

STATE OF DELAWARE  
DEPARTMENT OF NATURAL RESOURCES  
AND ENVIRONMENTAL CONTROL (DNREC)  
DIVISION OF FISH AND WILDLIFE

CONTRACT #NAT-201702/TED.HARVEY

SPECIFICATIONS  
FOR

TED HARVEY CONSERVATION AREA  
LEVEE REHABILITATION PROJECT

IN

DOVER, DE

PREPARED  
BY

MOFFATT & NICHOL

ISSUED FOR BID  
December 27, 2017



BIDS WILL BE RECEIVED AT THE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL **UNTIL 2:00 P.M. February 2, 2018** AND WILL BE PUBLICLY OPENED AND READ ALOUD AT THAT TIME. PROPOSALS RECEIVED AFTER THAT DATE AND TIME SET FOR THE OPENING WILL BE RETURNED UNOPENED.

**TABLE OF CONTENTS**

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

B. DOCUMENTS BOUND HEREWITH

DIVISION 00 – PROCUREMENT AND CONTRACT REQUIREMENTS

INTRODUCTORY INFORMATION

00 01 01 – PROJECT TITLE PAGE	1 page
00 01 10 – TABLE OF CONTENTS	1 page
00 01 15 – LIST OF DRAWING SHEETS	1 page

PROCUREMENT REQUIREMENTS

00 11 16 – INVITATION TO BID	1 page
00 21 13 – INSTRUCTIONS TO BIDDERS	12 pages
00 41 13 – BID FORM	5 pages
00 43 13 – BID BOND	1 page

CONTRACTING REQUIREMENTS

00 52 13 – DNREC CONTRACT BETWEEN OWNER AND CONTRACTOR	3 pages
00 61 13.13 – PERFORMANCE BOND	2 pages
00 61 13.16 – PAYMENT BOND	2 pages
00 73 46 – PREVAILING WAGE RATE REQUIREMENTS	1 page
00 81 13 – GENERAL REQUIREMENTS	14 pages
00 81 14 – DRUG TESTING FORMS	2 pages

DIVISION 31 – EARTHWORK

31 00 00 – EARTHWORK	17 pages
31 05 19 – GEOTEXTILE	4 pages

APPENDIX 1 PAYROLL REPORT SAMPLE	1 page
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APPENDIX 2 GEOTECHNICAL REPORT	3 pages
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END OF SECTION

**LIST OF DRAWING SHEETS**

G-001	Title Sheet with Vicinity and Location Maps
G-002	Index of Drawings, Legend, Abbreviations and General Notes
G-101	Plan – General Arrangement and Site Access
C-101	Plan – Dike Repair – Sheet 1 of 7
C-102	Plan – Dike Repair – Sheet 2 of 7
C-103	Plan – Dike Repair – Sheet 3 of 7
C-104	Plan – Dike Repair – Sheet 4 of 7
C-105	Plan – Dike Repair – Sheet 5 of 7
C-106	Plan – Dike Repair – Sheet 6 of 7
C-107	Plan – Dike Repair – Sheet 7 of 7
C-301	Sections – Typical Dike
C-302	Dike Cross Sections Sheet 1 of 7
C-303	Dike Cross Sections Sheet 2 of 7
C-304	Dike Cross Sections Sheet 3 of 7
C-305	Dike Cross Sections Sheet 4 of 7
C-306	Dike Cross Sections Sheet 5 of 7
C-307	Dike Cross Sections Sheet 6 of 7
C-308	Dike Cross Sections Sheet 7 of 7

**INVITATION TO BID**

Sealed bids for OMB/DFM Contract No. NAT-201702/TED.HARVEY, will be received by the State of Delaware, Department of Natural Resources and Environmental Control, Division of Fish and Wildlife, at Room B172, Richardson & Robbins Building, 89 Kings Highway, Dover, Delaware 19901, until 2:00 pm local time on February 2, 2018, at which time they will be publicly opened and read aloud in the DNREC Public Auditorium. Bidder bears the risk of late delivery. Any bids received after the stated time will be returned unopened.

Project involves includes performing earthwork to raise the elevation of the existing levee at the Ted Harvey Conservation Area.

A **MANDATORY** Pre-Bid Meeting will be held at 10AM on January 5, 2018, at the Little Creek Wildlife Management Area (WMA), 3010 Bayside Drive followed by a visit to the project's site for the purpose of establishing the listing of subcontractors and to answer questions. Representatives of each party to any Joint Venture must attend this meeting. **ATTENDANCE OF THIS MEETING IS A PREREQUISITE FOR BIDDING ON THIS CONTRACT.**

Sealed bids shall be addressed to the Department of Natural Resources and Environmental Control, Division of Fish & Wildlife, 89 Kings Highway, Dover, DE 19901, attn.: Mr. Jeremy Ashe. The outer envelope should clearly indicate: "**CONTRACT NO. NAT-201702/TED.HARVEY - SEALED BID - DO NOT OPEN.**"

Contract documents may be printed from [www.bids.delaware.gov](http://www.bids.delaware.gov)

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

**END OF ADVERTISEMENT FOR BIDS**

## **INSTRUCTIONS TO BIDDERS**

### **TABLE OF ARTICLES**

1. DEFINITIONS
2. BIDDER'S REPRESENTATION
3. BIDDING DOCUMENTS
4. BIDDING PROCEDURES
5. CONSIDERATION OF BIDS
6. POST-BID INFORMATION
7. PERFORMANCE BOND AND PAYMENT BOND
8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

**ARTICLE 1: GENERAL****1.1 DEFINITIONS**

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

1.2 STATE: The State of Delaware.

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

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

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

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

1.7 AGREEMENT: The Agreement shall be the DNREC Contract Document contained in these specifications.

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

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

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

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

1.12 SUB-BIDDER: A person or entity who submits a Bid to a Bidder for materials or labor, or both for a portion of the Work.

1.13 BID: A complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

- 1.14 BASE BID: The sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids (if any are required to be stated in the bid).
- 1.15 ALTERNATE BID (or ALTERNATE): An amount stated in the Bid, where applicable, to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents is accepted.
- 1.16 UNIT PRICE: An amount stated in the Bid, where applicable, as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.
- 1.17 SURETY: The corporate body which is bound with and for the Contract, or which is liable, and which engages to be responsible for the Contractor's payments of all debts pertaining to and for his acceptable performance of the Work for which he has contracted.
- 1.18 BIDDER'S DEPOSIT: The security designated in the Bid to be furnished by the Bidder as a guaranty of good faith to enter into a contract with the Agency if the Work to be performed or the material or equipment to be furnished is awarded to him.
- 1.19 CONTRACT: The written agreement covering the furnishing and delivery of material or work to be performed.
- 1.20 CONTRACTOR: Any individual, firm, or corporation with whom a contract is made by the Agency.
- 1.21 SUBCONTRACTOR: An individual, partnership, or corporation which has a direct contract with a contractor to furnish labor and materials at the job site, or to perform construction labor and furnish material in connection with such labor at the job site.
- 1.22 CONTRACT BOND: The approved form of security furnished by the contractor and his surety as a guaranty of good faith on the part of the contractor to execute the work in accordance with the terms of the contract.

## **ARTICLE 2: BIDDER'S REPRESENTATIONS**

- 2.1 PRE-BID MEETING
- 2.1.1 A pre-bid meeting for this project will be held at the time and place designated. Attendance at this meeting is a pre-requisite for submitting a Bid, unless this requirement is specifically waived elsewhere in the Bid Documents.
- 2.2 By submitting a Bid, the Bidder represents that:
- 2.2.1 The Bidder has read and understands the Bidding Documents and that the Bid is made in accordance therewith.
- 2.2.2 The Bidder has visited the site, become familiar with existing conditions under which the Work is to be performed, and has correlated the Bidder's his personal observations with the requirements of the proposed Contract Documents.
- 2.2.3 The Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception.

**2.3 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 copy of a valid Delaware Business License with their Bid.
- 2.3.6 Both Joint Venturers shall include their Federal E.I. Number with the Bid.
- 2.3.7 In the event of a mandatory Pre-bid Meeting, each Joint Venturer shall have a representative in attendance.
- 2.3.8 Due to exceptional circumstances and for good cause shown, one or more of these provisions may be waived at the discretion of the State.

**2.4 ASSIGNMENT OF ANTITRUST CLAIMS**

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

**ARTICLE 3: BIDDING DOCUMENTS****3.1 COPIES OF BID DOCUMENTS**

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

**3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS**

- 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local



conditions, and shall report any errors, inconsistencies, or ambiguities discovered to the Architect.

3.2.2 Bidders or Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request to the Architect at least seven days prior to the date for receipt of Bids. Interpretations, corrections, and changes to the Bidding Documents will be made by written Addendum. Interpretations, corrections, or changes to the Bidding Documents made in any other manner shall not be binding.

3.2.3 The apparent silence of the specifications as to any detail, or the apparent omission from it of detailed description concerning any point, shall be regarded as meaning that only the best commercial practice is to prevail and only material and workmanship of the first quality are to be used. Proof of specification compliance will be the responsibility of the Bidder.

3.2.4 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all permits, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.

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

### 3.3 SUBSTITUTIONS

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

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

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

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

### 3.4 ADDENDA

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

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

3.4.3 No Addenda will be issued later than 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 an issued Addenda could be grounds for determining a bid to be non-responsive.

#### **ARTICLE 4: BIDDING PROCEDURES**

##### **4.1 PREPARATION OF BIDS**

- 4.1.1 Submit the bids on the Bid Forms included with the Bidding Documents.
- 4.1.2 Submit the original Bid Form for each bid. Bid Forms may be removed from the project manual for this purpose.
- 4.1.3 Execute all blanks on the Bid Form in a non-erasable medium (typewriter or manually in ink).
- 4.1.4 Where so indicated by the makeup on the Bid Form, express sums in both words and figures, in case of discrepancy between the two, the written amount shall govern.
- 4.1.5 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.
- 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 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.
- 4.1.11 Each bidder shall include in their bid a copy of a valid Delaware Business License.'
- 4.1.12 Each bidder shall include signed Affidavit(s) for the Bidder and each listed Subcontractor certifying compliance with OMB Regulation 4104- "Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on "Large Public Works Projects." "Large Public Works" is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.
- 4.2 BID SECURITY
- 4.2.1 All bids shall be accompanied by a deposit of either a good and sufficient bond to the agency for the benefit of the agency, with corporate surety authorized to do business in this State, the form of the bond and the surety to be approved by the agency, or a security of the

bidder assigned to the agency, for a sum equal to at least 10% of the bid plus all add alternates, or in lieu of the bid bond a security deposit in the form of a certified check, bank treasurer's check, cashier's check, money order, or other prior approved secured deposit assigned to the State. The bid bond need not be for a specific sum, but may be stated to be for a sum equal to 10% of the bid plus all add alternates to which it relates and not to exceed a certain stated sum, if said sum is equal to at least 10% of the bid. The Bid Bond form used shall be the standard OMB form (attached).

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. 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:

- A. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, sex, color, sexual orientation, gender identity or national origin. The Contractor will take affirmative action to ensure the applicants are employed, and that employees are treated during employment, without regard to their race, creed, sex, color, sexual orientation, gender identity or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting agency setting forth this nondiscrimination clause.
- B. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, sex, color, sexual orientation, gender identity or national origin."

#### 4.5 PREVAILING WAGE REQUIREMENT

4.5.1 Wage Provisions: For renovation and new construction projects whose costs exceed the thresholds contained in Delaware Code, Title 29, Section 6960, the minimum wage rates for

various classes of laborers and mechanics shall be as determined by the Department of Labor, Division of Industrial Affairs of the State of Delaware.

4.5.2 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.

4.5.3 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.

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

#### 4.6 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, project number, 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 day of the Bid opening.

**5.2 COMPARISON OF BIDS**

5.2.1 After the Bids have been opened and read, the bid prices will be compared and the result of such comparisons will be made available to the public. Comparisons of the Bids may be based on the Base Bid plus desired Alternates. The Agency shall have the right to accept Alternates in any order or combination.

5.2.2 The Agency reserves the right to waive technicalities, to reject any or all Bids, or any portion thereof, to advertise for new Bids, to proceed to do the Work otherwise, or to abandon the Work, if in the judgment of the Agency or its agent(s), it is in the best interest of the State.

5.2.3 An increase or decrease in the quantity for any item is not sufficient grounds for an increase or decrease in the Unit Price.

5.2.4 The prices quoted are to be those for which the material will be furnished F.O.B. Job Site and include all charges that may be imposed during the period of the Contract.

5.2.5 No qualifying letter or statements in or attached to the Bid, or separate discounts will be considered in determining the low Bid except as may be otherwise herein noted. Cash or separate discounts should be computed and incorporated into Unit Bid Price(s).

**5.3 DISQUALIFICATION OF BIDDERS**

5.3.1 An agency shall determine that each Bidder on any Public Works Contract is responsible before awarding the Contract. Factors to be considered in determining the responsibility of a Bidder include:

- A. The Bidder's financial, physical, personnel or other resources including Subcontracts;
- B. The Bidder's record of performance on past public or private construction projects, including, but not limited to, defaults and/or final adjudication or admission of violations of the Prevailing Wage Laws in Delaware or any other state;
- C. The Bidder's written safety plan;
- D. Whether the Bidder is qualified legally to contract with the State;
- E. Whether the Bidder supplied all necessary information concerning its responsibility; and,

- F. Any other specific criteria for a particular procurement, which an agency may establish; provided however, that, the criteria be set forth in the Invitation to Bid and is otherwise in conformity with State and/or Federal law.

- 5.3.2 If an agency determines that a Bidder is nonresponsive and/or nonresponsible, the determination shall be in writing and set forth the basis for the determination. A copy of the determination shall be sent to the affected Bidder within five (5) working days of said determination.
- 5.3.3 In addition, any one or more of the following causes may be considered as sufficient for the disqualification of a Bidder and the rejection of their Bid or Bids.
- 5.3.3.1 More than one Bid for the same Contract from an individual, firm or corporation under the same or different names.
- 5.3.3.2 Evidence of collusion among Bidders.
- 5.3.3.3 Unsatisfactory performance record as evidenced by past experience.
- 5.3.3.4 If the Unit Prices are obviously unbalanced either in excess or below reasonable cost analysis values.
- 5.3.3.5 If there are any unauthorized additions, interlineation, conditional, or alternate bids or irregularities of any kind which may tend to make the Bid incomplete, indefinite, or ambiguous as to its meaning.
- 5.3.3.6 If the Bid is not accompanied by the required Bid Security and other data required by the Bidding Documents.
- 5.3.3.7 If any exceptions or qualifications of the Bid are noted on the Bid Form.
- 5.4 ACCEPTANCE OF BID AND AWARD OF CONTRACT
- 5.4.1 A formal Contract shall be executed with the successful Bidder within twenty (20) calendar days after the award of the Contract.
- 5.4.2 Per Section 6962(d)(13) a., Title 29, Delaware Code, "The contracting agency shall award any public works contract within thirty (30) days of the bid opening to the lowest responsive and responsible Bidder, unless the Agency elects to award on the basis of best value, in which case the election to award on the basis of best value shall be stated in the Invitation To Bid."
- 5.4.3 Each Bid on any Public Works Contract must be deemed responsive by the Agency to be considered for award. A responsive Bid shall conform in all material respects to the requirements and criteria set forth in the Contract Documents and specifications.
- 5.4.4 The Agency shall have the right to accept Alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid, plus accepted Alternates.
- 5.4.5 The successful Bidder shall execute a formal contract, submit the required Insurance Certificate, and furnish good and sufficient bonds, unless specifically waived in the General Requirements, in accordance with the General Requirement, within twenty (20) days of official notice of contract award. The successful Bidder shall provide two business days prior to contract execution, copies of the Employee Drug Testing Program for the Bidder and all listed Subcontractors. Bonds shall be for the benefit of the Agency with surety in the amount of 100% of the total contract award. Said Bonds shall be conditioned upon the faithful performance of the contract. Bonds shall remain in affect for period of one year after the date of substantial completion.

- 5.4.6 If the successful Bidder fails to execute the required Contract, Bond and all required information, as aforesaid, within twenty (20) calendar days after the date of official Notice of the Award of the Contract, their Bid guaranty shall immediately be taken and become the property of the State for the benefit of the Agency as liquidated damages, and not as a forfeiture or as a penalty. Award will then be made to the next lowest qualified Bidder of the Work or readvertised, as the Agency may decide.
- 5.4.7 Each bidder shall supply with its bid its taxpayer identification number (i.e., federal employer identification number or social security number) and a copy of its Delaware business license, and should the vendor be awarded a contract, such vendor shall provide to the agency the taxpayer identification license numbers of such subcontractors. Such numbers shall be provided on the later of the date on which such subcontractor is required to be identified or the time the contract is executed. The successful Bidder shall provide to the agency to which it is contracting, within 30 days of entering into such public works contract, copies of all Delaware Business licenses of subcontractors and/or independent contractors that will perform work for such public works contract. However, if a subcontractor or independent contractor is hired or contracted more than 20 days after the Bidder entered the public works contract the Delaware Business license of such subcontractor or independent contractor shall be provided to the agency within 10 days of being contracted or hired.
- 5.4.8 The Bid Security shall be returned to the successful Bidder upon the execution of the formal contract. The Bid Securities of unsuccessful bidders shall be returned within thirty (30) calendar days after the opening of the Bids.

**ARTICLE 6: POST-BID INFORMATION**

- 6.1 CONTRACTOR'S QUALIFICATION STATEMENT
- 6.1.1 Bidders to whom award of a Contract is under consideration shall, if requested by the Agency, submit a properly executed 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 provide in the Contract Documents.
- 7.1.3 The Performance and Payment Bond forms used shall be the standard OMB forms (attached).
- 7.2 TIME OF DELIVERY AND FORM OF BONDS
- 7.2.1 The bonds shall be dated on or after the date of the Contract.

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

**ARTICLE 8: FORM OF AGREEMENT BETWEEN AGENCY AND CONTRACTOR**

- 8.1 The Agreement for the Work will be DNREC Contract Document contained in these specifications.

END OF INSTRUCTIONS TO BIDDERS



# BID FORM

**To: DEPARTMENT OF NATURAL RESOURCES AND  
ENVIRONMENTAL CONTROL (DNREC)  
DIVISION OF FISH AND WILDLIFE  
89 KINGS HIGHWAY  
DOVER, DE 19901**

TED HARVEY CONSERVATION AREA  
DOVER, DE  
CONTRACT NO. NAT-201702/TED.HARVEY

**BID FORM**

**BASE BID QUANTITIES**

Bid quantities to be used for the lump sum base bid above are as follows:

BID ITEM No. 1 – Mobilization / Demobilization (1 Lump Sum)

BID ITEM No. 2 – Offsite Select Borrow for Levee Raising (30,000 Dry Tons)

BID ITEM No. 3 – Geotextile (2,500 Square Yards)

TED HARVEY CONSERVATION AREA  
DOVER, DE  
CONTRACT NO. NAT-201702/TED.HARVEY

**BID FORM**

**UNIT PRICES**

Unit prices conform to applicable project specification section. Refer to the specifications for a complete description of the following Unit Prices:

BASE BID

**ADD**

**DEDUCT**

UNIT PRICE BID ITEM No. 2: Offsite Select Borrow for Levee Raising per Dry Ton:\$ \_\_\_\_\_\$ \_\_\_\_\_

UNIT PRICE BID ITEM No. 3: Geotextile per Square Yard: \$ \_\_\_\_\_\$ \_\_\_\_\_

TED HARVEY CONSERVATION AREA  
DOVER, DE  
CONTRACT NO. NAT-201702/TED.HARVEY

**BID FORM**

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

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

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

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

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

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

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

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

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

\_\_\_\_\_  
(State of Corporation)

Business Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Witness:** \_\_\_\_\_ **By:** \_\_\_\_\_

(SEAL)

(Authorized Signature)

\_\_\_\_\_  
(Title)

**Date:** \_\_\_\_\_

**ATTACHMENTS**

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

TED HARVEY CONSERVATION AREA  
DOVER, DE  
CONTRACT NO. NAT-201702/TED.HARVEY

**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 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 Department of Natural Resources and Environmental Control, Division of Fish and Wildlife, **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.** This form must be filled out completely with no additions or deletions. **Note that all subcontractors listed below must have a signed Affidavit of Employee Drug Testing Program included with this bid.**

<u>Subcontractor Category</u>	<u>Subcontractor</u>	<u>Address (City &amp; State)</u>	<u>Subcontractors tax payer ID # or Delaware Business license #</u>
1. Earthwork	_____	_____	_____
2. Surveying	_____	_____	_____
3. Geotechnical Testing	_____	_____	_____

TED HARVEY CONSERVATION AREA  
DOVER, DE  
CONTRACT NO. NAT-201702/TED.HARVEY

**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 Department of Natural Resources and Environmental Control, Division of Fish and Wildlife.

All the terms and conditions of Contract No. NAT-201702/TED.HARVEY have been thoroughly examined and are understood.

**NAME OF BIDDER:** \_\_\_\_\_

**AUTHORIZED REPRESENTATIVE  
(TYPED):** \_\_\_\_\_

**AUTHORIZED REPRESENTATIVE  
(SIGNATURE):** \_\_\_\_\_

**TITLE:** \_\_\_\_\_

**ADDRESS OF BIDDER:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**E-MAIL:** \_\_\_\_\_

**PHONE NUMBER:** \_\_\_\_\_

Sworn to and Subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_.

My Commission expires \_\_\_\_\_. NOTARY PUBLIC \_\_\_\_\_.

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

TED HARVEY CONSERVATION AREA  
DOVER, DE  
CONTRACT NO. NAT-201702/TED.HARVEY

**AFFIDAVIT  
OF  
EMPLOYEE DRUG TESTING PROGRAM**

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

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

**Contractor/Subcontractor Name:** \_\_\_\_\_

**Contractor/Subcontractor Address:** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**Authorized Representative (typed or printed):** \_\_\_\_\_

**Authorized Representative (signature):** \_\_\_\_\_

**Title:** \_\_\_\_\_

Sworn to and Subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_.

My Commission expires \_\_\_\_\_. NOTARY PUBLIC \_\_\_\_\_.

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

STATE OF DELAWARE  
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL (DNREC)  
DIVISION OF FISH AND WILDLIFE

**BID BOND**

TO ACCOMPANY PROPOSAL  
(Not necessary if security is used)

KNOW ALL MEN BY THESE PRESENTS That: \_\_\_\_\_  
\_\_\_\_\_ of \_\_\_\_\_ in the County of \_\_\_\_\_  
\_\_\_\_\_ and State of \_\_\_\_\_ as **Principal**, and \_\_\_\_\_  
\_\_\_\_\_ of \_\_\_\_\_ in the County of \_\_\_\_\_  
and State of \_\_\_\_\_ as **Surety**, legally authorized to do business in the State of Delaware  
("State"), are held and firmly unto the **State** in the sum of \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_), or \_\_\_\_\_ percent not to exceed \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_)  
of amount of bid on Contract No. NAT-201702/TED.HARVEY, to be paid to the **State** for the use and  
benefit of **Department of Natural Resources and Environmental Control, Division of Fish and Wildlife**  
for which payment well and truly to be made, we do bind ourselves, our and each of our heirs, executors,  
administrators, and successors, jointly and severally for and in the whole firmly by these presents.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH That if the above bonded **Principal**  
who has submitted to the **Department of Natural Resources and Environmental Control, Division of  
Fish and Wildlife** 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, Division of Fish and Wildlife** 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



**00 73 46 PREVAILING WAGE RATE DETERMINATION**

**DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENTAL CONTROL**

**89 KINGS HIGHWAY**

**DOVER, DE 19901**

**CONTRACT DOCUMENT**

FOR

**TED HARVEY CONSERVATION AREA**  
**LEVEE REHABILITATION PROJECT**  
**CONTRACT NO. NAT-201702/TED.HARVEY**

THIS AGREEMENT, made and executed this \_\_\_\_\_ day of \_\_\_\_\_, 2017, by and between \_\_\_\_\_ (Hereinafter designated as Contractor) party of the first part, and the Department of Natural Resources and Environmental Control, a Department created under the laws of the State of Delaware (hereinafter designated as Department) party of the second part.

WITNESSETH that the Contractor, in consideration of the covenants and agreements herein contained and made by the Department, agrees to the following:

ARTICLE ONE. The Contractor shall provide and furnish all the material, supplies, machinery, implements, appliances, tools and labor required to complete this contract in Kent County, State of Delaware, as shown and specified in the specifications, proposals, drawings or plans as indicated in the project manual issued for the Department, with specifications, proposals, drawings or plans entitled **TED HARVEY CONSERVATION AREA, LEVEE REHABILITATION PROJECT NO. NAT-201702/TED.HARVEY** is hereby incorporated by reference as part of this contract. This contract will be binding on both parties upon receipt by the Contractor of an approved State of Delaware Purchase Order. The Contractor must prosecute the work in such order as to complete the fill placement no later than September 1, 2018.

The undersigned, representing that he has read and understands the Bidding Documents and that this bid is made in accordance therewith, that he has visited the site and has familiarized himself with the local conditions under which the Work is to be performed, and that his bid is based upon the materials, systems and equipment described in the Bidding Documents without exception, hereby proposes and agrees to provide all labor, materials, plant, equipment, supplies, transport and other facilities required to execute the work described by the aforesaid documents for the lump sum base bid for raising the dike to elevation +7 ft. NAVD, including but not limited to topsoil slopes, seeding/stabilizing all dike slopes, clearing and grubbing, installing geotextile, and maintaining all haul roads.

***CONTRACT DOCUMENT (CONTINUED)***

IN WITNESS WHEREOF, the said parties have duly executed this agreement in triplicate the day and year first above written.

IN WITNESS WHEREOF, the parties below have hereunto set their hands on the \_\_\_\_\_ day of \_\_\_\_\_, 2017.

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Witness

By: \_\_\_\_\_  
Title

State of \_\_\_\_\_  
County of \_\_\_\_\_

Sworn and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 2017.

\_\_\_\_\_  
Notary Public

IN WITNESS WHEREOF, the parties below have hereunto set their hands on the \_\_\_\_\_ day of \_\_\_\_\_, 2016.

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Project Manager  
Division of Fish and Wildlife

State of \_\_\_\_\_  
County of \_\_\_\_\_

Sworn and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 2017.

\_\_\_\_\_  
Notary Public

***CONTRACT DOCUMENT (CONTINUED)***

IN WITNESS WHEREOF, the parties below have hereunto set their hands on the \_\_\_\_\_  
day of \_\_\_\_\_, 2017.

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Director, Division of Fish and Wildlife

State of \_\_\_\_\_  
County of \_\_\_\_\_

Sworn and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 2017.

\_\_\_\_\_  
Notary Public

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Secretary, Department of  
Natural Resources &  
Environmental Control

State of \_\_\_\_\_  
County of \_\_\_\_\_

Sworn and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 2017.

\_\_\_\_\_  
Notary Public

STATE OF DELAWARE  
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL (DNREC)  
DIVISION OF FISH AND WILDLIFE

**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 ("Owner") Department of Natural Resources and Environmental Control, Division of Fish and Wildlife**, in the amount of \_\_\_\_\_ (\$\_\_\_\_\_), to be paid to **Owner**, for which payment well and truly to be made, we do bind ourselves, our and each and every of our heirs, executors, administrations, successors and assigns, jointly and severally, for and in the whole, firmly by these presents.

Sealed with our seals and dated this \_\_\_\_\_ day of \_\_\_\_\_, 2017.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if **Principal**, who has been awarded by **Owner** that certain contract known as Contract No. NAT-201702/TED.HARVEY dated the \_\_\_\_\_ day of \_\_\_\_\_, 2017 (the "Contract"), which Contract is incorporated herein by reference, shall well and truly provide and furnish all materials, appliances and tools and perform all the work required under and pursuant to the terms and conditions of the Contract and the Contract Documents (as defined in the Contract) or any changes or modifications thereto made as therein provided, shall make good and reimburse **Owner** sufficient funds to pay the costs of completing the Contract that **Owner** may sustain by reason of any failure or default on the part of **Principal**, and shall also indemnify and save harmless **Owner** from all costs, damages and expenses arising out of or by reason of the performance of the Contract and for as long as provided by the Contract; then this obligation shall be void, otherwise to be and remain in full force and effect.

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

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

transferees shall have the same effect as to **Surety** as though done or omitted to be done by or in relation to **Principal**.

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

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

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

PRINCIPAL

Name: \_\_\_\_\_

Witness or Attest: Address: \_\_\_\_\_

\_\_\_\_\_  
Name:

(Corporate Seal)

By: \_\_\_\_\_ (SEAL)

Name:

Title:

SURETY

Name: \_\_\_\_\_

Witness or Attest: Address: \_\_\_\_\_

\_\_\_\_\_  
Name:

(Corporate Seal)

By: \_\_\_\_\_ (SEAL)

Name:

Title:

STATE OF DELAWARE  
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL (DNREC)  
DIVISION OF FISH AND WILDLIFE

**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 (“Owner”) Department of Natural Resources and Environmental Control, Division of Fish and Wildlife**, in the amount of \_\_\_\_\_ (\$\_\_\_\_\_), to be paid to **Owner**, for which payment well and truly to be made, we do bind ourselves, our and each and every of our heirs, executors, administrations, successors and assigns, jointly and severally, for and in the whole firmly by these presents.

Sealed with our seals and dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

NOW THE CONDITION OF THIS OBLIGATION IS SUCH, that if **Principal**, who has been awarded by **Owner** that certain contract known as Contract No. NAT-201702/TED.HARVEY dated the \_\_\_\_\_ day of \_\_\_\_\_, 2017 (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:



## **GENERAL REQUIREMENTS**

### **TABLE OF ARTICLES**

1. GENERAL PROVISIONS
2. OWNER
3. CONTRACTOR
4. ADMINISTRATION OF THE CONTRACT
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****1.1 CONTRACT DOCUMENTS**

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

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

**1.2 EQUALITY OF EMPLOYMENT OPPORTUNITY ON PUBLIC WORKS**

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

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, sex, color, sexual orientation, gender identity or national origin. The Contractor will take positive steps to ensure that applicants are employed and that employees are treated during employment without regard to their race, creed, sex, color, sexual orientation, gender identity or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting agency setting forth this nondiscrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, sex, color, sexual orientation, gender identity or national origin."

**ARTICLE 2: OWNER**

(NO ADDITIONAL GENERAL REQUIREMENTS – SEE SUPPLEMENTARY GENERAL CONDITIONS)

**ARTICLE 3: CONTRACTOR**

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

3.2 Subcontracts: Upon approval of Subcontractors, the Contractor shall award their Subcontracts as soon as possible after the signing of their own contract and see that all material, their own and those of their Subcontractors, are promptly ordered so that the work will not be delayed by failure of materials to arrive on time.

3.3 Before commencing any work or construction, the General Contractor is to consult with the Owner as to matters in connection with access to the site and the allocation of Ground Areas for the various features of hauling, storage, etc.

- 3.4 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions.
- 3.5 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.
- 3.6 The Contractor warrants to the Owner that materials and equipment furnished will be new and of good quality, unless otherwise permitted, and that the work will be free from defects and in conformance with the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved, may be considered defective. If required by the Owner, the Contractor shall furnish evidence as to the kind and quality of materials and equipment provided.
- 3.7 Unless otherwise provided, the Contractor shall pay all sales, consumer, use and other similar taxes, and shall secure and pay for required permits, fees, licenses, and inspections necessary for proper execution of the Work.
- 3.8 The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work. The Contractor shall promptly notify the Owner if the Drawings and Specifications are observed to be at variance therewith.
- 3.9 The Contractor shall be responsible to the Owner for the acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons performing portions of the Work under contract with the Contractor.
- 3.10 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work the Contractor shall remove from and about the Project all waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials. The Contractor shall be responsible for returning all damaged areas to their original conditions.
- 3.11 STATE LICENSE AND TAX REQUIREMENTS
- 3.11.1 Each Contractor and Subcontractor shall be licensed to do business in the State of Delaware and shall pay all fees and taxes due under State laws. In conformance with Section 2503, Chapter 25, Title 30, Delaware Code, "the Contractor shall furnish the Delaware Department of Finance within ten (10) days after entering into any contract with a contractor or subcontractor not a resident of this State, a statement of total value of such contract or contracts together with the names and addresses of the contracting parties."
- 3.12 The Contractor shall comply with all requirements set forth in Section 6962, Chapter 69, Title 29 of the Delaware Code.
- 3.13 During the contract Work, the Contractor and each listed Subcontractor, shall implement an Employee Drug Testing Program in accordance with OMB Regulation 4104- "Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on "Large Public Works Projects". "Large Public Works" is based upon the current threshold required for bidding Public Works as set by the Purchasing and Contracting Advisory Council.

**ARTICLE 4: ADMINISTRATION OF THE CONTRACT****4.1 CONTRACT SURETY****4.1.1 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND**

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

4.1.3 Contents of Performance Bonds – The bond shall be in the form approved by the Office of Management and Budget. The bond shall be conditioned upon the faithful compliance and performance by the successful bidder of each and every term and condition of the contract and the proposal, plans, specifications, and bid documents thereof. Each term and condition shall be met at the time and in the manner prescribed by the Contract, Bid documents and the specifications, including the payment in full to every person furnishing 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 require, cause judgement to be confessed upon the bond.

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

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

**4.2 FAILURE TO COMPLY WITH CONTRACT**

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

**4.3 CONTRACT INSURANCE AND CONTRACT LIABILITY**

4.3.1 In addition to the bond requirements stated in the Bid Documents, each successful Bidder shall purchase adequate insurance for the performance of the Contract and, by submission of a Bid, agrees to indemnify and save harmless and to defend all legal or equitable actions brought against the State, any Agency, officer and/or employee of the

State, for and from all claims of liability which is or may be the result of the successful Bidder's actions during the performance of the Contract.

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

#### 4.4 RIGHT TO AUDIT RECORDS

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

### ARTICLE 5: SUBCONTRACTORS

#### 5.1 SUBCONTRACTING REQUIREMENTS

- 5.1.1 All contracts for the construction, reconstruction, alteration or repair of any public building (not a road, street or highway) shall be subject to the following provisions:
1. A contract shall be awarded only to a Bidder whose Bid is accompanied by a statement containing, for each Subcontractor category, the name and address (city or town and State only – street number and P.O. Box addresses not required) of the subcontractor whose services the Bidder intends to use in performing the Work and providing the material for such Subcontractor category.
  2. A Bid will not be accepted nor will an award of any Contract be made to any Bidder which, as the Prime Contractor, has listed itself as the Subcontractor for any Subcontractor unless:
    - A. It has been established to the satisfaction of the awarding Agency that the Bidder has customarily performed the specialty work of such Subcontractor category by artisans regularly employed by the Bidder's firm;
    - B. That the Bidder is duly licensed by the State to engage in such specialty work, if the State requires licenses; and
    - C. That the Bidder is recognized in the industry as a bona fide Subcontractor or Contractor in such specialty work and Subcontractor category.
- 5.1.2 The decision of the awarding Agency as to whether a Bidder who list itself as the Subcontractor for a Subcontractor category shall be final and binding upon all Bidders, and no action of any nature shall lie against any awarding agency or its employees or officers because of its decision in this regard.
- 5.1.3 After such a Contract has been awarded, the successful Bidder shall not substitute another Subcontractor for any Subcontractor whose name was set forth in the statement which accompanied the Bid without the written consent of the awarding Agency.

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

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

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

## 5.2 PENALTY FOR SUBSTITUTION OF SUBCONTRACTORS

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

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

## 5.3 ASBESTOS ABATEMENT

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

## 5.4 STANDARDS OF CONSTRUCTION FOR THE PROTECTION OF THE PHYSICALLY HANDICAPPED

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

## 5.5 CONTRACT PERFORMANCE

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

**ARTICLE 6: CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS**

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

**ARTICLE 7: CHANGES IN THE WORK**

- 7.1 The Owner, without invalidating the Contract, may order changes in the Work consisting of Additions, Deletions, Modifications or Substitutions, with the Contract Sum and Contract completion date being adjusted accordingly. Such changes in the Work shall be authorized by written Change Order signed by the Professional, as the duly authorized agent, the Contractor and the Owner.
- 7.2 The Contract Sum and Contract Completion Date shall be adjusted only by a fully executed Change Order.
- 7.3 The additional cost, or credit to the Owner resulting from a change in the Work shall be by mutual agreement of the Owner, Contractor and the Architect. In all cases, this cost or credit shall be based on the 'DPE' wages required and the "invoice price" of the materials/equipment needed.
- 7.3.1 "DPE" shall be defined to mean "direct personnel expense". Direct payroll expense includes 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 subcontractors subcontractor. No additional costs shall be allowed for changes related to the Contractor's onsite superintendent/staff, or project manager, unless a change in the work changes the project duration and is identified by the CPM schedule. There will be no other costs associated with the change order.

**ARTICLE 8: TIME**

- 8.1 Time limits, if any, are as stated in the Project Manual. By executing the Agreement, the Contractor confirms that the stipulated limits are reasonable, and that the Work will be completed within the anticipated time frame.
- 8.2 If progress of the Work is delayed at any time by changes ordered by the Owner, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions, unavoidable casualties or other causes beyond the Contractor's control, the Contract Time shall be extended for such reasonable time as the Owner may determine.
- 8.3 Any extension of time beyond the date fixed for completion of the construction and acceptance of any part of the Work called for by the Contract, or the occupancy of the building by the Owner, in whole or in part, previous to the completion shall not be deemed a waiver by the Owner of his right to annul or terminate the Contract for abandonment or delay in the matter provided for, nor relieve the Contractor of full responsibility.
- 8.4 **SUSPENSION AND DEBARMENT**
- 8.4.1 Per Section 6962(d)(14), Title 29, Delaware Code, "Any Contractor who fails to perform a public works contract or complete a public works project within the time schedule established by the Agency in the Invitation To Bid, may be subject to Suspension or Debarment for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the Project."
- 8.4.2 "Upon such failure for any of the above stated reasons, the Agency that contracted for the public works project may petition the Director of the Office of Management and Budget for Suspension or Debarment of the Contractor. The Agency shall send a copy of the petition to the Contractor within three (3) working days of filing with the Director. If the Director concludes that the petition has merit, the Director shall schedule and hold a hearing to determine whether to suspend the Contractor, debar the Contractor or deny the petition. The Agency shall have the burden of proving, by a preponderance of the evidence, that the Contractor failed to perform or complete the public works project within the time schedule established by the Agency and failed to do so for one or more of the following reasons: a) failure to supply the adequate labor supply ratio for the project; b) inadequate financial resources; or, c) poor performance on the project. Upon a finding in favor of the Agency, the Director may suspend a Contractor from Bidding on any project funded, in whole or in part, with public funds for up to 1 year for a first offense, up to 3 years for a second offense and permanently debar the Contractor for a third offense. The Director shall issue a written decision and shall send a copy to the Contractor and the Agency. Such decision may be appealed to the Superior Court within thirty (30) days for a review on the record."
- 8.5 **RETAINAGE**
- 8.5.1 Per Section 6962(d)(5) a.3, Title 29, Delaware Code: The Agency may at the beginning of each public works project establish a time schedule for the completion of the project. If the project is delayed beyond the completion date due to the Contractor's failure to meet their responsibilities, the Agency may forfeit, at its discretion, all or part of the Contractor's retainage.
- 8.5.2 This forfeiture of retainage also applies to the timely completion of the punchlist. A punchlist will only be prepared upon the mutual agreement of the Owner, Architect and Contractor. Once the punchlist is prepared, all three parties will by mutual agreement, establish a schedule for its completion. Should completion of the punchlist be delayed beyond the established date due to the Contractor's failure to meet their responsibilities,



the Agency may hold permanently, at its discretion, all or part of the Contractor's retainage.

**ARTICLE 9: PAYMENTS AND COMPLETION****9.1 APPLICATION FOR PAYMENT**

9.1.1 Applications for payment shall be made to Department of Natural Resources and Environmental Control Division of Fish & Wildlife, at Room B172, Richardson & Robbins Building, 89 Kings Highway, Dover, DE 19901 and marked Contract Contract No. NAT201702/TED.HARVEY; Attention: Jeremy Ashe. There will be a five percent (5%) retainage on all Contractor's monthly invoices until completion of the project. This retainage may become payable upon receipt of all required closeout documentation, provided all other requirements of the Contract Documents have been met.

9.1.2 A date will be fixed for the taking of the monthly account of work done. Upon receipt of Contractor's itemized application for payment, such application will be audited, modified, if found necessary, and approved for the amount. Statement shall be submitted to the Owner.

9.1.3 Section 6516, Title 29 of the Delaware Code annualized interest is not to exceed 12% per annum beginning thirty (30) days after the "presentment" (as opposed to the date) of the invoice.

**9.2 PARTIAL PAYMENTS**

9.2.1 Any public works Contract executed by any Agency may provide for partial payments at the option of the Owner with respect to materials placed along or upon the sites or stored at secured locations, which are suitable for use in the performance of the contract.

9.2.2 When approved by the agency, partial payment may include the values of tested and acceptable materials of a nonperishable or noncontaminative nature which have been produced or furnished for incorporation as a permanent part of the work yet to be completed, provided acceptable provisions have been made for storage.

9.2.2.1 Any allowance made for materials on hand will not exceed the delivered cost of the materials as verified by invoices furnished by the Contractor, nor will it exceed the contract bid price for the material complete in place.

9.2.3 If requested by the Agency, receipted bills from all Contractors, Subcontractors, and material, men, etc., for the previous payment must accompany each application for payment. Following such a request, no payment will be made until these receipted bills have been received by the Owner.

**9.3 SUBSTANTIAL COMPLETION**

9.3.1 When the building has been made suitable for occupancy, but still requires small items of miscellaneous work, the Owner will determine the date when the project has been substantially completed.

9.3.2 If, after the Work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor, and without terminating the Contract, the Owner may make payment of the balance due for the portion of the Work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment that it shall not constitute a waiver of claims.

9.3.3 On projects where commissioning is included, the commissioning work as defined in the specifications must be complete prior to the issuance of substantial completion.

## 9.4 FINAL PAYMENT

- 9.4.1 Final payment, including the five percent (5%) retainage if determined appropriate, shall be made within thirty (30) days after the Work is fully completed and the Contract fully performed and provided that the Contractor has submitted the following closeout documentation (in addition to any other documentation required elsewhere in the Contract Documents):
- 9.4.1.1 Evidence satisfactory to the Owner that all payrolls, material bills, and other indebtedness connected with the work have been paid,
- 9.4.1.2 An acceptable RELEASE OF LIENS,
- 9.4.1.3 Copies of all applicable warranties,
- 9.4.1.4 As-built drawings,
- 9.4.1.5 Operations and Maintenance Manuals,
- 9.4.1.6 Instruction Manuals,
- 9.4.1.7 Consent of Surety to final payment.
- 9.4.1.8 The Owner reserves the right to retain payments, or parts thereof, for its protection until the foregoing conditions have been complied with, defective work corrected and all unsatisfactory conditions remedied.

**ARTICLE 10: PROTECTION OF PERSONS AND PROPERTY**

- 10.1 The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take all reasonable precautions to prevent damage, injury or loss to: workers, persons nearby who may be affected, the Work, materials and equipment to be incorporated, and existing property at the site or adjacent thereto. The Contractor shall give notices and comply with applicable laws ordinances, rules regulations, and lawful orders of public authorities bearing on the safety of persons and property and their protection from injury, damage, or loss. The Contractor shall promptly remedy damage and loss to property at the site caused in whole or in part by the Contractor, a Subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable.
- 10.2 The Contractor shall notify the Owner in the event any existing hazardous material such as lead, PCBs, asbestos, etc. is encountered on the project. The Owner will arrange with a qualified specialist for the identification, testing, removal, handling and protection against exposure or environmental pollution, to comply with applicable regulation laws and ordinances. The Contractor and Architect will not be required to participate in or to perform this operation. Upon completion of this work, the Owner will notify the Contractor and Architect in writing the area has been cleared and approved by the authorities in order for the work to proceed. The Contractor shall attach documentation from the authorities of said approval.
- 10.3 As required in the Hazardous Chemical Information Act of June 1984, all vendors supplying any materials that may be defined as hazardous, must provide Material Safety Data Sheets for those products. Any chemical product should be considered hazardous if it has a warning caution on the label relating to a potential physical or health hazard, if it is known to be present in the work place, and if employees may be exposed under normal conditions or in any foreseeable emergency situation. Material Safety Data Sheets must be provided directly to the Owner along with the shipping slips that include those products.

- 10.4 The Contractor shall certify to the Owner that materials incorporated into the Work are free of all asbestos. This certification may be in the form of Material Safety Data Sheet (MSDS) provided by the product manufacturer for the materials used in construction, as specified or as provided by the Contractor.

#### ARTICLE 11: INSURANCE AND BONDS

- 11.1 The Contractor shall carry all insurance required by law, such as Unemployment Insurance, etc. The Contractor shall carry such insurance coverage as they desire on their own property such as a field office, storage sheds or other structures erected upon the project site that belong to them and for their own use. The Subcontractors involved with this project shall carry whatever insurance protection they consider necessary to cover the loss of any of their personal property, etc.
- 11.2 Upon being awarded the Contract, the Contractor shall obtain a minimum of two (2) copies of all required insurance certificates called for herein, and submit one (1) copy of each certificate, to the Owner, within 20 days of contract award.
- 11.3 Bodily Injury Liability and Property Damage Liability Insurance shall, in addition to the coverage included herein, include coverage for injury to or destruction of any property arising out of the collapse of or structural injury to any building or structure due to demolition work and evidence of these coverages shall be filed with and approved by the Owner.
- 11.4 The Contractor's Property Damage Liability Insurance shall, in addition to the coverage noted herein, include coverage on all real and personal property in their care, custody and control damaged in any way by the Contractor or their Subcontractors during the entire construction period on this project.
- 11.5 Builders Risk (including Standard Extended Coverage Insurance) on the existing building during the entire construction period, 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):

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

11.7.5.2 Minimum Limit for all employees working at one site.

11.7.6 Certificates of Insurance must be filed with the Owner guaranteeing fifteen (15) days prior notice of cancellation, non-renewal, or any change in coverages and limits of liability shown as included on certificates.

### 11.7.7 Social Security Liability

11.7.7.1 With respect to all persons at any time employed by or on the payroll of the Contractor or performing any work for or on their behalf, or in connection with or arising out of the Contractor's business, the Contractor shall accept full and exclusive liability for the payment of any and all contributions or taxes or unemployment insurance, or old age retirement benefits, pensions or annuities now or hereafter imposed by the Government of the United States and the State or political subdivision thereof, whether the same be measured by wages, salaries or other remuneration paid to such persons or otherwise.

11.7.7.2 Upon request, the Contractor shall furnish Owner such information on payrolls or employment records as may be necessary to enable it to fully comply with the law imposing the aforesaid contributions or taxes.

11.7.7.3 If the Owner is required by law to and does pay any and/or all of the aforesaid contributions or taxes, the Contractor shall forthwith reimburse the Owner for the entire amount so paid by the Owner.

## ARTICLE 12: UNCOVERING AND CORRECTION OF WORK

12.1 The Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed, and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of two years from the date of Substantial Completion, or by terms of an applicable special warranty required by the Contract Documents. The provisions of this Article apply to work done by Subcontractors as well as to Work done by direct employees of the Contractor.

- 12.2 At any time during the progress of the work, or in any case where the nature of the defects shall be such that it is not expedient to have them corrected, the Owner, at their option, shall have the right to deduct such sum, or sums, of money from the amount of the contract as they consider justified to adjust the difference in value between the defective work and that required under contract including any damage to the structure.

#### **ARTICLE 13: MISCELLANEOUS PROVISIONS**

##### **13.1 CUTTING AND PATCHING**

- 13.1.1 The Contractor shall be responsible for all cutting and patching. The Contractor shall coordinate the work of the various trades involved.

##### **13.2 DIMENSIONS**

- 13.2.1 All dimensions shown shall be verified by the Contractor by actual measurements at the project site. Any discrepancies between the drawings and specifications and the existing conditions shall be referred to the Owner for adjustment before any work affected thereby has been performed.

##### **13.3 LABORATORY TESTS**

- 13.3.1 Any specified laboratory tests of material and finished articles to be incorporated in the work shall be made by bureaus, laboratories or agencies approved by the Owner and reports of such tests shall be submitted to the Owner. The cost of the testing shall be paid for by the Contractor.

- 13.3.2 The Contractor shall furnish all sample materials required for these tests and shall deliver same without charge to the testing laboratory or other designated agency when and where directed by the Owner.

##### **13.4 ARCHAEOLOGICAL EVIDENCE**

- 13.4.1 Whenever, in the course of construction, any archaeological evidence is encountered on the surface or below the surface of the ground, the Contractor shall notify the authorities of the Delaware Archaeological Board and suspend work in the immediate area for a reasonable time to permit those authorities, or persons designated by them, to examine the area and ensure the proper removal of the archaeological evidence for suitable preservation in the State Museum.

##### **13.5 GLASS REPLACEMENT AND CLEANING**

- 13.5.1 The General Contractor shall replace without expense to the Owner all glass broken during the construction of the project. If job conditions warrant, at completion of the job the General Contractor shall have all glass cleaned and polished.

##### **13.6 WARRANTY**

- 13.6.1 For a period of two (2) years from the date of substantial completion, as evidenced by the date of final acceptance of the work, the contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect of equipment, material or workmanship performed by the contractor or any of his subcontractors or suppliers. However, manufacturer's warranties and guarantees, if for a period longer than two (2) years, shall take precedence over the above warranties. The contractor shall remedy, at his own expense, any such failure to conform or any such defect. The protection of this warranty shall be included in the Contractor's Performance Bond.

**ARTICLE 14: TERMINATION OF CONTRACT**

- 14.1 If the Contractor defaults or persistently fails or neglects to carry out the Work in accordance with the Contract Documents or fails to perform a provision of the Contract, the Owner, after seven days written notice to the Contractor, may make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor. Alternatively, at the Owner's option, and the Owner may terminate the Contract and take possession of the site and of all materials, equipment, tools, and machinery thereon owned by the Contractor and may finish the Work by whatever method the Owner may deem expedient. If the costs of finishing the Work exceed any unpaid compensation due the Contractor, the Contractor shall pay the difference to the Owner.
- 14.2 "If the continuation of this Agreement is contingent upon the appropriation of adequate state, or federal funds, this Agreement may be terminated on the date beginning on the first fiscal year for which funds are not appropriated or at the exhaustion of the appropriation. The Owner may terminate this Agreement by providing written notice to the parties of such non-appropriation. All payment obligations of the Owner will cease upon the date of termination. Notwithstanding the foregoing, the Owner agrees that it will use its best efforts to obtain approval of necessary funds to continue the Agreement by taking appropriate action to request adequate funds to continue the Agreement."

END OF GENERAL REQUIREMENTS

## EMPLOYEE DRUG TESTING REPORT FORM

Period Ending: \_\_\_\_\_

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds submit Testing Report Forms to the Owner no less than quarterly.

Project Number: \_\_\_\_\_

Project Name: \_\_\_\_\_

Contractor/Subcontractor Name: \_\_\_\_\_

Contractor/Subcontractor Address: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Number of employees who worked on the jobsite during the report period: \_\_\_\_\_

Number of employees subject to random testing during the report period: \_\_\_\_\_

Number of Negative Results \_\_\_\_\_ Number of Positive Results \_\_\_\_\_

Action taken on employee(s) in response to a failed or positive random test:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Authorized Representative of Contractor/Subcontractor: \_\_\_\_\_  
(typed or printed)

Authorized Representative of Contractor/Subcontractor: \_\_\_\_\_  
(signature)

Date: \_\_\_\_\_

**EMPLOYEE DRUG TESTING  
REPORT OF POSITIVE RESULTS**

4104 Regulations for the Drug Testing of Contractor and Subcontractor Employees Working on Large Public Works Projects requires that Contractors and Subcontractors who work on Large Public Works Contracts funded all or in part with public funds to notify the Owner in writing of a positive random drug test.

Project Number: \_\_\_\_\_

Project Name: \_\_\_\_\_

Contractor/Subcontractor Name: \_\_\_\_\_

Contractor/Subcontractor Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name of employee with positive test result: \_\_\_\_\_

Last 4 digits of employee SSN: \_\_\_\_\_

Date test results received: \_\_\_\_\_

Action taken on employee in response to a positive test result:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Authorized Representative of Contractor/Subcontractor: \_\_\_\_\_  
(typed or printed)

Authorized Representative of Contractor/Subcontractor: \_\_\_\_\_  
(signature)

Date: \_\_\_\_\_

**This form shall be sent by mail to the Owner within 24 hours of receipt of test results.**

**Enclose this test results form in a sealed envelope with the notation "Drug Testing Form – DO NOT OPEN" on the face thereof and place in a separate mailing envelope.**



**CONTRACT NO. NAT-201702/TED.HARVEY**

**SECTION 2  
TECHNICAL SPECIFICATIONS**

## **SECTION 31 00 00 – EARTHWORK**

### **PART 1 - GENERAL**

#### **1.01 UNIT PRICES**

##### **A. Offsite Select Borrow for Levee Raising**

1. **Payment:** Payment for “Offsite Select Borrow for Levee Raising” shall include all handling, hauling, stockpiling, placement, and compaction of fill material associated with raising the height of the existing levee to the elevation shown in the contract drawings.
2. **Measurement:** The quantity to be paid shall be the Dry Ton unit price quoted on the bid form for “Offsite Select Borrow for Levee Raising”. The quantity shall be calculated by using contractor-supplied weight tickets from the quarry, measuring the moisture content of the material, and deducting the weight of the water from the solids.
3. **Unit of Measure:** Dry Ton (TON).

##### **B. Topsoil Stripping, Sediment Control and Seeding**

1. **Payment:** Payment for “Topsoil Stripping, Sediment Control, and Seeding” shall include all excavation, handling and stockpiling of topsoil material, installation and maintenance of sediment control devices, and installation of seed with fertilizer and mulch shall be incidental to the placement of the Offsite Select Borrow for Levee Raising.

#### **1.02 CRITERIA FOR BIDDING**

##### **A. Base bids on the following criteria:**

1. Surface elevations are as indicated.
2. Pipes or other artificial obstructions, except those indicated, will not be encountered.
3. Ground water elevations indicated by the boring log were those existing at the time subsurface investigations were made and do not necessarily represent ground water elevation at the time of construction. See Geotechnical Reports in Appendix 2 for further information.
4. Material character is indicated by the boring logs. See Geotechnical Reports in Appendix 2 for further information.

#### **1.03 REFERENCES**

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.
- B. American Association of State Highway and Transportation Officials (AASHTO)

- |              |   |
|--------------|---|
| AASHTO T 180 | Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop |
| AASHTO T 224 | Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test                                   |
- C.     ASTM International (ASTM)
- |                 |   |
|-----------------|---|
| ASTM C136/C136M | (2014) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates  |
| ASTM D422       | (2007)e2 Particle-Size Analysis of Soils  |
| ASTM D698       | (2012e2) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))  |
| ASTM D1140      | (2014) Standard Test Methods for Determining the Amount of Material Finer than No. 200 (75-micrometer) Sieve in Soils by Washing                                    |
| ASTM D1556      | (2015) Density and Unit Weight of Soil in Place by the Sand-Cone Method   |
| ASTM D1557      | (2012e1) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> ) (2700 kN-m/m <sup>3</sup> ) |
| ASTM D2167      | (2015) Density and Unit Weight of Soil in Place by the Rubber Balloon Method  |
| ASTM D2487      | (2011) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)  |
| ASTM D2937      | (2010) Density of Soil in Place by the Drive-Cylinder Method  |
| ASTM D4318      | (2010e1) Liquid Limit, Plastic Limit, and Plasticity Index of Soils   |
| ASTM D6938      | (2015) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)                                    |
- D.     State of Delaware Department of Transportation
- Standard Specifications for Road and Bridge Construction August 2001
- E.     U.S. Army Corps of Engineers (USACE)
- USACE EM 385-1-1 (2014) Safety and Health Requirements Manual

- F. U.S. Environmental Protection Agency (EPA)
  - EPA 600/4-79/020 Methods for Chemical Analysis of Water and Wastes
  - EPA SW-846.3-3 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods
- G. U.S. General Services Administration (GSA)
  - CID A-A-203 Paper, Kraft, Untreated

#### 1.04 DEFINITIONS

- A. Satisfactory Materials: Satisfactory materials comprise any materials classified by ASTM D2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP. Satisfactory materials for grading comprise stones less than 8 inches.
- B. Unsatisfactory Materials: Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. Notify the Engineer when encountering any contaminated materials.
- C. Cohesionless and Cohesive Materials: Cohesionless materials include materials classified in ASTM D2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C136/C136M, ASTM D422, and ASTM D1140.
- D. Degree of Compaction: Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with AASHTO T 180 and corrected with AASHTO T 224. To maintain the same percentage of coarse material, use the "remove and replace" procedure as described in NOTE 8 of Paragraph 7.2 in AASHTO T 180.
- E. Topsoil: Material suitable for topsoils obtained from offsite areas is defined as: Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.
- F. Select Granular Material:
  - 1. General Requirements: Select granular material consist of materials classified as GW, GP, GM, SW, SP, SM by ASTM D2487 where indicated.

The liquid limit of such material must not exceed 40 percent when tested in accordance with ASTM D4318. The plasticity index must not be greater than 12 percent when tested in accordance with ASTM D4318, and not more than 30 percent by weight may be finer than No. 200 sieve when tested in accordance with ASTM D1140.

Sieve Size	Percent Passing by Weight
2-1/2 inches	100
No. 4 (4.75 mm)	40 - 85
No. 10 (2.00 mm)	20 - 80
No. 40 (0.425 mm)	10 - 60
No. 200 (0.075 mm)	5 - 25

#### 1.05 SYSTEM DESCRIPTION

- A. Subsurface soil boring logs are included in the Geotechnical Report in Appendix 2. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.
- B. Classification of Excavation: No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.
  - 1. Common Excavation: Include common excavation with the satisfactory removal and disposal of all materials not classified as rock excavation.

#### 1.06 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:
  - 1. Preconstruction Submittals
  - 2. Test Reports
  - 3. Testing

### PART 2 - PRODUCTS

#### 2.01 REQUIREMENTS FOR OFFSITE SOILS

- A. Test offsite soils brought in for use as backfill for Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and full Toxicity Characteristic Leaching Procedure (TCLP) including ignitability, corrosivity and reactivity. Backfill shall contain a maximum of 100 parts per million (ppm) of total petroleum hydrocarbons (TPH) and a maximum of 10ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and shall pass the TCPL test. Determine TPH concentrations by using EPA 600/4-79/020 Method 418.1. Determine BTEX concentrations by using EPA SW-846.3-3 Method 5030/8020.

Perform TCLP in accordance with EPA SW-846.3-3 Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Do not bring material onsite until tests have been approved by the Engineer.

## 2.02 SEEDING

- A. Seeding shall conform to DelDOT Standard Specifications for Road and Bridge Construction Section 734. Seed shall be the mix specified for Permanent Grass Seeding – Dry Ground.

## PART 3 - EXECUTION

### 3.01 STRIPPING OF TOPSOIL

- A. Where indicated or directed, strip topsoil to a depth of 4 inches. Spread topsoil on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations.

### 3.02 GENERAL EXCAVATION

- A. Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Dispose surplus satisfactory excavated material not required for fill or embankment in areas approved for surplus material storage or designated waste areas. Dispose unsatisfactory excavated material in designated waste or spoil areas. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times. Excavate material required for fill or embankment in excess of that produced by excavation within the grading limits from the borrow areas indicated or from other approved areas selected by the Contractor as specified.
- B. Drainage: Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity [and] [or] provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the

responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

- C. **Underground Utilities:** The Contractor is responsible for movement of construction machinery and equipment over pipes and utilities during construction. Excavation made with power-driven equipment is not permitted within two feet of known Owner-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Engineer. Report damage to utility lines or subsurface construction immediately to the Engineer.

### 3.03 SELECTION OF BORROW MATERIAL

- A. Select borrow material to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Obtain borrow material from approved private sources. Unless otherwise provided in the contract, the Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. Borrow material from approved sources on Owner-controlled land may be obtained without payment of royalties. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval. Consider necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon related operations to the borrow excavation.

### 3.04 GRADING AREAS

- A. Where indicated, divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Place and grade stockpiles of satisfactory and unsatisfactory as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

### 3.05 GROUND SURFACE PREPARATION

- A. **General Requirements:** Remove and replace unsatisfactory material with satisfactory materials, as directed by the Engineer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 6 inches before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When

subgrades are less than the specified density, break up the ground surface to a minimum depth of 6 inches, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inches and compact it as specified for the adjacent fill.

- B. Frozen Material: Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary 14 percent of optimum moisture to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

### 3.06 UTILIZATION OF EXCAVATED MATERIALS

- A. Dispose unsatisfactory materials removed from excavations into designated waste disposal or spoil areas. Use satisfactory material removed from excavations, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Submit procedure and location for disposal of unused satisfactory material. Submit proposed source of borrow material. Do not waste any satisfactory excavated material without specific written authorization. Dispose of satisfactory material, authorized to be wasted, in designated areas approved for surplus material storage or designated waste areas as directed. Clear and grub newly designated waste areas on Owner-controlled land before disposal of waste material thereon. Stockpile and use coarse rock from excavations for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. Do not dispose excavated material to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

### 3.07 BACKFILLING AND COMPACTION

- A. Place backfill and compact to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Prepare ground surface on which backfill is to be placed and provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs GROUND SURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

### 3.08 EMBANKMENTS

- A. Earth Embankments: Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. Place the material in successive horizontal layers of loose material not more than 12 inches in depth. Spread each layer uniformly on a soil surface that has been moistened or aerated as necessary, and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, plow, disk, or otherwise break up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 90 percent laboratory maximum density



for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements are identical with those requirements specified in paragraph SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

### 3.09 FINISHING

- A. Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turving materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.
- B. Subgrade and Embankments: During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do not disturb the finished subgrade by traffic or other operation. Protect and maintain the finished subgrade in a satisfactory condition until ballast, subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on the finished subgrade. Do not lay subbase, base course, ballast, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy, spongy, or frozen subgrade.

### 3.10 PLACING TOPSOIL

- A. On the slope areas to receive topsoil, prepare the compacted subgrade soil to a 2 inches depth for bonding of topsoil with subsoil. Spread topsoil evenly to a thickness of 6 inch and grade to the elevations and slopes shown. Do not spread topsoil when frozen or excessively wet or dry. Obtain material required for topsoil in excess of that produced by excavation within the grading limits from offsite areas. Topsoil shall not be compacted as specified in Paragraph 3.10 but shall be tracked or raked in prior to seeding.

### 3.11 TESTING

- A. Perform testing by a DNREC validated commercial testing laboratory or the Contractor's validated testing facility. Submit qualifications of the DNREC validated commercial testing laboratory or the Contractor's validated testing facilities. If the Contractor elects to establish testing facilities, do not permit work requiring testing until the Contractor's facilities have been inspected, DNREC validated and approved by the Engineer.
  - 1. Determine field in-place density in accordance with ASTM D1556, ASTM D2167, or ASTM D6938. When ASTM D6938 is used, check the calibration curves and adjust using only the sand cone method as described in ASTM D1556.

2. Check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D6938; check the calibration of both the density and moisture gauges at the beginning of a job on each different type of material encountered and at intervals as directed by the Engineer. When test results indicate, as determined by the Engineer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements.
  3. Perform tests on recompacted areas to determine conformance with specification requirements. Appoint a registered professional civil engineer to certify inspections and test results. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.
- B. Fill and Backfill Material Gradation: One test per 500 dry tons stockpiled or in-place source material. Determine gradation of fill and backfill material in accordance with ASTM C136/C136M.
- C. In-Place Densities
1. One test per 1,000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.
  2. One test per 1,000 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.
- D. Moisture Contents: In the stockpile, excavation, or borrow areas, perform a minimum of two tests per day per type of material or source of material being placed during stable weather conditions. During unstable weather, perform tests as dictated by local conditions and approved by the Engineer.
- E. Optimum Moisture and Laboratory Maximum Density: Perform tests for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 500 dry tons of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.
- F. Tolerance Tests for Subgrades: Perform continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION during construction of the subgrades.

### 3.12 DISPOSITION OF SURPLUS MATERIAL

- A. Remove surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and to an approved licensed/permitted facility approved by the Engineer.

### 3.13 SEEDING

- A. Seed side slopes every 500' or as soon as practical to stabilize soil material and prevent erosion. The horizontal top elevation of the levee shall not be seeded.

3.14 TEMPORARY STABILIZATION

- A. Temporary stabilization of the slopes shall be the responsibility of the Contractor during earthwork operations. Contractor to follow DNREC Erosion and Control Handbook BMPs.

3.15 MEASUREMENT PROCEDURES

- A. Excavation: The unit of measurement for excavation will be the cubic yard, computed by the average end area method from cross sections taken before and after the excavation and borrow operations, including the excavation for ditches, gutters, and channel changes, when the material is acceptably utilized or disposed of as herein specified. The measurements will include authorized excavation of rock, authorized excavation of unsatisfactory subgrade soil, and the volume of loose, scattered rocks and boulders collected within the limits of the work; allowance will be made on the same basis for selected backfill ordered as replacement. The measurement will not include the volume of subgrade material or other material that is scarified or plowed and reused in-place, and will not include the volume excavated without authorization or the volume of any material used for purposes other than directed. The volume of overburden stripped from borrow pits and the volume of excavation for ditches to drain borrow pits, unless used as borrow material, will not be measured for payment. The measurement will not include the volume of any excavation performed prior to the taking of elevations and measurements of the undisturbed grade.
- B. Topsoil Requirements: Separate excavation, hauling, and spreading or piling of topsoil and related miscellaneous operations will be considered subsidiary obligations of the Contractor, covered under the contract unit price for Offsite Select Borrow for Levee Raising.
- C. Overhaul Requirements: Allow the unit of measurement for overhaul to be the station-yard. The overhaul distance will be the distance in stations between the center of volume of the overhaul material in its original position and the center of volume after placing, minus the free-haul distance in stations. The haul distance will be measured along the shortest route determined by the Engineer as feasible and satisfactory. Do not measure or waste unsatisfactory materials for overhaul where the length of haul for borrow is within the free-haul limits.
- D. Select Granular Material: Measure select granular material in place as the actual dry tons. The weights of the Offsite Select Borrow for Levee Raising material delivered and placed at the project site shall be adjusted for moisture content. Moisture content shall be determined in the laboratory in accordance with ASTM D2216. All moisture content testing shall be by the Contractor's hired independent laboratory and the test results shall be reported to the Owner at the time they become available to the Contractor. The Contractor shall take a representative sample of the Offsite Select Borrow for Levee Raising material in the delivered material for laboratory determination of moisture content. The moisture contents determined by each test shall be averaged separately for each source and for each day's deliveries. The total dry weight tons of Offsite Select Borrow for Levee Raising material delivered each day, from each source, shall be determined in accordance with the formula below, using the average moisture content for each day's deliveries from each source.

$$Total\ dry\ weight\ tons = \frac{TW}{2,000\ lbs. * [1 + (\frac{\% Moisture}{100})]}$$

Where:

*TW* = Total weight of material delivered from each respective source for the day, in pounds (Offsite Select Borrow for Levee Raising material plus moisture)

2,000 lb = one (1) ton

*% Moisture* = Average moisture content for each respective source, and each day's delivered material

### 3.16 PAYMENT PROCEDURES

- A. Payment will constitute full compensation for all labor, equipment, tools, supplies, and incidentals necessary to complete the work.
- B. Off-Site Select Borrow for Levee Raising: Off-Site Select Borrow for Levee Raising will be paid for at the contract unit price per dry ton.
- C. Topsoil Stripping and replacement will be paid for under Off-Site Select Borrow for Levee Raising.
- D. Erosion and Sediment Control will be paid for under Off-Site Select Borrow for Levee Raising. It is the responsibility of the contractor to follow DNREC Erosion and Control Handbook BMPs.
- E. Seeding will be paid for will be paid for under Off-Site Select Borrow for Levee Raising. Contractor will have to reseed at own cost if slopes do not meet DNREC Sediment & Stormwater 70% coverage.

END OF SECTION

## SECTION 31 05 19 - GEOTEXTILE

### PART 1 - GENERAL

#### 1.01 Unit Prices

##### A. Geotextile

1. Payment for "Geotextile" shall include the cost of materials, equipment, installation, testing, and other costs associated with placement of the geotextile.
2. Measurement: The quantity to be paid shall be the square yard unit price quoted on the bid form for "Geotextile".
3. Unit of Measure: Square Yard (SY).

#### 1.02 REFERENCES

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

B. American Society for Testing and Materials (ASTM)

ASTM D 3786	(2009) Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method
ASTM D 4354	(2009) Sampling of Geosynthetics for Testing
ASTM D 4355	(2007) Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
ASTM D 4491	(2009) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2009) Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	(2009) Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D 4632	(2008) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4833	(2007) Index Puncture Resistance of Geomembranes and Related Products
ASTM D 4873	(2009) Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D 5261	(2010) Measuring Mass per Unit Area of Geotextiles

### 1.03 SUBMITTALS

- A. General: Submit the following in accordance with the Special Provision SP-16, "Submittals," of these Specifications.
- B. Prior to delivery of Geotextile to the job site, the Contractor shall submit the following certified test reports to the Engineer for approval:
  - 1. AASHTO Survivability Class (AASHTO M288)
  - 2. Apparent Opening Size (ASTM D 4751)
  - 3. Grab Tensile Strength and Elongation (ASTM D 4632)
  - 4. Mullen Burst Strength (ASTM D 3786)
  - 5. Permittivity (ASTM D 4491)
  - 6. Puncture Strength (ASTM D 4833)
  - 7. Sewn Seam Strength, if used (ASTM D 4632)
  - 8. Trapezoidal Tear Strength (ASTM D 4533)
  - 9. U.V. Resistance (ASTM D 4355)
  - 10. Wide Width Tensile Strength – Machine Direction (ASTM D 4595)
  - 11. Wide Width Tensile Strength – Cross-Machine Direction (ASTM D 4595)
- C. Manufacturer's recommendations for seaming and/or lapping joints.
- D. Samples: Representative sample of each type of geotextile showing the name of the manufacturer, brand name, type of fiber shall be submitted.
- E. The certification(s) shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material meets the specifications.

### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Geotextile labeling, shipment, and storage shall follow ASTM D 4873. Product labels shall clearly show the manufacturer or supplier name, style name, roll number, length and width of the roll.
- B. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.
- C. Geotextile shall be stored in areas where water cannot accumulate, elevated off the ground, and protected from conditions that will affect the properties or performance. Outdoor storage shall not be for periods that exceed the manufacturer's recommendations, or for two months, whichever is less.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. All materials specified shall be applied as per the Manufacturer's printed instructions and recommendations or as directed by the Engineer.

- B. Any work in which unapproved materials are used shall be performed at the Contractor's risk and will be considered unacceptable, unauthorized, and will not be paid for and may require removal.

## 2.02 GEOTEXTILE

- A. The geotextile shall be manufactured with fibers consisting of long-chain synthetic polymers composed of at least 95% by weight polyolefins or polyesters. They shall form a stable network such that filaments or yarns retain their dimensional stability relative to each other, including selvages. The geotextile shall be free of any chemical treatment or coating which reduces permeability and shall be inert to chemicals commonly found in soil.
- B. Woven slit film geotextiles will not be allowed.
- C. The geotextile materials shall equal or exceed the minimum (or maximum, if noted) average roll values (MARVs) specified below:

Physical Property	Test Value	Test Method
Survivability Class	Class 1 (nonwoven) Class 2 (woven monofilament)	AASHTO M288
Mass Per Unit Area (Nonwoven Geotextiles Only)	8 oz/sy	ASTM D 5261
Apparent Opening Size (max.)	0.425mm	ASTM D 4751
Permittivity	0.7 sec-1	ASTM D 4491
Percent Open Area (woven geotextile only)	4%	CWO-22125
Porosity (nonwoven geotextiles only)	50%	
UV Resistance	70% strength retained for all classes @ 500 hours	ASTM D 4355

- D. Geotextile shall have a minimum roll width of 17 feet.
- E. The geotextile shall be delivered to the job site in its original manufacturer's container(s). Each roll shall be individually wrapped in a protective wrapping which shall protect the fabric from ultraviolet radiation and from abrasion due to shipping and handling and to avoid moisture pick up. Materials exhibiting wetness, disintegration, decomposition, and/or abrasion due to shipping and handling will be rejected and shall be removed from the job site immediately, at the Contractor's cost.
- F. Installation, handling and storage of geotextile fabric shall be in accordance with the manufacturer's recommendations and the Engineer's direction.

## 2.03 ANCHORS

- A. Geotextile anchors shall be either:

1. Commercially available or manufactured 12-inch long by 1/8-inch diameter galvanized steel pins placed through the center of 1-inch diameter by 1/8-inch thick galvanized steel washers.
2. Sand bags or rock placed on top of the geotextile to secure it in place prior to rock placement.

## PART 3 - EXECUTION

### 3.01 GEOTEXTILE PLACEMENT

- A. Geotextile shall be placed between Stations 41+00 and 48+00.
- B. Surface to receive the geotextile shall be prepared in accordance with the requirements of Section 31 00 00, "Earthwork," of these Specifications and shall be accepted by the Engineer prior to geotextile placement.
- C. Surface to receive the geotextile shall be prepared to a relatively smooth condition free of obstructions, sharp objects, stumps, and debris that could damage the geotextile during installation. When directed by the Engineer, rolling shall be used for surface preparation at no cost to the Administration.
- D. Fabric shall be placed in two rolls with the roll length oriented parallel to the levee baseline direction.
- E. Geotextile joints shall be made by either overlapping or seaming:
  1. Overlap: The geotextile shall be overlapped at all longitudinal and transverse joints a minimum of 3 feet. The geotextile shall be placed so that the preceding roll overlaps the following roll in the direction the fill material is being spread and upslope geotextile sheets shall be overlapped over downslope sheets.
  2. Seams: Seams shall develop of 90% of the specified grab tensile strength when tested in accordance with ASTM D 4632. All seams shall be subject to the approval of the Engineer.
- E. No mechanical equipment shall be permitted on the fabric surface.

END OF SECTION



## **APPENDIX 1**

### **PAYROLL REPORT SAMPLE**

**APPENDIX 2**

**GEOTECHNICAL REPORTS**

## GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND  
ENVIRONMENTAL CONSULTANTS

*A Practicing Geoprofessional Business Association Member Firm*



June 10, 2015

Moffatt & Nichol  
2700 Lighthouse Point East, Suite 501  
Baltimore, Maryland 21224

Attn: Mr. Peter Kotulak, P.E.

Re: Subsurface Exploration  
***Ted Harvey Conservation Area Restoration Project***  
Kent County, Delaware

Gentlemen:

In accordance with our agreement dated January 27, 2015, Geo-Technology Associates, Inc. (GTA) has performed a subsurface exploration for the eroded levee and emergency spillway located along the St. Jones River, within the Ted Harvey Conservation Area in Kent County, Delaware. The exploration consisted of performing Standard Penetration Test (SPT) borings at 9 locations and one hand auger boring along the levee and adjacent to the spillway in order to collect subsurface data for engineering analysis. The results of the field testing, laboratory analyses, and our geotechnical recommendations regarding restoration of the levee and spillway are included in this report.

Sincerely,  
**GEO-TECHNOLOGY ASSOCIATES, INC.**

Timothy Hill  
Project Manager

Meghan Lester, P.E.  
Vice President

TH/ML/amd  
150371  
Attachments

18 Boulden Circle, Suite 36, New Castle, DE 19720 (302) 326-2100 Fax: (302) 326-2399

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## REPORT OF GEOTECHNICAL EXPLORATION

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# **TED HARVEY CONSERVATION AREA RESTORATION PROJECT**

**Kent County, Delaware**

June 2015

Prepared For:

**MOFFATT & NICHOL**

2700 Lighthouse Point East, Suite 500  
Baltimore, Maryland 21224

---

Prepared By:

**GEO-TECHNOLOGY ASSOCIATES, INC.**

*Geotechnical and Environmental Consultants*

18 Boulden Circle, Suite 36

New Castle, Delaware 19720

(302) 326-2100

GTA Job No: 150371

## TABLE OF CONTENTS

	PAGE
INTRODUCTION.....	1
SITE DESCRIPTION.....	1
RELEVANT GEOLOGY.....	2
SUBSURFACE EXPLORATION.....	2
SUBSURFACE CONDITIONS.....	4
LABORATORY ANALYSIS.....	4
CONCLUSIONS AND RECOMMENDATIONS.....	5
<i>Grading Activities</i> .....	6
<i>Control Structures</i> .....	7
CONSTRUCTION MONITORING SCOPE.....	9
LIMITATIONS.....	10
ASFE—Important Information About Your Geotechnical Engineering Report	
APPENDICES	
Appendix A – Figures	
Figure No. 1 – Site Location Map	
Figure No. 2 – Exploration Location Plan	
Appendix B – Subsurface Exploration Data	
Notes For Exploration Logs	
Test Boring Logs (TH-1 and TH-10, 19 Sheets)	
Appendix C – Laboratory Data	
Figures Nos. 3 to 7 - Particle Size Distribution Reports (5 Sheets)	
Figure No. 8- Consolidation Test Reports (1 Sheet)	

**REPORT OF GEOTECHNICAL EXPLORATION**  
**TED HARVEY CONSERVATION AREA RESTORATION PROJECT**  
**KENT COUNTY, DELAWARE**  
**JUNE 2015**

**INTRODUCTION**

This report presents the results of the geotechnical exploration performed along the existing levee berms and emergency spillway adjacent to the St. Jones River at the Ted Harvey Conservation Area, in Kent County, Delaware. The levee is located in the southern portion of the Ted Harvey Conservation Area and generally extends from the southern end of the existing spillway approximately 4000 feet east towards Delaware Bay. Geo-Technology Associates, Inc. (GTA) understands that the existing levee has undergone some erosion and may have stability issues. We understand that the Delaware Department of Natural Resources and Environmental Control is considering restoring the levee. In addition, DNREC intends to upgrade the emergency spillway. No survey plans were available for the berm embankments at the time this report was prepared; however, it is understood that the levee will be reconstructed to an elevation of approximately 8 feet NAVD.

GTA was retained to perform a geotechnical exploration of the existing levee berms and emergency spillway area. The scope of this study included a field exploration, laboratory testing, and engineering analyses. Included in our field exploration were Standard Penetration Test (SPT) borings and a hand auger boring drilled at 10 locations within the spillway and levee berms to depths of approximately 10 to 50 feet below the existing berm elevation. Limited laboratory testing was performed to verify the visual classifications and characterize general subsurface conditions. Conclusions and recommendations regarding the site were derived from engineering analysis of field and laboratory data, and review of available aerial photographs.

**SITE DESCRIPTION**

The subject site is generally situated south of Kitts Hummock Road within the Ted Harvey Conservation Area in Kent County, Delaware. Specifically, the emergency spillway and levee berm which were the focus of this investigation are located adjacent to the northern bank of the St. Jones River within the Ted Harvey Conservation Area. The specific areas investigated

included approximately 1,000 feet of berm within the emergency spillway area and about 4,000 feet of berm along the levee alignment adjacent to the St. Jones River. The general location of the site and surrounding features are shown on *Figure 1: Site Location Map*, in Appendix A.

The general area is a tidal and fresh water marsh that is close to mean sea level with top of berm elevations estimated to be about Elevation (EL) 3 to 5. The upland areas and farmland in the vicinity of the spillway and levee are at about EL 3 to 10. Two control structures (weirs) were identified at the eastern and western ends of the levee. No survey of the area was available at the time this report was prepared. However, based visual observations and data obtained from Google Earth imagery the levee berm appears to be about 40 to 70 feet wide at the base and approximately 10 to 20 feet wide at the top.

#### **RELEVANT GEOLOGY**

Based on the Geologic Map of Kent Castle County, Delaware (2007), prepared by the Delaware Geological Survey (DGS), the area is situated in the Coastal Plain Physiographic Province, which is characterized by undifferentiated and interlayered sedimentary deposits. Specifically the site is mapped as underlain by Holocene Age marsh deposits. These materials are described as structureless to finely laminated, black to dark gray, organic-rich, silty clay to clayey silt, with discontinuous beds of peat and rare shells. The deposit ranges from 1 to 40 feet thick and is generally mapped where there is salt-tolerant marsh grass present. Refer to the publication for further information.

#### **SUBSURFACE EXPLORATION**

The subsurface exploration was conducted March 24, 2015 through April 23, 2015. The field exploration included drilling nine Standard Penetration Test (SPT) borings and one hand auger boring, designated as TH-1 through TH-10, at evenly spaced intervals along the centerline of the emergency spillway and levee berms. The test borings were drilled to depths of approximately 35 to 50 feet below the existing ground surface using an ATV-mounted CME 550X drill rig equipped with hollow stem augers and an auto-trip hammer. Due to a breach in the levee, one of the borings (TH-10) had limited access and was performed with hand auger equipment. The hand auger was performed to a depth of approximately 10 feet below the

existing ground surface. The test locations were selected and field located by GTA by measuring from existing site features. Elevations were interpolated from Google Earth image and should be considered approximate. The approximate test boring locations are indicated on the attached *Exploration Location Plan, Figure 2*.

Standard Penetration Testing was performed in the boreholes, with soil samples obtained at approximate 2-foot intervals in the upper 10 feet and at 5-foot intervals thereafter. Standard Penetration Testing involves driving a 2-inch O.D., 1½-inch I.D. split-spoon sampler with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler 24 inches was recorded in 4 intervals of 6 inches. The total number of hammer blows required to drive the sampler from the 6 to 18 inch interval is the SPT N-value. Uncorrected blow counts are noted on the logs.

Also, undisturbed samples of fine-grained soils were obtained using a thin-wall tube sampler in general accordance with ASTM D1587. The thin-wall (Shelby tube) sampling procedure consisted of slowly pushing a 3-inch O.D. tube into the soil, waiting for a period of about 15 minutes, manually rotating the sampler, and then retrieving the tube. Three Shelby Tube samples were obtained during the investigation. One Shelby Tube sample was obtained at boring location TH-4 at a depth of 13 to 15 feet below ground surface, another Shelby Tube sample was obtained at boring location TH-7 at a depth of 8 to 10 feet below ground surface and the last Shelby Tube sample was obtained at boring location TH-9 at a depth of 8 to 10 feet below ground surface. Recoveries of the undisturbed samples were 100 percent, 60 percent and 86 percent, respectively.

Detailed descriptions of the encountered subsurface conditions are indicated on the individual boring logs, which are included in Appendix B. The soil samples retrieved from the borings were brought to GTA's laboratory for visual classification by engineering personnel and limited laboratory testing. The soil descriptions indicated on the logs are based on visual observations of the individual soil samples using the Unified Soil Classification System (ASTM D2488) as summarized in the *Notes for Exploration Logs* included in Appendix B, supplemented by the laboratory test results.



### **SUBSURFACE CONDITIONS**

In general agreement with the known site conditions and the published geology, test borings TH-1 through TH-10 encountered approximately 2 to 8 feet of fill materials comprised primarily of silt and sand mixtures with varying amounts gravel and/or organic matter. The fill materials were generally encountered in a soft/very loose to stiff/medium dense state and were underlain by very soft to stiff, organic and elastic silts and clays. The very soft to stiff organic and elastic silts and clays were encountered to depths ranging from 33 to 50 feet. Loose silty sand and poorly-graded sand layers were encountered below the organic silts and clays at test locations TH-1 and TH-7, respectively. These sand layers extended to the maximum depth explored (35 feet).

Unconfined compressive strengths of the fine grained soils recovered from the split spoon samples were estimated using a Pocket Penetrometer. Pocket Penetrometer values indicated unconfined compressive strengths varying between less than 200 psf in the very soft soils and 1000 psf in the soft to medium stiff soils. These values correlate to undrained shear strengths varying from less than 100 to about 500 psf.

Groundwater was initially encountered during drilling at depths ranging from 2.2 to 13 feet below existing surface grades. Subsequent groundwater readings after removal of the augers were recorded at depths ranging from 3 to 10 feet below existing surface grades. The boreholes at test locations TH-3, TH-6 and TH-9 caved dry at depths ranging from about 0.7 to 4 feet following removal of the augers. The groundwater elevation likely fluctuates with the level of the water in the St. Jones River and tidal changes in Delaware Bay.

### **LABORATORY ANALYSIS**

Selected samples obtained from the borings were tested for particle-size distribution, Atterberg Limits, natural moisture content, organic content and consolidation characteristics. The particle-size distribution and Atterberg Limits testing were performed on samples to determine their classification using the Unified Soil Classification System (USCS), which provides information regarding soil's engineering behavior. The results of the testing are summarized in the table below.

### SUMMARY OF INDEX TESTING

BORING	DEPTH (FEET)	USCS CLASSIFICATION	LL%	PI%	NMC%
TH-2	6 to 8	Organic CLAY with Sand (OH)	73	39	63.2
TH-4	2 to 4	Organic SILT (OH)	107	59	114.6
TH-6	23 to 25	Organic CLAY (OH)	90	53	82.4
TH-7	8 to 10	Organic SILT with Sand (OH)	82	44	105.4
TH-9	13 to 15	Organic CLAY (OH)	136	85	136.0

LL=Liquid Limit; PI=Plasticity Index; NP=Non-plastic; NMC=Natural Moisture Content

The particle size distribution reports are included in Appendix C. One sample selected from Test Boring TH-6 was tested for organic content. The organic content based on a dry weight basis was determined to be 4.8%. The compression index ( $c_c$ ), coefficients of consolidation ( $c_v$ ) under specific load conditions, and initial void ratio ( $e_o$ ) were also calculated, and are indicated on the consolidation test report included in Appendix C.

### CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the boring and laboratory data, there is a 10-foot to greater than 44-foot thick layer of very soft to soft compressible silts and clays below the levee berm. We have considered that this layer is normally consolidated so any new load from regrading and/or berm reconstruction activities will cause additional settlement. Given the width and configuration of the of the levee embankment, there is an adequate factor of safety for slope stability under normal pool conditions and rapid draw down conditions provided no significant changes are made in geometry of the berm.

Estimated settlement at the end of primary consolidation due to an imposed load equal to 5 feet of new embankment fill ranges from about ½ to 1½ feet. Very soft/organic soils typically exhibit large secondary compression settlements under a constant load, and this mechanism is dominant after primary consolidation is complete. Settlements due to secondary compression were estimated to range from about ½ to 2 inches over a period of 30 years, in addition to the ½- to 1½-foot of settlement expected after 90 percent consolidation is achieved.

### ***Grading Activities***

At the time this report was prepared, proposed grading changes to the berm were not available. Given the limited work area and the site constraints, filling the embankment and placing additional fill as necessary as settlement occurs is likely the most cost-effective and practical solution to providing the desired freeboard.

Prior to placing any new fill to raise or widen the levee berm, the upstream and downstream face of the slope would need to be cleared and grubbed. Prior to the placement of compacted fill, the area should be stripped to remove any vegetation, organic material, surface debris, or other unsuitable materials from the cartway and slopes. Any surficial materials identified as unstable or unsuitable should be undercut to stable stratum and backfilled with controlled, compacted fill as recommended in the field by the Geotechnical Engineer. Fill should be placed in lifts and be compacted in accordance with the specifications included in this report. The stripping of organics, proofrolling, undercutting of any uncontrolled or unsuitable material, and placement of controlled, compacted fill should be observed by a Geotechnical Engineer or their qualified representative. Off-site borrow, should meet Unified Soil Classification System (USCS) designation ML, CL, SC, SM, or GM. The contractor should provide a sample of the borrow materials to the engineer for testing and approval. All borrow sources should be approved by the geotechnical engineer prior to hauling the material to the site. Structural fill should be placed and compacted to a minimum of 92 percent of the Standard Proctor (ASTM D698) maximum dry density.

Upon satisfactory evaluation of the subgrade, structural fill should be placed in lifts and compacted in accordance with the specifications included in this report. The materials will typically need to be within 3 to 4 percentage points of the optimum moisture before compactive effort is applied. Positive drainage should be maintained on the site during construction to reduce the potential for subgrade degradation due to ponding water. Depending on the moisture content at the time of construction, the soils could require drying to reduce the moisture content to within the required working range for compaction. All structural fill should be constructed in maximum 8-inch thick loose lifts.

The embankment materials shall be spread in level, continuous, horizontal layers for the width and length of such portion at that elevation. Where the lift ties back into an existing slope steeper than 5H:1V, the layer should be keyed or benched into the existing slope. Additionally, GTA recommends that the embankment faces be filled steeper than proposed then reshaped or shaved to their intended design slope. Also, during construction, any previously placed and compacted materials which have become soft or loose due to exposure to weather, which contain erosion channels or cracks, or which are excessively dry, shall be reworked or removed before successive lifts are placed.

Based on the results of the test borings and laboratory analyses, it is anticipated that soft and unstable soils will be encountered below the surficial vegetation along portions of the levee berm. Where these soft and unstable conditions are identified during site preparation activities, the subgrade soils will likely require undercutting and stabilization using geogrids or high strength geotextiles and free draining granular fill. The slopes should generally be limited to 3H:1V (horizontal:vertical) or flatter if the toe of the slope extends into open waterways to reduce the potential for a bearing capacity failure. Due to the soft and compressible nature of the underlying soils and the anticipated variability in the fill placement quantities required to achieve the proposed design elevation, it is anticipated that some differential settlements or localized subsidence may occur after the new embankment fill is placed. Therefore, GTA recommends that a periodic evaluation and maintenance program be implemented to assess and correct any potential areas that may be exhibiting signs of differential settlement or subsidence that could result in a breach of the levee. More specific details for staging, sequence of construction, and instrumentation or monitoring can be provided to address the soft ground issues once a concept plan is prepared.

### ***Control Structures***

Due to the very soft/compressible deposits in the upper 15 to 40+ feet, a deep foundation system which bypasses the fill and compressible deposits and derives its support from the underlying natural granular soils will be necessary for support of new control structures. Pile loads of up to 15 tons are anticipated for the structures. Therefore, it is our opinion that treated timber piles would be the most economical pile type to use on this project. Treated, southern

pine timber piles with a minimum tip diameter of seven inches and minimum butt diameter of 13 inches may be designed for vertical allowable capacities of up to 15 tons when driven to the required capacity within the medium dense sand. A downdrag load of up to 5 tons was considered in the pile capacities due to settlement of the soft/organic soils in the upper 15 to 40+ feet caused by the 5 feet of new fill. Individual pile spacing should be no closer than 3 pile diameters or 3 feet to maintain a group efficiency of one. The piles should conform to the requirements of ASTM D25 for the structural properties of the pile and should be pressure treated in accordance with AWPAC-3 specifications. Pile lengths are expected to range from 45 to 65 feet below the design cutoff elevation to achieve this capacity, depending on the locations of the new structures. We recommend that grading activities be mostly complete prior to pile installation.

The piles should be driven through the organic and soft stratum and into the underlying natural granular soils using a pile driving hammer which delivers a rated energy generally ranging from 16,000 to 25,000 foot-pounds per blow. The piles should be driven to the resistance required by an approved driving formula to achieve the required design capacity. During driving, pore pressures in the granular soils will increase resulting in a temporary reduction of shear stress in the soil and the pile capacity. As pore pressures dissipate, the actual pile capacity will increase. This phenomenon is known as the "pile set up". Therefore, if the estimated depths are reached and the driving criterion has not been met, the piles should be allowed to sit a minimum of 24 hours to allow pore pressures to dissipate. After the "pile set up" time, the piles can be re-struck to evaluate if the driving criteria has been met. If possible, the driving resistance should be maintained for at least 12 inches. Also, the piles should generally penetrate a minimum of 10 feet into the bearing stratum regardless of the driving resistance unless practical refusal is encountered. If practical, test piles can be driven at or near the proposed outlet structures to better estimate the required lengths based on the final design capacity prior to delivering all of the production piles so that adjustments can be made to the delivered lengths. However, the contract documents should make it the sole responsibility of the pile drive to deliver adequate length piles to the site.

All pile driving operations should be observed by a qualified geotechnical engineer or their representative who is familiar with the site conditions and design criteria.

### ***Instrumentation***

During grading activities and embankment reconstruction, instrumentation consisting of settlement plates and piezometers should be installed and monitored. A minimum of three settlement plates should be placed on the subgrade soils before placing structural fill for the building pad. The settlement monuments should be constructed of ¼-inch, 18-inch x 18-inch, or larger, steel plate set at or near the current subgrade elevation. Threaded ¾- to 1-inch diameter steel pipe should be welded vertically to the plate. A PVC casing pipe should be placed over the steel pipe to isolate it from the fill. Additional pipe can be added as needed using threaded pipe couplers as the fill is placed. A detail sketch of a settlement monument can be prepared, if necessary.

Surveyed elevation readings should be shot to the nearest 0.005 foot at least prior to and during fill placement. After fill placement, surveyed elevations should be made weekly. The monument riser pipes should be well marked and protected to avoid disturbance by construction traffic. The survey data should be provided to the geotechnical engineer for review.

In addition to the settlement plates, piezometers equipped with pore pressure transducers and/ or vibrating wires can be installed into the alluvial layer at several locations. Weekly readings can be performed to monitor pore pressure dissipation during consolidation. The piezometers and pore pressure readings can be used to better understand the subsurface drainage and to refine the time-rate settlement model using actual field data.

### **CONSTRUCTION MONITORING SCOPE**

We recommended that during final design and construction of the subject project, GTA be retained to provide consultation and observation and testing during construction generally as follows.

- Review final civil plans and specifications to evaluate if they conform to the intent of this report.

- Provide recommendations for an instrumentation program if deemed appropriate based on the final design.
- Provide installation and review of instrumentation during construction to evaluate soft ground response during loading.
- Observe the proof-rolling of the embankment to evaluate stability.
- Provide on-site observation and testing of structural fill.

### **LIMITATIONS**

This report has been prepared for the exclusive use of Moffatt & Nichol in accordance with generally accepted geotechnical engineering practice. No warranty, express or implied, is made. Use and reproduction of this report by any other person without the expressed written permission of GTA and Moffatt & Nichol is unauthorized and such use is at the sole risk of the user.

The analysis and recommendations contained in this report are based on the data obtained from the test borings. The test borings indicate soil conditions only at specific locations and times and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between the test boring locations. If variations in subsurface conditions from those described are noted during construction, recommendations in this report may need to be re-evaluated.

In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing. Geo-Technology Associates, Inc. is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the express written authorization of Geo-Technology Associates, Inc.

The scope of our services for this geotechnical exploration did not include any environmental assessment or investigation for the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around this site.

Any statements in this report or on the logs regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

This report and the attached logs are instruments of service. If certain conditions or items are noted during our investigation, Geo-Technology Associates, Inc. may be required by prevailing statutes to notify and provide information to regulatory or enforcement agencies. Geo-Technology Associates, Inc. will notify our Client should a required disclosure condition exist.

**150371**

**GEO-TECHNOLOGY ASSOCIATES, INC.**



# Important Information About Your Geotechnical Engineering Report

*Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.*

*The following information is provided to help you manage your risks.*

## **Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects**

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply the report for any purpose or project except the one originally contemplated.*

## **Read the Full Report**

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

## **A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors**

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

## **Subsurface Conditions Can Change**

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

## **Most Geotechnical Findings Are Professional Opinions**

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

## **A Report's Recommendations Are *Not* Final**

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

### **A Geotechnical Engineering Report Is Subject to Misinterpretation**

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

### **Do Not Redraw the Engineer's Logs**

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

### **Give Contractors a Complete Report and Guidance**

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time to perform additional study.* Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

### **Read Responsibility Provisions Closely**

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that

have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

### **Geoenvironmental Concerns Are Not Covered**

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

### **Obtain Professional Assistance To Deal with Mold**

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

### **Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance**

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.




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# **APPENDIX A**



**Key:**

 **TH-#** Number and approximate location of Test Borings performed for this study

JOB NUMBER:  
150371

FIGURE:  
2

REVIEW BY:  
ML

SCALE:  
NTS

DATE:  
JUNE 2015

**EXPLORATION LOCATION PLAN**  
TED HARVEY CONSERVATION AREA  
RESTORATION PROJECT  
KENT COUNTY, DELAWARE

**GEO-TECHNOLOGY ASSOCIATES, INC.**  
*Geotechnical and Environmental Consultants*  
18 Boulden Circle, Suite 36  
New Castle, Delaware 19720  
(302) 326-2100  
Fax (302) 326-2399



Notes: (1) Layout was obtained from Google Earth Imagery, Inc from July 2010.  
(2) Exploration Location Plan should be read together with GTA Report Job No. 150371 for complete evaluation.





**Notes:**

- 1) Base map obtained from Google Earth Imagery, Inc. from July 2010



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**SITE LOCATION MAP**

**TED HARVEY CONSERVATION AREA  
 RESTORATION PROJECT**

**KENT COUNTY, DELAWARE**

SCALE

NTS

DATE

JUNE 2015

DRAWN BY

GOOGLE

REVIEW BY

ML

JOB NO.

150371

FIGURE NO.

1

## **APPENDIX B**

# NOTES FOR EXPLORATION LOGS

## KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)			SYMBOLS	
			GRAPHIC	LETTER
COARSE - GRAINED SOILS	GRAVEL AND GRAVELY SOILS  MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS  (LESS THAN 5% PASSING THE NO. 200 SIEVE)		GW
		GRAVELS WITH FINES  (MORE THAN 15% PASSING THE NO. 200 SIEVE)		GP
				GM
				GC
	SAND AND SANDY SOILS  MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS  (LESS THAN 5% PASSING THE NO. 200 SIEVE)		SW
		SANDS WITH FINES  (MORE THAN 15% PASSING THE NO. 200 SIEVE)		SP
			SM	
FINE - GRAINED SOILS	SILTS AND CLAYS  LIQUID LIMIT LESS THAN 50	SILT OR CLAY ( $<15\%$ RETAINED THE NO. 200 SIEVE)		ML
		SILT OR CLAY WITH SAND OR GRAVEL ( $15\%$ TO $30\%$ RETAINED THE NO. 200 SIEVE)		CL
		SANDY OR GRAVELY SILT OR CLAY ( $>30\%$ RETAINED THE NO. 200 SIEVE)		OL
	SILTS AND CLAYS  LIQUID LIMIT GREATER THAN 50	SILT OR CLAY ( $<15\%$ RETAINED THE NO. 200 SIEVE)		MH
		SILT OR CLAY WITH SAND OR GRAVEL ( $15\%$ TO $30\%$ RETAINED THE NO. 200 SIEVE)		CH
		SANDY OR GRAVELY SILT OR CLAY ( $>30\%$ RETAINED THE NO. 200 SIEVE)		OH
HIGHLY ORGANIC SOILS				PT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS CONTAINING AN ESTIMATED 10% FINES BY VISUAL CLASSIFICATION OR WHEN THE SOIL HAS BETWEEN 5 AND 12 PERCENT FINES FROM LABORATORY TESTS; AND FOR FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSSHATCHED AREA. RESULTS OF LABORATORY TESTING ARE USED TO SUPPLEMENT THE CLASSIFICATION OF THE SOILS BASED ON THE VISUAL-MANUAL PROCEDURES OF ASTM D2488.

## ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

ADDITIONAL DESIGNATION	DESCRIPTION		GRAPHIC SYMBOLS
	TOPSOIL		
	MAN-MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATION	DESCRIPTION	"N" VALUE	
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" PENETRATION, AUGER PENETRABLE	

## COARSE-GRAINED SOILS (GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D1586

## FINE-GRAINED SOILS (SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:  
WOH = WEIGHT OF HAMMER  
WOR = WEIGHT OF ROD(S)

## SAMPLE TYPE

DESIGNATION	SYMBOL
SPLIT-SPOON	S-
SHELBY TUBE	U-
ROCK CORE	R-

## WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	
UPON COMPLETION OF DRILLING	
24 HOURS AFTER COMPLETION	

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

# LOG OF BORING NO. TH-1

Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
PROJECT NO.: **150371**  
PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **8.5** **13.0** **4.0**  
DATE: **3/24/15** **3/24/15** **3/26/15**  
CAVED (ft): **In Auger** **N/A** **N/A**

DATE STARTED: **3/24/15**  
DATE COMPLETED: **3/24/15**  
DRILLING CONTRACTOR: **GTA**  
DRILLER: **D. Hans**  
DRILLING METHOD: **Hollow Stem Auger**  
SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft) **8.5**  
GROUND SURFACE ELEVATION: **3 ft**  
DATUM: **Google Earth**  
EQUIPMENT: **CME550X**  
LOGGED BY: **T. Hill**  
CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					3.0	0	FILL		Brown, moist, medium dense, silty sand FILL, trace gravel	
S-1	0.0	8	3-6-8-9	14					Same	
S-2	2.0	8	3-5-6-5	11					Brown, wet, medium dense, gravely sand with silt FILL	
S-3	4.0	2	3-6-5-6	11		5			Same	
S-4	6.0	11	7-5-7-7	12						
S-5	8.0	15	2-3-4-4	7	-5.0		SM		Brown, moist, loose, Silty SAND	
						10				
S-6	13.0	12	WH/18	WH/18					Gray, wet, very loose, Silty SAND, trace gravel	
						15				
S-7	18.0	10	1-1-1-1	2					Same	
						20				
S-8	23.0	20	2-2-2-2	4	-20.0		OL		Dark brown, wet, soft organic SILT/PEAT with root fibers	
						25				
S-9	28.0	15	1-2-1-2	3					Same	
						30				

NOTES: Elevation and location should be considered approximate.



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LOG OF BORING NO. TH-1

Sheet 1 of 2



## Sheet 2 of 2

WATER LEVEL (ft):	 8.5	 13.0	 4.0
DATE:	3/24/15	3/24/15	3/26/15
CAVED (ft):	In Auger	N/A	N/A

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-10	33.0	13	2-2-2-3	4	-30.0		SM		Green and gray, moist, loose, Silty SAND	
					-32.0	35			Boring terminated at 35.0 feet	
						40				
						45				
						50				
						55				
						60				
						65				



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LOG OF BORING NO. TH-1

Sheet 2 of 2


# LOG OF BORING NO. TH-10


Sheet 1 of 1

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft):     
 DATE: \_\_\_\_\_  
 CAVED (ft): \_\_\_\_\_

DATE STARTED: **4/23/15**  
 DATE COMPLETED: **4/23/15**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: \_\_\_\_\_  
 DRILLING METHOD: \_\_\_\_\_  
 SAMPLING METHOD: \_\_\_\_\_

WATER ENCOUNTERED DURING DRILLING (ft)  **2.2**  
 GROUND SURFACE ELEVATION: **4 ft**  
 DATUM: **Google Earth**  
 EQUIPMENT: **Hand Auger**  
 LOGGED BY: **T. Hill**  
 CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS GRAPHIC SYMBOL		
								DESCRIPTION	REMARKS
					4.0	0	FILL	Gray, moist, organic clay FILL, trace root fibers	
					2.0		OL	Gray, wet, Organic SILT, trace root fibers	
						5		Same, some root fibers	
					-6.0	10		Auger boring terminated at 10 feet	
						15			
						20			
						25			
						30			

NOTES: Elevation and location should be considered approximate.



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**LOG OF BORING NO. TH-10**

Sheet 1 of 1

# LOG OF BORING NO. TH-2





Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
PROJECT NO.: **150371**  
PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft):  $\nabla$  **13**     $\nabla$  **12.5**     $\nabla$  **3.0**  
DATE: **3/24/15**    **3/24/15**    **3/26/15**  
CAVED (ft): **In Auger**    **N/A**    **N/A**

DATE STARTED: **3/24/15**  
DATE COMPLETED: **3/24/15**  
DRILLING CONTRACTOR: **GTA**  
DRILLER: **D. Hans**  
DRILLING METHOD: **Hollow Stem Auger**  
SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft)  $\nabla$  **13.0**  
GROUND SURFACE ELEVATION: **4 ft**  
DATUM: **Google Earth**  
EQUIPMENT: **CME550X**  
LOGGED BY: **T. Hill**  
CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
					4.0	0	FILL		Brown, moist, medium dense, silty sand FILL, trace gravel	
S-1	0.0	9	1-5-6-6	11					Same	
S-2	2.0	5	4-3-4-5	7					Same	
S-3	4.0	1	3-5-3-3	8		5			Same	
S-4	6.0	4	2-3-3-3	6	-2.0		OH		Dark brown, moist, medium stiff, Organic CLAY with sand	
S-5	8.0	0	WH/24	WH/24	-4.0				no recovery	
						10				
S-6	13.0	1	WH/24	WH/24	-9.0		OL		Dark brown, moist, medium stiff, organic SILT with root fibers	
						15			Same	
S-7	18.0	14	1-1-1-1	2		20				
S-8	23.0	5	WH/24	WH/24	-19.0		ML		Gray, wet, very soft SILT with Sand	
						25			Same	
S-9	28.0	22	WH/24	WH/24		30				

NOTES: Elevation and location should be considered approximate.



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**LOG OF BORING NO. TH-2**





Sheet 1 of 2

# LOG OF BORING NO. TH-2

Sheet 2 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft):  $\nabla$  13  $\nabla$  12.5  $\nabla$  3.0  
 DATE: **3/24/15** **3/24/15** **3/26/15**  
 CAVED (ft): **In Auger** **N/A** **N/A**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
									DESCRIPTION	REMARKS
S-10	33.0	26	WH/24	WH/24	-29.0	35	CL		Gray, wet, very soft, organic CLAY, trace roots	
S-11	38.0	23	WH/24	WH/24	-39.0	40	ML		Same	
S-12	43.0	24	1-1-2-2	3	-39.0	45	ML		Dark brown, wet, soft, organic SILT, trace root fibers	
S-13	48.0	24	WH/24	WH/24	-44.0	50	CL		Dark gray, wet, very soft, organic CLAY, trace root fibers	
					-46.0	50			Boring terminated at 50.0 feet	
						55				
						60				
						65				



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**LOG OF BORING NO. TH-2**

Sheet 2 of 2

# LOG OF BORING NO. TH-3




Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft):  $\nabla$  **13**  $\nabla$  **9.5**  $\nabla$  **Dry**  
 DATE: **3/24/15** **3/24/15** **3/26/15**  
 CAVED (ft): **In Auger** **N/A** **1.0**

DATE STARTED: **3/24/15**  
 DATE COMPLETED: **3/25/15**  
 DRILLING CONTRACTOR: **GTA**  
 DRILLER: **D. Hans**  
 DRILLING METHOD: **Hollow Stem Auger**  
 SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft)  $\nabla$  **13.0**  
 GROUND SURFACE ELEVATION: **4 ft**  
 DATUM: **Google Earth**  
 EQUIPMENT: **CME550X**  
 LOGGED BY: **T. Hill**  
 CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	13	2-3-12-10	15	4.0	0	FILL		Brown, moist, medium dense, gravelly sand FILL	
S-2	2.0	12	4-3-2-2	5	1.0		OL		Dark brown, moist, medium stiff, organic SILT with root fibers	
S-3	4.0	7	1-1-1-2	2		5			Same, soft	
S-4	6.0	11	1-1-1-1	2					Same	
S-5	8.0	2	WH/24	WH/24					Same, very soft	
						10				
S-6	13.0	13	WH/24	WH/24	-9.0		MH		Gray, wet, very soft, Elastic SILT with root fibers	
						15				
S-7	18.0	20	WH/24	WH/24					Same, trace gravel	
						20				
S-8	23.0	18	WH/24	WH/24					Same, no gravel	
						25				
S-9	28.0	24	WH/24	WH/24					Same	
						30				

NOTES: Elevation and location should be considered approximate.



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**LOG OF BORING NO. TH-3**

Sheet 1 of 2

# LOG OF BORING NO. TH-3

Sheet 2 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft):  $\nabla$  13  $\nabla$  9.5  $\nabla$  Dry  
 DATE: 3/24/15 3/24/15 3/26/15  
 CAVED (ft): In Auger N/A 1.0

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
									DESCRIPTION	REMARKS
S-10	33.0	24	WH/24	WH/24		35			Same	
S-11	38.0	24	WH/24	WH/24	-36.0	40			Same, less root fibers	
									Boring terminated at 40.0 feet	
						45				
						50				
						55				
						60				
						65				



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**LOG OF BORING NO. TH-3**

Sheet 2 of 2

# LOG OF BORING NO. TH-4







Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
PROJECT NO.: **150371**  
PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft):  $\nabla$  **3.0**  $\nabla$  **6.0**  $\nabla$  **3.5**  
DATE: **3/25/15** **3/25/15** **3/26/15**  
CAVED (ft): **In Auger** **N/A** **N/A**

DATE STARTED: **3/25/15**  
DATE COMPLETED: **3/25/15**  
DRILLING CONTRACTOR: **GTA**  
DRILLER: **D. Hans**  
DRILLING METHOD: **Hollow Stem Auger**  
SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft)  $\nabla$   
GROUND SURFACE ELEVATION: **4 ft**  
DATUM: **Google Earth**  
EQUIPMENT: **CME550X**  
LOGGED BY: **T. Hill**  
CHECKED BY: **M. Lester**

CHECKED BY: WH-20001											
SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
						0	FILL		Gray, moist, soft, sandy silt with organic fibers FILL		
S-1	0.0	6	1-2-2-2	4	4.0	2.0	OH		Gray, wet, soft, Organic SILT		
S-2	2.0	15	2-2-2-2	4					Same, very soft		
S-3	4.0	3	WH/24	WH/24		5			Same		
S-4	6.0	24	WH/24	WH/24							
S-5	8.0	11	WH/24	WH/24	-4.0		CH		Gray, wet, very soft, Fat CLAY with Sand		
						10					
U-1	13.0	24				15					Tube 13-15 feet 100% recovery
S-7	18.0	24	WH/24	WH/24	-14.0		MH		Gray, wet, very soft, Elastic SILT with root fibers		
						20					
S-8	23.0	24	WH/24	WH/24		25			Same		
S-9	28.0	24	WH/24	WH/24		30			Same		

NOTES: Elevation and location should be considered approximate.



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**LOG OF BORING NO. TH-4**

Sheet 1 of 2

# LOG OF BORING NO. TH-4

Sheet 2 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **3.0** **6.0** **3.5**  
 DATE: **3/25/15** **3/25/15** **3/26/15**  
 CAVED (ft): **In Auger** **N/A** **N/A**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
									DESCRIPTION	REMARKS
S-10	33.0	24	WH/24	WH/24	-31.0	35			Same	
									Boring terminated at 35.0 feet	



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**LOG OF BORING NO. TH-4**

Sheet 2 of 2



# LOG OF BORING NO. TH-5





Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
PROJECT NO.: **150371**  
PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **8.0** **13.0** **4.5**  
DATE: **3/25/15** **3/25/15** **3/26/15**  
CAVED (ft): **In Auger** **N/A** **N/A**

DATE STARTED: **3/25/15**  
DATE COMPLETED: **3/25/15**  
DRILLING CONTRACTOR: **GTA**  
DRILLER: **D. Hans**  
DRILLING METHOD: **Hollow Stem Auger**  
SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft) **8.0**  
GROUND SURFACE ELEVATION: **4 ft**  
DATUM: **Google Earth**  
EQUIPMENT: **CME550X**  
LOGGED BY: **T. Hill**  
CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	4	2-2-2-2	4	4.0	0	FILL		Gray, moist, soft, sandy silt FILL with root fibers	
S-2	2.0	13	1-1-1-1	2	1.0		MH		Gray, wet, soft, Elastic SILT with root fibers	
S-3	4.0	2	WH/24	WH/24	5					
S-4	6.0	9	WH/24	WH/24	-3.0		OL		Dark brown, wet, soft, organic SILT with abundant root fibers (peat)	
S-5	8.0	11	WH/24	WH/24	-5.0		CH		Gray, wet, very soft, Fat CLAY with Sand, trace root fibers	
					10					
S-6	13.0	16	WH/24	WH/24	15				Same	
S-7	18.0		WH/24	WH/24	20				Same	
S-8	23.0	24	WH/24	WH/24	25				Same	
S-9	28.0	24	WH/24	WH/24	30				Same	

NOTES: Elevation and location should be considered approximate.



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LOG OF BORING NO. TH-5


Sheet 1 of 2

# LOG OF BORING NO. TH-5

Sheet 2 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft):  **8.0**  **13.0**  **4.5**  
 DATE: **3/25/15** **3/25/15** **3/26/15**  
 CAVED (ft): **In Auger** **N/A** **N/A**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
									DESCRIPTION	REMARKS
S-10	33.0	24	WH/24	WH/ 24	-31.0	35			Same	
									Boring terminated at 35.0 feet	



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**LOG OF BORING NO. TH-5**

Sheet 2 of 2

# LOG OF BORING NO. TH-6

Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
PROJECT NO.: **150371**  
PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **4.5** **Dry** **BOC**  
DATE: **3/26/15** **3/26/15** **3/26/15**  
CAVED (ft): **In Auger** **4.0**

DATE STARTED: **3/26/15**  
DATE COMPLETED: **3/26/15**  
DRILLING CONTRACTOR: **GTA**  
DRILLER: **D. Hans**  
DRILLING METHOD: **Hollow Stem Auger**  
SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft) **4.5**  
GROUND SURFACE ELEVATION: **4 ft**  
DATUM: **Google Earth**  
EQUIPMENT: **CME550X**  
LOGGED BY: **T. Hill**  
CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	4	1-1-1-1	2	4.0	0	FILL		Brown, moist, soft, sandy silt FILL with abundant root fibers	
S-2	2.0	11	1-1-1-1	2	2.0		OL		Dark brown, moist, soft, organic SILT with root fibers	
S-3	4.0	2	WH/24	WH/24	0.0	5	CH		Gray, wet, very soft, Fat CLAY with Sand and trace root fibers	
S-4	6.0	1	WH/24	WH/24					Same	
S-5	8.0	11	WH/24	WH/24	-4.0		OH		Dark gray, wet, Organic CLAY, trace root fibers	
						10			Same	
S-6	13.0	13	WH/24	WH/24		15			Same	
									Same	
S-7	18.0	24	WH/24	WH/24	-14.0		MH		Dark brown, wet, very soft, Elastic SILT with some root fibers	
						20			Same	
S-8	23.0	21	WH/24	WH/24		25			Same	
									Same	
S-9	28.0	24	WH/24	WH/24		30			Same, abundant root fibers	

NOTES: Elevation and location should be considered approximate.



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LOG OF BORING NO. TH-6

Sheet 1 of 2

# LOG OF BORING NO. TH-6

Sheet 2 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **4.5**  
 DATE: **3/26/15**  
 CAVED (ft): **In Auger**

**Dry**  
**3/26/15**  
**4.0**

**BOC**  
**3/26/15**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-10	33.0	24	WH/24	WH/24	-31.0	35			Same	
									Boring terminated at 35.0 feet	
						40				
						45				
						50				
						55				
						60				
						65				



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**LOG OF BORING NO. TH-6**

Sheet 2 of 2

# LOG OF BORING NO. TH-7






Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
PROJECT NO.: **150371**  
PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **6.0** **5.0** **BOC**  
DATE: **3/26/15** **3/26/15**  
CAVED (ft): **In Auger** **N/A**

DATE STARTED: **3/26/15**  
DATE COMPLETED: **3/26/15**  
DRILLING CONTRACTOR: **GTA**  
DRILLER: **D. Hans**  
DRILLING METHOD: **Hollow Stem Auger**  
SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft) **▽**  
GROUND SURFACE ELEVATION: **4 ft**  
DATUM: **Google Earth**  
EQUIPMENT: **CME550X**  
LOGGED BY: **T. Hill**  
CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-1	0.0	2	1-2-1-1	3	4.0	0	FILL		Brown, moist, very loose, silty sand FILL with abundant root fibers	
S-2	2.0	1	1-1-1-1	2					Same	
S-3	4.0	1	WH/24	WH/24	0.0	5	PT		Brown, moist, very loose, PEAT	<b>▽</b>
S-4	6.0	24	WH/24	WH/24	-2.0		OH		Gray, wet, very soft, organic CLAY with abundant root fibers	<b>▽</b>
U-1	8.0	18					OH		Dark Gray, wet, Organic SILT with sand	Tube 8 - 10 feet 60% recovery
						10				
S-6	13.0	10	WH/24	WH/24					Same	
						15				
S-7	18.0	22	WH/24	WH/24					Same	
						20				
S-8	23.0	24	WH/24	WH/24					Same	
						25				
S-9	28.0	24	1-1-2-2	3	-24.0		CH		Gray, wet, soft, Sandy Fat CLAY	
						30				

NOTES: Elevation and location should be considered approximate.



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LOG OF BORING NO. TH-7


Sheet 1 of 2

# LOG OF BORING NO. TH-7

Sheet 2 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **6.0** **5.0** **BOC**  
 DATE: **3/26/15** **3/26/15**  
 CAVED (ft): **In Auger** **N/A**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
S-10	33.0	24	2-3-5-7	8	-30.0				Same	
					-31.0	35	SP		Gray, wet, loose, Poorly-graded SAND	
									Boring terminated at 35.0 feet	
						40				
						45				
						50				
						55				
						60				
						65				



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**LOG OF BORING NO. TH-7**

Sheet 2 of 2

# LOG OF BORING NO. TH-8




Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
PROJECT NO.: **150371**  
PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **5.0** **10.0**  
DATE: **3/27/15** **3/27/15**  
CAVED (ft): **In Auger** **N/A**

DATE STARTED: **3/27/15**  
DATE COMPLETED: **3/27/15**  
DRILLING CONTRACTOR: **GTA**  
DRILLER: **D. Hans**  
DRILLING METHOD: **Hollow Stem Auger**  
SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft) **▽**  
GROUND SURFACE ELEVATION: **4 ft**  
DATUM: **Google Earth**  
EQUIPMENT: **CME550X**  
LOGGED BY: **T. Hill**  
CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
S-1	0.0	8	1-1-2-2	3	4.0	0	FILL		Brown, moist, soft, organic silt FILL with root fibers		
S-2	2.0	11	2-2-2-2	4	2.0		OL		Gray, moist, soft, organic SILT with abundant root fibers		
S-3	4.0	8	WH/24	WH/24		5			Same, wet		▽
S-4	6.0	10	WH/24	WH/24					Same (Peat)		
S-5	8.0	1	WH/24	WH/24		10			Same		▽
S-6	13.0	7	WH/24	WH/24	-9.0		MH		Gray, wet, very soft, Elastic SILT, trace root fibers		
S-7	18.0	10	WH/24	WH/24		15			Same		
S-8	23.0	24	WH/24	WH/24		20			Same, no root fibers		
S-9	28.0	24	WH/24	WH/24		25			Same		
						30					

NOTES: Elevation and location should be considered approximate.



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LOG OF BORING NO. TH-8


Sheet 1 of 2

# LOG OF BORING NO. TH-8

Sheet 2 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft):  **5.0**  **10.0**   
 DATE: **3/27/15** **3/27/15**  
 CAVED (ft): **In Auger** **N/A**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
									DESCRIPTION	REMARKS
S-10	33.0	24	WH/24	WH/ 24	-31.0	35			Same	
									Boring terminated at 35.0 feet	
						40				
						45				
						50				
						55				
						60				
						65				



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**LOG OF BORING NO. TH-8**

Sheet 2 of 2



# LOG OF BORING NO. TH-9





Sheet 1 of 2

PROJECT: **Ted Harvey Conservation Area**  
PROJECT NO.: **150371**  
PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **6.0** **Dry** **BOC**  
DATE: **3/27/15** **3/27/15** **3/27/15**  
CAVED (ft): **In Auger** **0.7**

DATE STARTED: **3/27/15**  
DATE COMPLETED: **3/27/15**  
DRILLING CONTRACTOR: **GTA**  
DRILLER: **D. Hans**  
DRILLING METHOD: **Hollow Stem Auger**  
SAMPLING METHOD: **Split Spoon**

WATER ENCOUNTERED DURING DRILLING (ft) **▽**  
GROUND SURFACE ELEVATION: **4 ft**  
DATUM: **Google Earth**  
EQUIPMENT: **CME550X**  
LOGGED BY: **T. Hill**  
CHECKED BY: **M. Lester**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
S-1	0.0	10	1-1-1-1	2	4.0	0	FILL		Gray, very moist, soft, organic silt FILL with root fibers		<div>▽</div> Tube 8-10 feet 86% recovery
S-2	2.0	14	1-2-2-2	4	2.0		ML		Black, moist, soft, Sandy SILT with root fibers		
S-3	4.0	12	1-2-2-2	4	0.0	5	OH		Brown, moist, soft, Organic CLAY with trace to some root fibers		
S-4	6.0	10	2-2-2-2	4					Same, gray, wet		
U-1	8.0	26				10					
S-6	13.0	16	WH/24	WH/24		15	OH		Gray, wet, very soft, Organic CLAY		
S-7	18.0	17	WH/24	WH/24		20			Same		
S-8	23.0	24	WH/24	WH/24		25			Same, less fibers		
S-9	28.0	24	WH/24	WH/24		30			Same		

NOTES: Elevation and location should be considered approximate.



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LOG OF BORING NO. TH-9


Sheet 1 of 2

# LOG OF BORING NO. TH-9

Sheet 2 of 2

PROJECT: **Ted Harvey Conservation Area**  
 PROJECT NO.: **150371**  
 PROJECT LOCATION: **Kent County, Delaware**

WATER LEVEL (ft): **6.0** **Dry** **BOC**  
 DATE: **3/27/15** **3/27/15** **3/27/15**  
 CAVED (ft): **In Auger** **0.7**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
									DESCRIPTION	REMARKS
S-10	33.0	24	WH/24	WH/ 24	-31.0	35			Same	
									Boring terminated at 35.0 feet	
						40				
						45				
						50				
						55				
						60				
						65				



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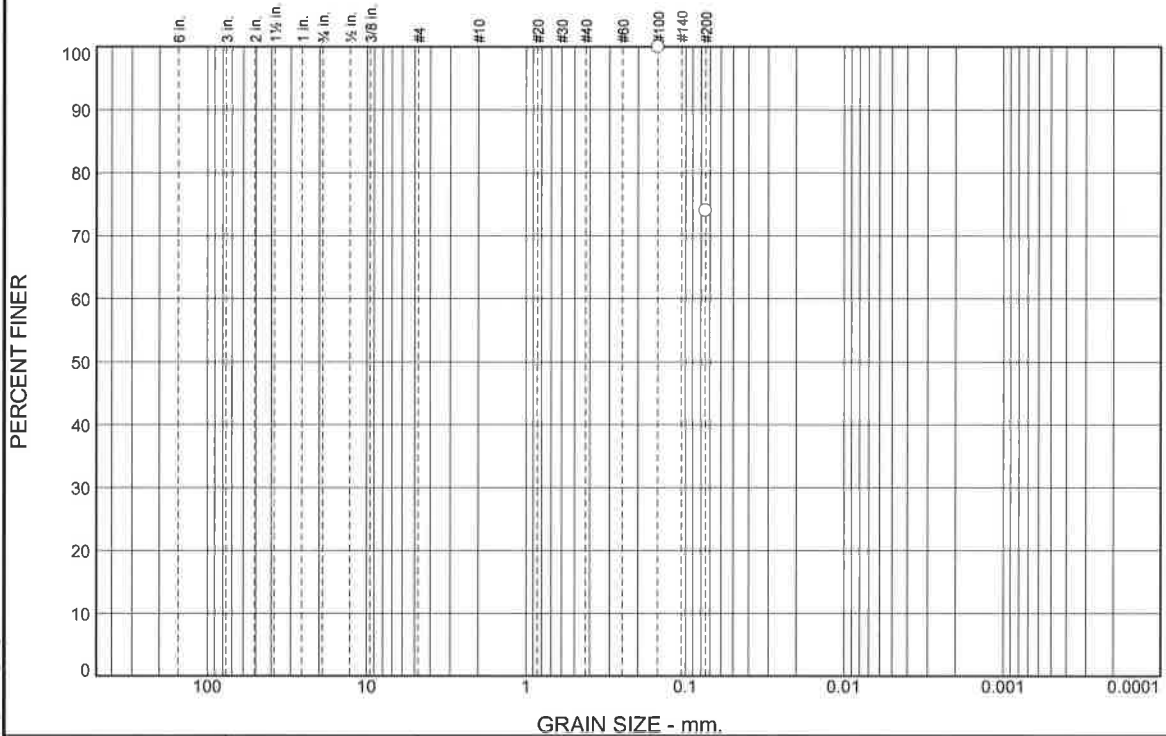
**LOG OF BORING NO. TH-9**

Sheet 2 of 2

## **APPENDIX C**

ASTM Specifications performed may include D421, D422, D2216, D2217 and D4318.

## Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	26.1	73.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#100	100.0		
#200	73.9		

(no specification provided)

**Soil Description**

Dark brown, moist, Organic CLAY with sand

**Atterberg Limits**

PL= 34    LL= 73    PI= 39    NM= 63.2

**Coefficients**

D<sub>90</sub>= 0.1150    D<sub>85</sub>= 0.1007    D<sub>60</sub>=  
D<sub>50</sub>=            D<sub>30</sub>=            D<sub>15</sub>=  
D<sub>10</sub>=            C<sub>u</sub>=                C<sub>c</sub>=

**Classification**

USCS= OH            AASHTO= A-7-5(31)

**Remarks**

Source of Sample: TH-2    Depth: 6.0  
Sample Number: S-4

Date: 4/6/2015



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**Client:** Moffatt & Nichol  
**Project:** Ted Harvey Conservation Area

**Project No:** 150371

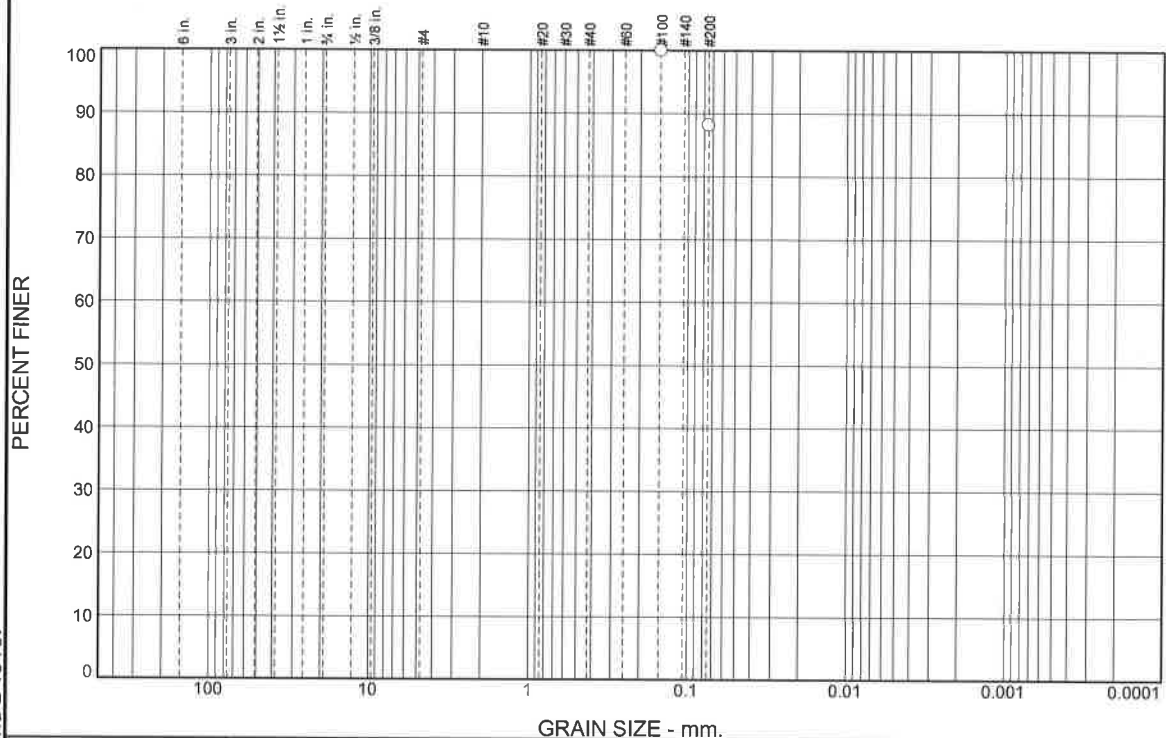
**Figure** 3

Tested By: J. Friant

Checked By: M. Lester

ASTM Specifications performed may include D421, D422, D2216, D2217 and D4318.

## Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	11.9		88.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#100	100.0		
#200	88.1		

\* (no specification provided)

Source of Sample: TH-4  
Sample Number: S-2

Depth: 2.0

Date: 4/6/2015



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Client: Moffatt & Nichol

Project: Ted Harvey Conservation Area

Project No: 150371

Figure 4

### Soil Description

Gray, wet, soft, Organic SILT

### Atterberg Limits

PL= 48    LL= 107    PI= 59    NM= 114.6

### Coefficients

D<sub>90</sub>= 0.0838    D<sub>85</sub>=    D<sub>60</sub>=  
D<sub>50</sub>=    D<sub>30</sub>=    D<sub>15</sub>=  
D<sub>10</sub>=    C<sub>u</sub>=    C<sub>c</sub>=

### Classification

USCS= OH    AASHTO= A-7-5(64)

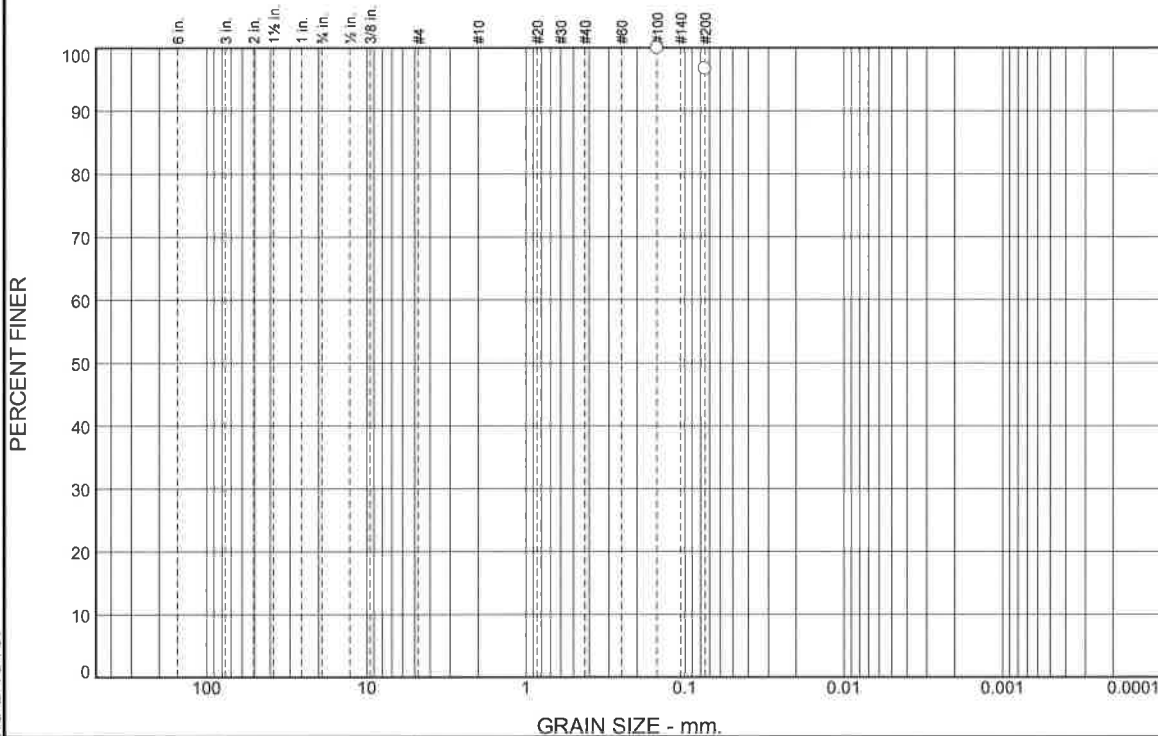
### Remarks

Tested By: J. Friant

Checked By: M. Lester

ASTM Specifications performed may include D421, D422, D2216, D2217 and D4318.

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	3.4	96.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#100	100.0		
#200	96.6		

\* (no specification provided)

**Soil Description**  
Dark Gray, wet, Organic CLAY

**Atterberg Limits**  
PL= 37    LL= 90    PI= 53    NM= 82.4

**Coefficients**  
D<sub>90</sub>=    D<sub>85</sub>=    D<sub>60</sub>=  
D<sub>50</sub>=    D<sub>30</sub>=    D<sub>15</sub>=  
D<sub>10</sub>=    C<sub>u</sub>=    C<sub>c</sub>=

**Classification**  
USCS= OH    AASHTO= A-7-5(63)

**Remarks**  
Organic Content =4.75%

Source of Sample: TH-6    Depth: 8.0  
Sample Number: S-5

Date: 4/6/2015



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**Client:** Moffatt & Nichol  
**Project:** Ted Harvey Conservation Area

**Project No:** 150371

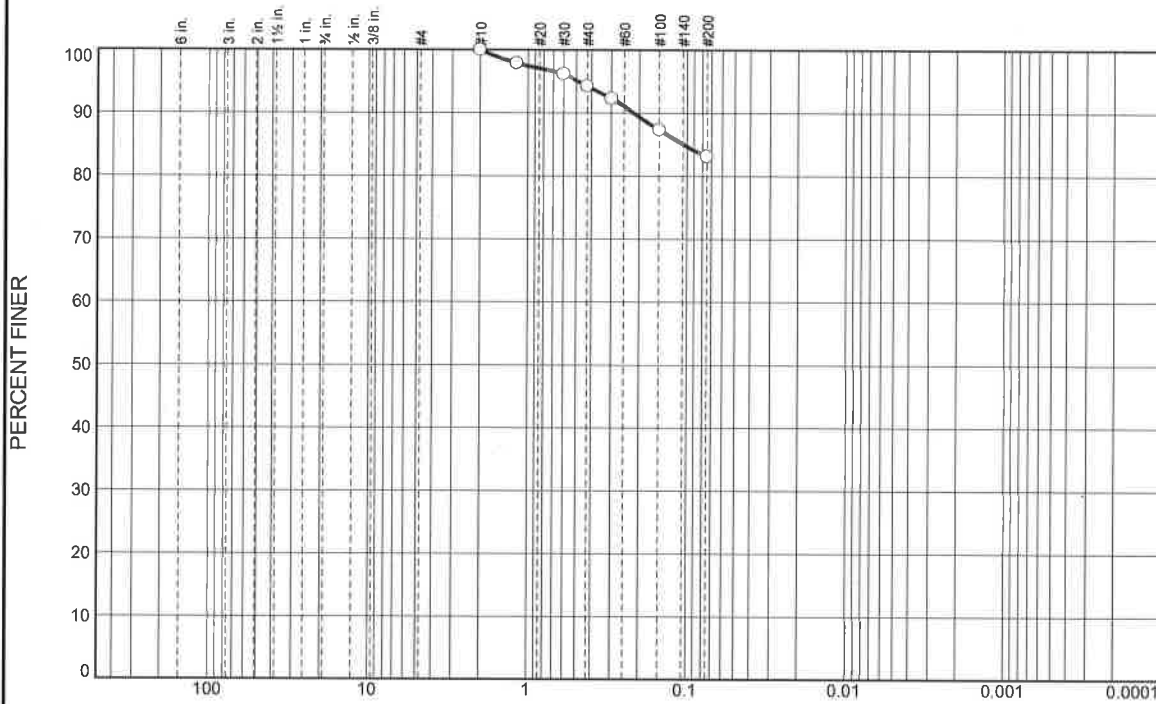
**Figure** 5

Tested By: J. Friant

Checked By: M. Lester

ASTM Specifications performed may include D421, D422, D2216, D2217 and D4318.

# Particle Size Distribution Report



GRAIN SIZE - mm.						
% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt Clay
0.0	0.0	0.0	0.0	5.7	11.2	83.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#16	97.9		
#30	96.1		
#40	94.3		
#50	92.3		
#100	87.3		
#200	83.1		

(no specification provided)

**Soil Description**  
Dark Gray, wet, Organic SILT with sand

**Atterberg Limits**  
PL= 38    LL= 82    PI= 44    NM= 105.4

**Coefficients**  
D<sub>90</sub>= 0.2158    D<sub>85</sub>= 0.1047    D<sub>60</sub>=  
D<sub>50</sub>=    D<sub>30</sub>=    D<sub>15</sub>=  
D<sub>10</sub>=    C<sub>u</sub>=    C<sub>c</sub>=

**Classification**  
USCS= OH    AASHTO= A-7-5(43)

**Remarks**  
Dry Unit Weight = 41.46 pcf

Source of Sample: TH-7    Depth: 8.0  
Sample Number: U-1

Date: 4/14/2015



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**Client:** Moffatt & Nichol  
**Project:** Ted Harvey Conservation Area

**Project No:** 150371

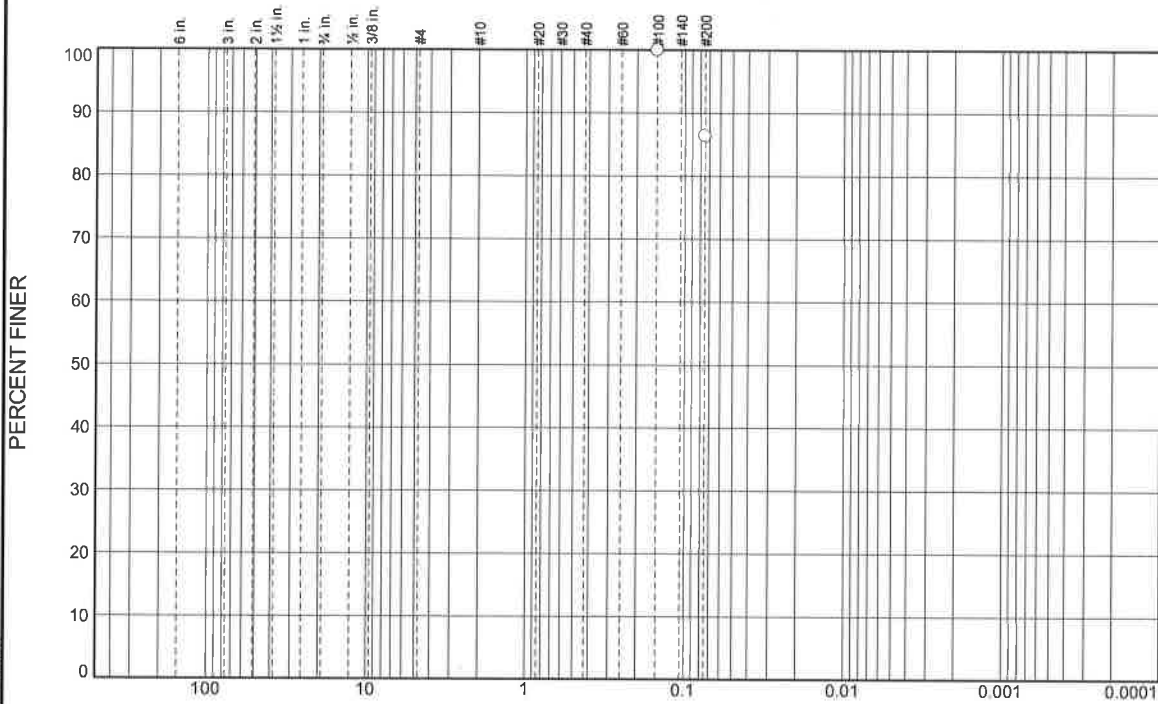
**Figure** 6

Tested By: J. Day

Checked By: M. Lester

ASTM Specifications performed may include D421, D422, D2216, D2217 and D4318.

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	13.7	86.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#100	100.0		
#200	86.3		

(no specification provided)

**Soil Description**  
Gray, wet, very soft, Organic CLAY

**Atterberg Limits**  
PL= 51    LL= 136    PI= 85    NM= 136.0

**Coefficients**  
D<sub>90</sub>= 0.0904    D<sub>85</sub>=    D<sub>60</sub>=  
D<sub>50</sub>=    D<sub>30</sub>=    D<sub>15</sub>=  
D<sub>10</sub>=    C<sub>u</sub>=    C<sub>c</sub>=

**Classification**  
USCS= OH    AASHTO= A-7-5(88)

**Remarks**

Source of Sample: TH-9  
Sample Number: S-6

Depth: 13.0

Date: 4/6/2015



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**Client:** Moffatt & Nichol  
**Project:** Ted Harvey Conservation Area

**Project No:** 150371

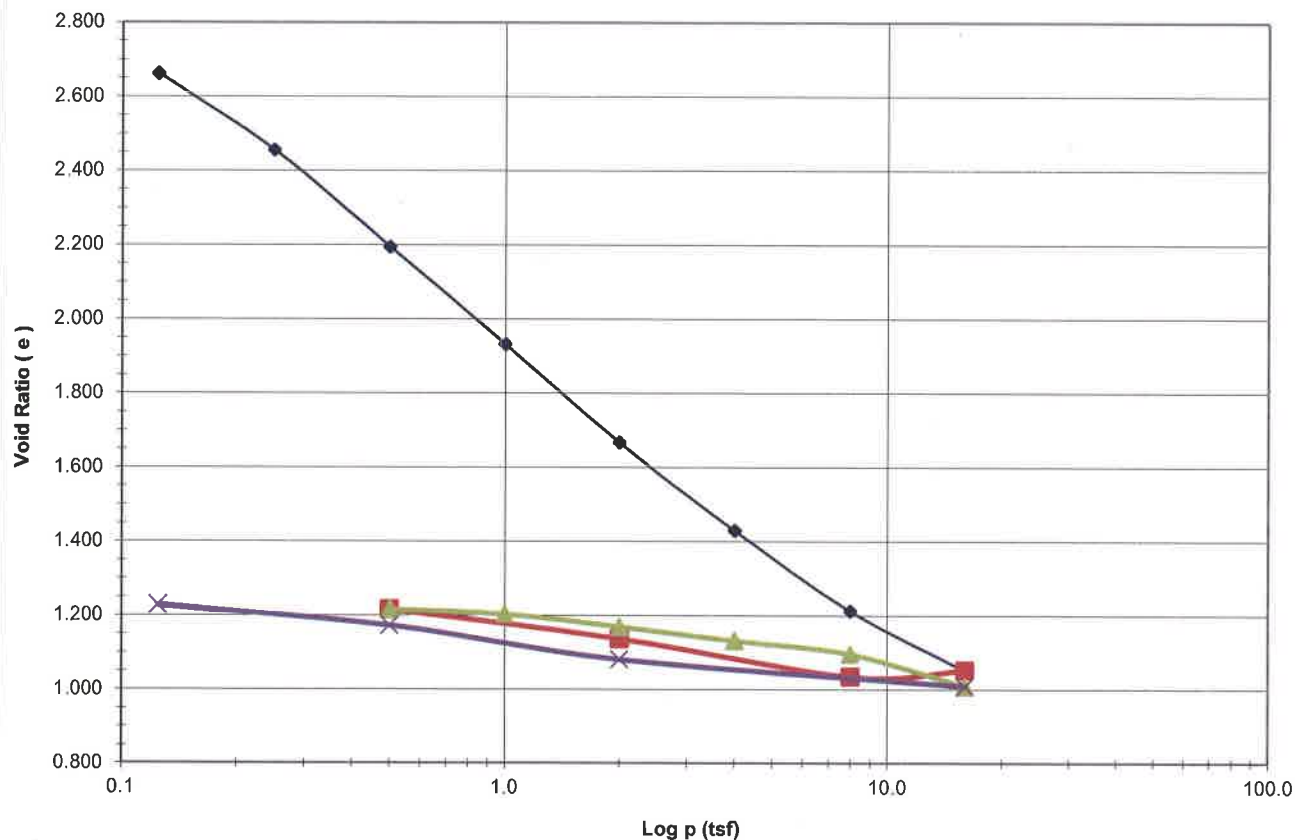
**Figure** 7

Tested By: J. Friant

Checked By: M. Lester



e vs log p



Test	Load	Cv	Test	Load	Cv	Test	Load	Cv
1	0.5 TSF	0.009						
2	1.0 TSF	0.008						
3	2.0 TSF	0.015						
Specimen Identification			Classification (USCS)			Dry Density (pcf)		
TH-7, U-1, 8 to 10 feet			OH			41.5		
						Natural Moisture		
						LL (%)		
						PI (%)		
						82		
						44		

Remarks: Test performed in general accordance with ASTM D2345. Cv values in feet squared per day.  
 Maximum past pressure = 460 psf  
 Cc = 0.877



Geo-Technology Associates, Inc.  
 18 Boulden Circle, Suite 36  
 New Castle, Delaware 19720  
 Telephone: (302) 326-2100  
 Fax: (302) 326-2399

### CONSOLIDATION TEST REPORT

Project: Ted Harvey Conservation Area

Client: Moffatt & Nichol

Number: 150371

### **APPENDIX 3**

### **PREVAILING WAGE RATE DETERMINATION**

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

Mailing Address:  
4425 North Market St. 3rd FL  
Wilmington, DE 19802

Located at:  
4425 North Market St. 3rd FL  
Wilmington, DE 19802

PREVAILING WAGES FOR HEAVY CONSTRUCTION EFFECTIVE MARCH 15, 2017

CLASSIFICATION	NEW CASTLE	KENT	SUSSEX
ASBESTOS WORKERS	22.10	19.44	42.27
BOILERMAKERS	77.62	32.12	58.92
BRICKLAYERS	47.02	23.20	24.91
CARPENTERS	53.81	53.81	42.77
CEMENT FINISHERS	43.59	24.35	18.14
ELECTRICAL LINE WORKERS	73.65	28.24	64.65
ELECTRICIANS	66.85	66.85	66.85
GLAZIERS	20.42	17.73	12.00
INSULATORS	55.48	55.48	55.48
IRON WORKERS	60.95	60.95	58.31
LABORERS	44.70	44.70	44.70
MILLWRIGHTS	69.18	69.18	55.75
PAINTERS	79.76	79.76	79.76
PILEDRIVERS	75.27	39.35	30.63
PLASTERERS	19.23	16.70	11.29
PLUMBERS/PIPEFITTERS/STEAMFITTERS	82.03	77.84	17.89
POWER EQUIPMENT OPERATORS	67.29	62.96	67.29
SHEET METAL WORKERS	30.73	19.06	17.90
SPRINKLER FITTERS	33.11	12.54	10.38
TRUCK DRIVERS	31.96	20.62	22.27

CERTIFIED: 12/11/17

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) 761-8200

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

PROJECT: MT201702/Ted Harvey Ted Harvey Conservation Area Levee Rehabilitation  
Project , Kent County

## **APPENDIX 4**

### **DNREC SUBAQUEOUS PERMIT & COASTAL MANAGEMENT CONSISTENCY REVIEW**

Reviewed at Prebid and provided to awarded contractor

## **APPENDIX 5**

### **U.S. ARMY CORPS OF ENGINEERS (USACE) PERMIT**

Reviewed at Prebid and provided to awarded contractor