range.

Toxicity - Upon heating to application temperature, the material shall not exude fumes which are toxic or injurious to persons or property.

Viscosity - Formulations of each component shall be such that the viscosity of both components shall coincide (within 10%) at a recommended spray application.

2. Physical Properties of Mixed Composition:

Unless otherwise noted, all samples are to be prepared and tested at an ambient temperature of $73 \pm 5^\circ\text{F}$. ($23 \pm 3^\circ\text{C}$).

- a. Color. The white epoxy composition when applied at a minimum wet film thickness of 20 ± 1 mils ($500 \mu\text{m}$) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

The yellow epoxy composition when applied at a minimum wet film thickness of 20 ± 1 mils ($500 \mu\text{m}$) as applicable and allowed to dry, shall plot within the boundaries described by the four corner points listed in Tables 1 and 2 of ASTM D 6628-01 when measured in accordance with the test methods prescribed in Section 7 of ASTM D 6628-01.

- b. Directional Reflectance. The white epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 84% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141.

The yellow epoxy composition (without glass spheres) shall have a daylight directional reflectance of not less than 55% relative to a magnesium oxide standard when tested in accordance with Method 6121 of Federal Test Method Standard No. 141c. Drying Time (Laboratory). The epoxy composition, when mixed in the proper ratio and applied at a 20 ± 1 mils ($500 \mu\text{m}$) minimum wet film thickness, and immediately dressed with large reflective glass spheres (Federal Spec. Type 4) at a rate of 12 lb/gal (1.4 kg/l) of epoxy pavement marking materials, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 lb/gal (1.4 kg/L) of epoxy pavement marking material, shall exhibit a no-track condition in 15 minutes or less (ASTM D711). A Bird Applicator or any other doctor blade shall be used to produce a uniform film thickness.

- d. Drying Time (Field). When installed at a minimum wet film thickness of 20 ± 1 mils (500 or 625 μm) and reflectorized with glass spheres, the maximum drying times shall correspond to these temperatures:

80°F (27°C)	10 minutes
70°F (21°C)	10 minutes

60°F (16°C)	15 minutes
50°F (10°C)	25 minutes
40°F (4°C)	45 minutes
35°F (2°C)	60 minutes

The composition shall dry to “no-tracking” in approximately 10 minutes, and after thirty (30) minutes shall show no damaging effect from traffic. Dry to “no-tracking” shall be considered as the condition where no visual deposition of the epoxy marking to the pavement surface is observed when viewed from a distance of 100 feet (30 meters), after a passenger car is passed over the line. Regardless of the temperature at the time of installation, the installation contractor shall be responsible for protection of the markings material until dry to a non-tracking state.

e. Abrasion Resistance. The wear index of the composition shall not exceed 82 when tested in accordance with ASTM C501 using a CS-17 wheel and under a load of 1000 grams for 1000 cycles.

f. Tensile Strength. The tensile strength of the epoxy composition shall not be less than 6000 psi (41 MPa) when tested in accordance with ASTM D638 using a Type IV specimen [$0.125'' \pm 0.010''$ (3.18 ± 0.25 mm) thick]. Tests shall be conducted at an ambient temperature of $75 \pm 5^\circ\text{F}$ ($24 \pm 3^\circ\text{C}$). The testing machine shall operate at a speed of $0.20''$ (5.1 mm) per minute.

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing, shall not be less than 24 hours nor more than 96 hours.

Test specimens for tensile strength determination will be prepared as follows:

A 1/8 inch (3 mm) thick sheet of epoxy material is cast from a reservoir-type mold, fabricated from polytetrafluorethylene (PTFE), 1/8" deep x 10" x 10" (3 mm deep x 250 mm x 250 mm).

Prior to casting, the mold is sprayed with a suitable release agent. A sufficient amount of epoxy composition is mixed in the proper proportions (A:B) and poured level with the top of the mold. Care should be taken so as not to decrease or exceed the 1/8" (3 mm) thickness.

After a period of 1 to 4 hours, the material will have set into a semi-rigid sheet that is flexible enough to die-cut yet rigid enough to retain its shape. While the material is in this “plastic” state, five (5) specimens shall be die-cut and then placed on a flat, smooth, PTFE surface for the completion of the specified conditioning period.

g. Compressive Strength. The compressive strength of the epoxy composition shall not be less than 12,000 psi (83 MPa) when tested in accordance with ASTM D695 except that a compression tool shall not be necessary. The test specimen shall be a right cylinder [0.50 inch diameter by 1.0 inch length (12 mm diameter by 25 mm length)]. Tests shall be conducted at an ambient temperature of $75 \pm 5^\circ\text{F}$ ($24 \pm 3^\circ\text{C}$).

The total conditioning or drying period, from the time the epoxy composition is first mixed to the time of testing shall not be less than 24 hours nor more than 96 hours.

Test specimens for compressive strength determinations will be prepared as follows:

Five molds will be prepared from 1/2" (12 mm) I.D., 1/16" (1.5 mm) wall thickness acrylic tubing cut in 1 1/2" (38 mm) lengths. After spraying the inside of the mold with a suitable release agent,⁽¹⁾ the cylindrical tubes are placed in a vertical position on a PTFE sheet base. A sufficient amount of epoxy composition is thoroughly

mixed in the proper proportions (A:B) and poured into the mold to a depth of approximately 1 1/4" (32 mm). After a minimum of 72 hours curing, the specimens are removed from the molds and machined to a length of 1" \pm 0.002" (25 mm \pm 0.05 mm).

- h. Hardness. The epoxy composition when tested in accordance with ASTM D2240 shall have a Shore D hardness of between 75 and 100. Samples shall be allowed to dry for not less than 24 hours nor more than 96 hours prior to testing.

B. Reflective Glass Spheres/Beads

Reflective glass spheres for drop-on application shall conform to the following requirements:

The glass spheres shall be colorless; clean; transparent; free from milkiness or excessive air bubbles; and essentially clean from surface scarring or scratching. They shall be spherical in shape and at least 80% of the glass beads shall be true spheres when tested in accordance with ASTM D1155. At least 80% of the Type IV beads shall be true spheres as measured by the visual method.

The refractive index of the spheres shall be a minimum of 1.50 as determined by the liquid immersion method at 77°F (25°C).

The silica content of the glass spheres shall not be less than 60%.

The crushing resistance of the spheres shall be as follows: A 40 lb. (18 kg) dead weight, for

20 to 30 (850 μ m to 600 μ m) mesh spheres shall be the average resistance when tested in accordance with ASTM D1213.

The glass spheres shall have the following grading when tested in accordance with ASTM D1214.

M247 AASHTO Type 1 Glass Spheres

<u>U.S. Standard Sieve</u>	<u>% Retained</u>	<u>% Passing</u>
#20 (850 μ m)	0	100
#30 (600 μ m)	5-25	75-95
#50 (300 μ m)	40-65	15-35
#100 (150 μ m)	15-35	0-5
Pan	0-5	

Type 4 Large Spheres

<u>U.S. Standard Sieve</u>	<u>% Retained</u>	<u>% Passing</u>
#10 (2000 μ m)	0	100
#12 (1680 μ m)	0-5	95-100
#14 (1410 μ m)	5-20	80-95
#16 (1190 μ m)	40-80	10-40
#18 (1000 μ m)	10-40	0-5

#20 (850 μ m)
Pan

0-5
0-2

0-2

The AASHTO M247 Type 1 glass spheres shall be treated with a moisture-proof coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations. The moisture-resistance of the glass spheres shall be determined in accordance with AASHTO M247 test method 4.4.1.

Type IV glass spheres shall be treated with an adhesion coating. They shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for marking operations. The adhesion coating property of the Type IV beads shall be tested in accordance with the dansylchloride test.

E. Packaging and Shipment

Epoxy pavement marking materials shall be shipped to the job site in strong substantial containers. Individual containers shall be plainly marked with the following information:

- a. Name of Product
- b. Lot Number
- c. Batch Number
- d. Test Number
- e. Date of Manufacture
- f. Date of expiration of acceptance (12 months from date of manufacture)
- g. The statement (as appropriate)
Part A - Contains Pigment & Epoxy Resin
Part B - Contains Catalyst
- h. Quantity
- i. Mixing proportions, Application Temperature and Instructions
- j. Safety Information
- k. Manufacturer's Name and Address

Reflective glass spheres shall be shipped in moisture resistant bags. Each bag shall be marked with the name and address of the manufacturer and the name and net weight of the material.

F. The Department reserves the right to randomly take a one-quart sample of white, yellow and hardener, of the epoxy material or glass spheres without prior notice for testing to ensure the epoxy material meets specifications.

Epoxy Application Equipment:

Application equipment for the placement of epoxy reflectorized pavement markings shall be approved by the Department, prior to the start of work.

At any time throughout the duration of the project, the Contractor shall provide free access to his epoxy application equipment for inspection by the Architect or his authorized representative.

In general, the application equipment shall be a mobile, truck mounted and self contained pavement marking machine, specifically designed to apply epoxy resin materials and reflective glass spheres in continuous and skip-line patterns. The application equipment shall be maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. In addition, the truck mounted unit shall be provided with accessories to allow for the marking of legends, symbols, crosswalks, and other special patterns.

The Architect may approve the use of a portable applicator in lieu of truck mounted accessories, for use in applying special markings only, provided such equipment can demonstrate satisfactory application of reflectorized epoxy markings in accordance with these specifications.

The applicator shall be capable of installing up to 20,000 lineal feet (6,100 lineal meters) of epoxy reflectorized pavement markings in an 8-hour day and shall include the following features:

- 1 The applicator shall provide individual material reservoirs, or space, for the storage of Part A and Part B of the epoxy resin composition; for the storage of water; and for the storage of reflective glass spheres.
- 2 The applicator shall be equipped with heating equipment of sufficient capacity to maintain the individual epoxy resin components at the manufacturer's recommended temperature for spray application and for heating water to a temperature of approximately 140°F (60°C).
- 3 The glass spheres shall be gravity dropped upon 20 mils (500 um) of epoxy pavement markings to produce a wet-night-reflective pavement marking. The large spheres (Federal Spec. Type 4) shall be applied at a rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material. This application rate and the following gradation shall conform to FHWA's FP-96: Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (pages 757761 Type 3 and Type 4 Beads).
- 4 The applicator shall be equipped with metering devices or pressure gauges, on the proportioning pumps. Metering devices or pressure gauges shall be visible to the Architect.
- 5 The applicator shall be equipped with all the necessary spray equipment, mixers, compressors, and other appurtenances to allow for the placement of epoxy reflectorized pavement markings in a simultaneous sequence of operations as described below in Construction Details, D. Applications of Epoxy Reflectorized Pavement Markings of this Special Provisions.

Construction Details.

- A. General: All pavement marking and patterns shall be placed as shown on the Plans or as directed by the Architect.

Before any pavement markings work is begun, a schedule of operations shall be submitted for the approval of the Architect. This schedule shall be submitted 2 weeks prior to the application of the striping.

At least five (5) days prior to starting striping the Contractor shall provide the Architect with the epoxy manufacturer's written instructions for use. These instructions shall include but not be limited to: mixing ratios, application temperatures, and recommendations for use of water spray.

The application of pavement markings shall be done in the general direction of traffic. Striping

against the direction of traffic flow shall not be allowed.

The Contractor shall be responsible for removing, to the satisfaction of the Architect, tracking marks, spilled epoxy or epoxy markings applied in unauthorized areas.

The hot water spray shall not be used in conjunction with markings applications on any pavement surface, or on any existing durable type marking, unless specifically recommended by the manufacturer of the epoxy material.

- B. Atmospheric Conditions: Epoxy pavement markings shall only be applied during conditions of dry weather and on substantially dry pavement surfaces. At the time of installation the pavement surface temperature shall be a minimum of 35°F (2°C) and the ambient temperature shall be a minimum of 35°F (2°C) and rising. The Architect shall be the sole determiner as to when atmospheric conditions and pavement surface conditions are such to produce satisfactory results.

- C. Surface Preparations: The Contractor shall clean the pavement or existing durable marking to the satisfaction of the Architect.

Surface cleaning and preparation work shall be performed only in the area of the epoxy markings application.

At the time of application all pavement surfaces and existing durable markings shall be free of oil, dirt, dust, grease and similar foreign materials. The cost of cleaning these contaminants shall be included in the bid price of this item. Also, the item shall include the cost of removal of the curing component in the area of the epoxy markings application, if concrete curing compounds on new portland cement concrete surfaces have been used. Waterblasting will not be permitted for removal.

- D. Application of White/Yellow Epoxy Reflectorized Pavement Markings: White/yellow epoxy reflectorized pavement markings shall be placed at the widths and patterns designated on the Contract Plans.

Markings operations shall not begin until applicable surface preparation work is completed, and approved by the Architect.

White/yellow epoxy pavement markings shall be applied at a minimum uniform thickness of 20 mils (500 µm) on all Portland cement concrete and bituminous concrete pavement, including Stone Matrix Asphalt.

Large reflective glass spheres (Federal Spec. Type 4) shall be applied at the rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material, immediately followed by a second drop of AASHTO M-247 Type 1 glass spheres applied at a rate of 12 pounds per gallon (1.4 kg/L) of epoxy pavement marking material. Glass spheres shall uniformly cover the length and width of the pavement marking.

- F. Defective Epoxy Pavement Markings: Epoxy reflectorized pavement markings, which after application and curing are determined by the Architect to be defective and not in conformance with this specification, shall be repaired. Repair of defective markings shall be the responsibility of the Contractor and shall be performed to the satisfaction of the Architect as follows:

1. Insufficient film thickness [(less than 20±1 mils (500 µm) as applicable] and line widths; insufficient glass bead coverage or inadequate glass bead retention.

Repair Method: Prepare the surface of the defective epoxy marking by shot blasting, sand blasting, or water blasting. No other cleaning methods will be allowed. Surface preparation shall be performed to the extent that a substantial amount of the reflective glass spheres are removed and a roughened epoxy marking surface remains.

Immediately after surface preparation remove loose particles and foreign debris by brooming or blasting with compressed air.

Repair shall be made by re-striping over the cleaned surface, in accordance with the requirements of this specification and at a full 20 ± 1 mils ($500 \mu\text{m}$) minimum line thickness as applicable.

2. Uncured or discolored epoxy (brown patches); insufficient bond to pavement surface (or existing durable marking).

Uncured epoxy shall be defined as applied material that fails to cure (dry) in accordance with the requirements of this specification under MATERIALS, A, 2d. DRYING TIME (FIELD); or applied material that fails to cure (dry) within a reasonable time period under actual field conditions, as defined by the Architect.

Discoloration (brown patches) shall be defined as localized areas or patches of brown or grayish colored epoxy marking material. These areas often occur in a cyclic pattern and also, often are not visible until several days or weeks after markings are applied.

Repair Method: The defective epoxy marking shall be completely removed and cleaned to the underlying pavement surface to the satisfaction of the Architect.

The extent of removal shall be the defective area plus any adjacent epoxy pavement marking material extending one foot (300 mm) any direction.

After surface preparation work is complete, repair shall be made by re-applying epoxy over the cleaned pavement surface in accordance with the requirements of this specification.

3. Reflectivity for epoxy resin paint.

After satisfactory completion of all striping work and written notification from the Contractor, the Department shall test the striping to ensure it has the minimum reflectivity. The testing will be completed within 30 calendar days from notification. The Contractor may request that tests be conducted on completed phases or portions of the work. Approval of such a request will be at the discretion of the Architect. Testing will be done using a Delta LTL 2000 Retrometer (30 meter geometry). Five readings will be taken per line per mile (1.6 km). Projects less than 1 mile (1.6 km) in length will have a minimum of 5 readings per line. These readings will then be averaged for the overall project average. The required average minimum initial reflectivity reading in millicandellas shall be:

White 450
Yellow 325

Any single reading shall not be less than 350 millicandellas for white and 250 millicandellas for yellow. Without exception, any pavement markings installed that does not meet the above average minimum initial reflectivity numbers shall be removed and replaced, at the

installation contractor's expense.

Other defects not noted above, but determined by the Architect to need repair, shall be repaired or replaced as directed by and to the satisfaction of the Architect.

All work in conjunction with the repair or replacement of defective epoxy reflectorized pavement markings shall be performed by the Contractor at no additional cost to the State.

NOTE:

For information only:

The following manufacturers are known to us which manufacture Epoxy Resin Paint for Pavement Striping. The Department does not endorse or require the use of any of the manufacturers listed below. However, a bidder wishes to use another manufacturer's product, it shall be submitted for review and approval prior to submitting a bid proposal. Should the product be deemed unacceptable by the Department, the successful bidder will be required to use only an approved product.

1. POLY CARB, Inc.
33095 Bambridge Road
Solon, Ohio 44139
Tel. 1-800-CALLMIX
2. IPS - Ennis Paint
P.O. Box 13582
Research Triangle Park, North Carolina 27709
Tel. 1-877-477-7623
3. Epoplex
One Park Avenue
Maple Shade, NJ 08052
Tel. 1-800-822-6920
4. Or an approved equal.

NOT FOR BIDDING

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749687 – INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON SINGLE SIGN POST**Description:**

This work consists of installing or removing traffic sign(s) on a single post at the locations indicated on the Plans or as directed by the Architect. This specification also includes installation of posts in boring holes constructed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than or equal to 48 inches shall be installed on multiple sign posts under Item 749690 – Installation or Removal of Traffic Sign on Multiple Sign Posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the DelDOT MUTCD or as directed by the Architect. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. All signing materials removed from the project shall be returned to the DelDOT Sign Shop without any damage to the sign materials.

NOT FOR BIDDING

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749690 - INSTALLATION OR REMOVAL OF TRAFFIC SIGN ON MULTIPLE SIGN POSTS**Description:**

This work consists of installing or removing traffic sign(s) on multiple sign posts at the locations indicated on the Plans or as directed by the Architect. This specification also includes installation of posts in holes installed under other items.

A single sign totaling more than 9 square feet, or with any dimension, length or width, greater than 48 inches shall be mounted on two (2) posts. Signs with a length greater than or equal to 78 inches shall be mounted on three (3) sign posts.

Materials:

The Department will provide all sign materials to be used on this project. The Contractor shall contact the DelDOT Sign Shop Supervisor with project plans and quantity sheets at 302-760-2581. Sign fabrication orders require a minimum of four (4) weeks for completion. Orders placed with less than 4 weeks lead-time will result in a delay. Any delay caused by inadequate lead-time due to a late order will be the sole responsibility of the Contractor. The Contractor shall pick-up the sign materials from the DelDOT Sign Shop and deliver them to the job site without any damage to the sign materials.

Construction Methods:

The Contractor shall pick-up necessary signs, sign posts, hardware, and extensions from the Department and install the signs in the locations indicated on the Plans in accordance with the DelDOT MUTCD or as directed by the Architect. The Contractor shall be responsible for obtaining all necessary utility clearances before the signs may be installed. For sign removals, the sign posts shall have all nuts, bolts, and other connectors removed. The disturbed ground shall be graded and backfilled accordingly. All signing materials removed from the project shall be returned to the DelDOT Sign Shop without any damage to the sign materials.

NOT FOR BIDDING

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763500 - MAINTENANCE OF TRAFFIC**Description:**

This item shall consist of all work performed by the Contractor to maintain vehicular, bicycle and pedestrian traffic through the project's work zones, including, but not limited to, the passage through the area of persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA) Title II, paragraph 35.130. All work associated with this item shall be completed as shown on the Plans or as directed by the Architect.

All work shall be performed in a manner that will reasonably provide the least practicable obstruction to all road users, including vehicular traffic, bicycle traffic and pedestrian traffic. All temporary traffic control and temporary traffic control devices shall comply with the contract documents and with the latest edition of the manual titled "Delaware Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD)," hereafter referred to as the "Delaware MUTCD", including all revisions as of the date of the advertisement of this Contract.

This item shall include installing, maintaining and/or relocating the temporary traffic control devices depicted in the approved Temporary Traffic Control (TTC) Plan, standard Delaware MUTCD TTC Cases and as required by project phasing.

The safety measures outlined within this Contract and the Delaware MUTCD are not necessarily sufficient in every instance to guarantee the protection of the traveling public or the persons working on the project. Therefore, the provisions of this Contract do not relieve the Contractor of the sole responsibility for the safety of all persons working within or traveling through the work zone throughout the duration of the project. The Contractor shall implement any additional safety measures that are not expressly required by the Contract and are necessary to ensure the safety of all persons. The Contractor shall submit to the Architect justification for deviations from the TTC plan or additions to the TTC plan included in the contract documents. Final approval of the deviations or additions shall rest with the Architect.

The Department reserves the right to stop the Contractor's operations, if in the opinion of the Architect:

1. The Contractor's operations are not in compliance with the Delaware MUTCD, the specifications or the Plans.
2. The Contractor's operations are unsafe.

Construction Methods:

If the Contractor desires to deviate from the Temporary Traffic Control Plan (TTCP) provided in the Contract Documents or desires changes to the phasing or scope of the TTCP, the Contractor shall submit a new TTCP to the Architect for approval prior to the start of work at each and every location. The TTCP shall be prepared, signed and sealed by a Professional Architect registered in the State of Delaware and shall be prepared in accordance with all applicable DelDOT standards. The TTCP shall be submitted 14 calendar days in advance of starting work. Longitudinal dimensions for maintenance of traffic configurations may be adjusted slightly to fit field conditions as directed by the Architect.

When specified by a note in the project plans, the Contractor shall be required to have an American Traffic Safety Services Association (ATSSA) certified Traffic Control Supervisor on the project. The ATSSA certified Traffic Control Supervisor's sole responsibility shall be the maintenance of traffic throughout the project. This responsibility shall include, but is not limited to, the installation, operations, maintenance and service of temporary traffic control devices. Also required is the daily maintenance of a log to record maintenance of traffic activities, i.e. number and location of temporary traffic control devices; and times of installation, changes, and repairs to temporary traffic control devices. He/she shall also serve as the liaison with the Department concerning the Contractor's maintenance of traffic. The name and contact information for the ATSSA certified Traffic Control Supervisor shall be provided to the Architect at the Preconstruction Meeting. A copy of the certifications for the ATSSA certified Traffic Control Supervisors proposed for the project shall be submitted to the Department prior to award. The cost of the ATSSA certified Traffic Control Supervisor shall be incidental to this item.

The Department will not make payment to the Contractor for any and all temporary traffic control devices where the Contractor sets up temporary traffic control to perform work, but fails to perform any work. This does not include long-term temporary traffic control set-ups that are installed as part of the maintenance of traffic plans outlined in the contract documents.

Temporary traffic control devices shall be maintained in good condition in accordance with the brochure entitled "Quality Guidelines for Temporary Traffic Control Devices", published by the American Traffic Safety Services Association (ATSSA). Any temporary traffic control devices that do not meet the quality guidelines shall be removed and replaced with acceptable devices. Failure to comply will result in work stoppage with time charges continuing to be assessed.

Any existing signs that conflict with any temporary or permanent construction signs shall be covered as needed or as directed by the Architect. The Contractor shall stake out locations of permanent warning signs in the field and receive approval from the Architect for the location and method of mounting prior to ordering the signs. The Contractor, with the Architect, shall inventory all existing signs within the Contract limits. Signs that must remain in place during the project shall be maintained by the Contractor. Any other existing signs shall be removed and properly stored by the Contractor to prevent loss or damage. Immediately prior to the final inspection, the Contractor and the Architect shall again inventory the traffic signs and account for any lost or damaged signs. The Contractor shall replace or reimburse the Department for any lost or damaged signs.

Access to all businesses and residences within the Project limits shall be maintained throughout the duration of this Contract. Any temporary closure of a driveway or entrance for tie-in purposes shall be coordinated with the Architect and the property owner in advance of the closure.

Access to all transit stops located within the project limits shall be maintained unless otherwise directed by the Plans or the Architect. Maintaining access to the transit stop shall include maintaining an area for the transit vehicle to stop to pick-up and drop-off passengers and also an accessible path for pedestrians to safely access the transit stop.

The Contractor shall provide all property owners and residents who live adjacent to the work zone with written notice, 48 hours in advance of the start of construction work. This notification shall include the scope of work, working hours, anticipated start and completion dates, a summary of construction activities which may interfere with access to the property including a schedule and access coordination plan, Contractor's name and address, and a DelDOT contact phone number. Failure to give proper notice will result in a suspension of the work requiring notice, until proper notice is provided. The Contractor shall provide written verification to the Architect that the property owners and residents were

notified.

All roadway closures or lane closures beyond those specified and approved in the Contract Documents, shall be approved by the Chief Traffic Architect or Designee a minimum of 48 hours in advance of the proposed restriction.

The Contractor shall notify the Architect no less than fourteen (14) calendar days prior to the start of any detours and road closures and the Architect will then notify the following entities:

- Local post offices
- DelDOT's Transportation Management Center (TMC)
- Town Managers
- Local Police
- Local Fire Department and Emergency Medical Services
- DelDOT's Public Information Center
- Delaware Transit Corporations (DTC)

Immediately prior to the implementation of any lane or roadway closures, the Architect shall notify the DelDOT TMC at (302) 659-4600. Notifications shall also be given to the TMC when the closure is lifted. The Architect shall notify the TMC and the district Safety Officer if lane closures cannot be removed prior to the end of the allowable work hours.

The Contractor shall notify the local 911 center if access to a fire hydrant is temporarily restricted. The Contractor shall provide written confirmation to the Architect that the local 911 center was notified.

The Contractor shall conduct construction operations in a manner that will minimize delays to traffic, and shall meet the following requirements:

1. If work is being conducted within 200 feet in advance or up to 200 feet beyond an intersection that is controlled by a traffic signal, the Flagger shall direct the flow of traffic in concert with the traffic signal to avoid queuing unless active work prohibits such action. The Flagger shall direct traffic to prevent traffic from queuing through an intersection (i.e., blocking an intersection).
2. If work is being conducted within a signalized intersection or series of signalized intersections, the Architect shall notify the DelDOT TMC no less than 24 hours in advance of the operation. If work is being conducted within a signalized intersection, a Traffic Officer may direct traffic against the operation of the traffic signal only until the operation occurring within the intersection is completed. When the operation within the intersection is complete, the Architect shall notify the DelDOT TMC that the intersection is no longer impeded by construction activities.
3. Work in the vicinity of traffic signals shall be scheduled to minimize the time during which the signal is operated without detectors. Prior approval of the Architect shall be required for such work to be scheduled. The Contractor shall submit a schedule to the Architect for approval seven (7) days in advance of the proposed start date of this work. The DelDOT Transportation Management Center (TMC) requires 48 hours advance notice of the cutting of a loop detector, and immediate notification once the loop detector has been reinstalled. The Contractor shall coordinate with the Architect sufficiently in advance of loop detector work to ensure that these requirements are met.
4. When a lane adjacent to an open lane is closed to traffic, the temporary traffic control devices

shall be set 2' (0.61 m) into the closed lane from the edge of the open lane, unless an uncured patch exists or actual work is being performed closer to the open lane with minimum restriction to traffic.

5. Except for "buffer lanes" on high volume and/or high speed roadways, lanes shall not be closed unless construction activity requiring lane closure is taking place or will take place within one hour. Lanes shall be reopened immediately upon completion of the work. For moving operations the lane closure shall be shortened as work progresses and as traffic conditions warrant to keep the length of the closure to a minimum. The Contractor shall conduct construction operations in a manner so as to minimize disruption to traffic during peak hours and periods of heavy flow. The Department reserves the right to stop the Contractor's operations if, in the opinion of the Architect, such operations are impeding traffic unnecessarily.

It is required that all temporary traffic control work and related items shall either be performed entirely by the Contractor's own organization, or totally subcontracted. Maintenance of equipment shall not be subject to this requirement.

Any deficiencies related to temporary traffic control that are reported to the Contractor in writing shall be corrected within 24 hours or as directed by the Architect. Corrective actions on severe deficiencies shall be taken immediately unless otherwise directed by the Architect. Failure to comply will result in non-payment for those devices that are found to be deficient for the duration of the deficiency. Serious deficiencies that are not corrected immediately could result in possible suspension of work until items identified are brought back into compliance and/or the holding of the pay estimate until the serious deficiencies are corrected.

At the end of each workday, the Contractor shall correct all pavement edge drop-offs in accordance with Table 6G-1 in the Delaware MUTCD. This corrective work shall be accomplished with Temporary Road Material (TRM) unless an alternate method is specified in the Plans. All ruts and potholes shall be filled with TRM as soon as possible, but no later than by the end of each workday. Placement of TRM shall be completed in accordance with the applicable sections of the Delaware Standard Specifications and shall be incidental to the appropriate item in the Contract. If temporary elimination of a drop-off hazard cannot be accomplished, then the area shall be properly marked and protected with additional temporary barriers, barricades, warning signs, flashing lights, etc. as required by Section 6G.20 of the Delaware MUTCD.

If an open trench accessible by vehicular traffic cannot be backfilled prior to the end of the working day, steel plates may be used to protect the trench area. Shop drawings for the steel plates shall be submitted to the Architect for approval prior to starting construction. The Architect shall forward the shop drawings to the Bridge Design Section for review and approval. The shop drawing shall show the intended method to brace, sheet, support or shore the excavation and to prevent a trench failure while the walls of the trench are under the load of traffic. The plan should include details of the plating design, the method of fastening plates, plate thickness, span, bearing and the method of preventing the movement of the plates. This design shall be prepared and signed by a Professional Architect registered in the State of Delaware. Whenever steel plates are placed on a travel lane or shoulder, the associated temporary traffic control related to the use of steel plates shall follow the standards presented in Table 6G-1 of the Delaware MUTCD. The Contractor is required to provide a ramp (wedge) around the steel plate using bituminous temporary roadway material (TRM) placed at a slope of 20 to 1 or flatter. The cost for the wedge material shall be incidental to the item being constructed. If steel plates are used, the cost of furnishing and installing steel plates, bracing, sheeting, supporting or shoring the excavation and the preparation of shop drawings shall be incidental to the item being constructed. Steel plates are not

permitted between November 1 and April 1, without the prior approval of the Architect.

If pavement marking information is not provided in the Plans, the Contractor shall submit detailed drawings (including but not limited to, lane and shoulder widths, turn lane lengths, locations of stop bars, turn arrows, crosswalks and railroad crossings) that depict the existing pavement markings for each project location prior to beginning construction. These drawings will be reviewed by the Department's Traffic Section to determine if any changes to the final pavement markings are required.

Travel lane and ramp closings on multilane highways and Interstates shall not be permitted during the following holiday periods:

- December 24 through December 27 (Christmas Day)
- December 31 through January 3 (New Years Day)
- Friday prior to Easter through Easter Sunday
- Thursday prior to Memorial Day through the Tuesday following Memorial Day
- Dover International Speedway Race Weekends (Thursday prior to the race event through the day after the race event)
- July 3 through July 5 (Independence Day)
- Thursday prior to Labor Day through the Tuesday following Labor Day
- Wednesday prior to Thanksgiving Day through the Monday following Thanksgiving Day

Additional time restrictions may apply as noted in the project plans or as directed by the Architect. Any requests to waive any restrictions must be made in writing to the Architect for review and approval. A copy of the request shall be provided to the District Safety Officer for review.

Certification:

Temporary traffic control devices used on all highways open to the public in this State shall conform to the Delaware MUTCD. All devices shall be crashworthy in accordance with the National Cooperative Highway Research Program (NCHRP) Report 350, the memorandum issued August 28, 1998 by The USDOT Federal Highway Administration, and/or in accordance with the latest edition of the Manual for Assessing Safety Hardware (MASH), published by the American Association of State Highway and Transportation Officials (AASHTO).

The Contractor shall submit certification for temporary traffic control devices used specifically on this project at or prior to the pre-construction meeting.

Certification of compliance with NCHRP report 350 and/or MASH is required for the following categories of temporary traffic control devices:

Category I contains small and lightweight channelizing and delineating devices, which includes cones, tubular markers, flexible delineator posts and drums, all without any accessories or attachments.

Category II includes temporary traffic control devices that are not expected to produce significant vehicular velocity changes to impacting vehicles. These devices, which shall weigh 45 kg (100 lbs.) or less, include Type III barricades, portable sign supports with signs, and intrusion alarms. Also included are drums, cones, and vertical panels with accessories or attachments.

Category III includes temporary traffic control devices that are expected to cause significant vehicular velocity changes to impacting vehicles. These devices, which weigh more than 45 kg (100

lbs.), include temporary barrier, temporary impact attenuators, and truck-mounted attenuators.

Category IV includes portable or trailer-mounted devices such as arrow panels, variable message signs, temporary traffic signals and temporary area lighting. Note that certification compliance to NCHRP Report 350 or MASH criteria is not required for Category IV devices.

For Category I devices, the manufacturer or Contractor may self-certify that the devices meet the NCHRP-350 and/or MASH criteria. The Contractor shall supply the Federal Highway Administration's NCHRP-350 and/or MASH acceptance letter for each type of device that falls under Category II and III devices.

NOT FOR BIDDING

763501 - CONSTRUCTION ENGINEERING**Description:**

This work consists of construction lay out including; stakes, lines and grades as specified below. Subsection 105.10 Construction Stakes, Lines and Grades of the Standard Specifications is voided.

Based on contract plans and information provided by the Engineer, the Contractor shall stake out right-of-way and easements lines, limits of construction and wetlands, slopes, profile grades, drainage system, centerline or offset lines, benchmarks, structure working points and any additional points to complete the project.

The Engineer will only establish the following:

- (a) Original and final cross-sections for borrow pits.
- (b) Final cross-sections for all excavation items.
- (c) Line and grade for extra work added on to the project plans

Equipment:

The Contractor shall use adequate equipment/instruments in a good working order. He/she shall provide written certification that the equipment/instrument has been calibrated and is within manufacturer's tolerance. The certification shall be dated a maximum of 9 months before the start of construction. The Contractor shall renew the certification a minimum of every 9 months. The equipment/instrument shall have a minimum measuring accuracy of $[3\text{mm}+2\text{ppm}\times\text{D}]$ and an angle accuracy of up to 2.0 arc seconds or 0.6 milligons. If the Contractor chooses to use GPS technology in construction stakeout, the Contractor shall provide the Engineer with a GPS rover for the duration of the contract. The GPS rover shall be in good working condition and of similar make and model used by the Contractor. The Contractor shall provide up to 8 hours of formal training on the Contractor's GPS system to a maximum of four Engineer's appointees. At the end of the contract, the Engineer will return the GPS rover to the Contractor. If any of the equipment/instruments are found to be out of adjustment or inadequate to perform its function, such instrument or equipment shall be immediately replaced by the Contractor to the satisfaction of the Engineer.

Engineering/Survey Staff:

The Contractor shall provide and have available for the project an adequate engineering staff that is competent and experienced to set lines and grades needed to construct the project. The engineering personnel required to perform the work outlined herein shall have experience and ability compatible with the magnitude and scope of the project. Additionally, the Contractor shall employ an engineer or surveyor licensed in the State of Delaware to be responsible for the quality and accuracy of the work done by the engineering staff. When individuals or firms other than the Contractor perform any professional services under this item, that work shall not be subject to the subcontracting requirements of Subsection 108.01 of the Standard Specifications. The Contractor shall assume full responsibility for any errors and/or omissions in the work of the engineering staff described herein. If construction errors are caused due to erroneous work done under Construction Engineering the Contractor accepts full responsibility, no matter when the error is discovered. Consideration will not be given for any extension of contract time or additional compensation due to delays, corrective work, or additional work that may result from faulty

and erroneous construction stakeout, surveying, and engineering required by this specification.

Construction Methods:

Performance Requirements:

- (a) Construction Engineering shall include establishing the survey points and survey centerlines; finding, referencing, offsetting the project control points; running a horizontal and vertical circuit to check the accuracy of given control points. Establishing plan coordinates and elevations marks for culverts, slopes, subbase, subsurface drains, paving, subgrade, retaining walls, and any other stakes required for control lines and grades; and setting vertical control elevations, such as footings, caps, bridge seats and deck screed. The Contractor shall be responsible for the preservation of the Department's project control points and benchmarks. The Contractor shall establish and preserve any temporary control points (traverse points or benchmarks) needed for construction. Any project control points (traverse points) or benchmarks conflicting with construction of the project shall be relocated by the Contractor. The Contractor as directed by the Engineer must replace any or all stakes that are destroyed at any time during the life of the contract. The Contractor shall re-establish centerline points and stationing prior to final cross-sections by the Engineer. The Vertical Control error of closure shall not exceed 0.05 ft times [Square root of number of miles in the level run] (0.01 m times [square root of number of kilometers]). The Horizontal Control accuracy ratio shall not exceed an error of closure of 1 foot per 20,000 feet (1 meter per 20,000 meters or 1:20,000) of distance traversed prior to adjustment.
- (b) The Contractor shall perform construction centerline layout of all roadways, ramps and connections, etc. from project control points set by the Engineer. The Contractor using the profiles and typical sections provided in the plans shall calculate proposed grades at the edge of pavement or verify information shown on Grades and Geometric sheets.
- (c) The Contractor shall advise the Engineer of any horizontal or vertical alignment revisions needed to establish smooth transitions to existing facilities. The Contractor shall immediately bring to the attention of the Engineer any potential drainage problem within the project limits. The Engineer must approve any proposed variation in profile, width or cross slope.
- (d) The Contractor shall establish the working points, centerlines of bearings on bridge abutments and on piers, mark the location of anchor bolts to be installed, check the elevation of bearing surfaces after they are ground and set anchor bolts at their exact elevation and alignment as per Contract Plans. Before completion of the fabrication of beams for bridge superstructures, the Contractor shall verify by accurate field measurements the locations both vertically and horizontally of all bearings and shall assume full responsibility for fabricated beams fitting and bearing as constructed. After beam erection and concurrently with the Department project surveyors, the Contractor shall survey top of beam elevations at a maximum of 10-ft (3.0-meter) stations and compute screed grades. These shall be submitted to the Engineer for review and approval before the stay in place forms are set. Construction stakes and other reference control marks shall be set at sufficiently frequent intervals to assure that all components of the structure are constructed in accordance with the lines and grades shown on the plans. The Contractor will be responsible for all structure alignment control, grade control and all necessary calculations to establish and set these controls.

- (e) The Contractor, using contract plans, shall investigate proposed construction for possible conflicts with existing and proposed utilities. The Contractor shall then report such conflicts to the Engineer for resolution. All stakes for advanced utility relocation, which will be performed by others, shall be paid for under item 763597 – Utility Construction Engineering.
- (f) The Contractor shall be responsible for the staking of all sidewalk and curb ramp grades in accordance with the plans and the Departments Standard Construction Details. The Contractor shall review the stakeout with the Engineer prior to construction. The Engineer must approve any deviation from plans, Department Standard Construction Details and Specifications in writing. The Contractor shall be responsible for any corrective actions resulting from problems created by adjustments if they fail to obtain such approval.
- (g) If wetland areas are involved and specifically defined on the Plans the following shall apply:
 - i. It is the intent of these provisions to alert the Contractor, that he/she shall not damage or destroy wetland areas, which exist beyond the construction limits. These provisions will be strictly enforced and the Contractor shall advise his/her personnel and those of any Subcontractor of the importance of these provisions.
 - ii. All clearing operations and delineation of wetlands areas shall be performed in accordance with these Special Provisions. Before any clearing operation commences the Contractor shall demarcate wetlands at the Limits of Construction throughout the entire project as shown on the Plans labeled as Limits of Construction or Wetland Delineation to the satisfaction of the Engineer.
 - iii. The material to be used for flagging the limits of construction shall be orange vinyl material with the wording "Wetland Boundary" printed thereon. In wooded areas, the flagging shall be tied on the trees, at approximate 20-foot (6.1 meter) intervals through wetland areas. In open field and yard areas that have been identified as wetlands, 3 foot (one meter) wooden grade stakes shall be driven into the ground at approximate 20 foot (6.1 meter) intervals and tied with the flagging.
 - iv. If the flagging has been destroyed and the Engineer determines that its use is still required, the Contractor shall reflag the area at no cost to the Department. If the Contractor, after notification by the Engineer that replacement flagging is needed, does not replace the destroyed flagging within 48 hours, the Engineer may proceed to have the area reflagged. The cost of the reflagging by the Engineer will be charged to the Contractor and deducted from any monies due under the Contract.
 - v. At the completion of construction, the Contractor shall remove all stakes and flagging.
 - vi. The Contractor shall be responsible for any damages to wetlands located beyond the construction limits, which occurs from his/her operations during the life of the Contract. The Contractor shall restore all temporarily disturbed wetland areas to their preconstruction conditions. This includes restoring bank elevations,

streambed and wetland surface contours and wetlands vegetation disturbed or destroyed. The expense for this restoration shall be borne solely by the Contractor.

Submittals:

All computations necessary to establish the exact position of all work from the control points shall be made and preserved by the Contractor. All computations, survey notes and other records necessary to accomplish the work shall be made available to the Department in a neat and organized manner at anytime as directed by the Engineer. The Engineer may check all or any portion of the stakeout survey work or notes made by the Contractor and any necessary correction to the work shall be made as soon as possible. The Contractor shall furnish the Engineer with such assistance as may be required for checking all lines, grades, and measurements established by the Contractor and necessary for the execution of the work. Such checking by the Engineer shall not relieve the Contractor of his/her responsibility for the accuracy or completeness of the work.

The Contractor shall submit any of the following at the Engineer's request:

- (a) Proposed method of recording information in field books to ensure clarity and adequacy.
- (b) A printout of horizontal control verification, as well as coordinates, differences and error of closure for all reestablished or temporary Control Points.
- (c) A printout of vertical control verification, with benchmark location elevation and differences from plan elevation.
- (d) Sketch of location of newly referenced horizontal control, with text printout of coordinates, method of reference and field notes associated with referencing control.
- (e) Description of newly established benchmarks with location, elevation and closed loop survey field notes.
- (f) All updated electronic and manuscript survey records.
- (g) Stakeout plan for each structure and culvert.
- (h) Computations for buildups over beams, screed grades and overhang form elevations.
- (i) A report showing differences between supplied baseline coordinates and field obtained coordinates, including a list of preliminary input data.
- (j) Any proposed plan alteration to rectify a construction stakeout error, including design calculations, narrative and sealed drawings.
- (k) Baseline for each borrow pit location.
- (l) Detailed sketch of proposed overhead ground mounted signs or signals showing obstructions that may interfere with their installation.
- (m) Copies of cut sheets.