



STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES &
ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
89 Kings Highway
Dover, DE 19901

**CONTRACT DOCUMENTS & TECHNICAL SPECIFICATIONS
ADDENDUM NO. 1**

**BOWERS BEACH PARKING AREA IMPROVEMENTS – PHASE I
CONTRACT NO. NAT19001-BOWERS**

Project Name: Bowers Beach Parking Area Improvements – Phase I

Contract No.: NAT19001-BOWERS

Date of Issue: October 8, 2019

Notice No. 1: Attach this addendum to the Project Manual for this project. It modifies and becomes part of the Bidding Documents. Work or material not specifically mentioned herein is to be as described in the main body of the specifications and as shown on the drawings.

Bids Due: October 23, 2019, 2:00 PM local time

“DNREC CONTRACT NO. FW-2-15 - SEALED BID - DO NOT OPEN”
Dept. of Natural Resources & Environmental Control
Division of Fish and Wildlife
89 Kings Highway, Dover DE 19901
Attn: Anthony T. Gonzon, Jr, Delaware Bayshore Initiative Coordinator

1. PRE-BID MEETING AGENDA, MEETING MINUTES AND SIGN-IN SHEET:

The mandatory pre-bid meeting for the above referenced project was held at the project site, located at South Flack Avenue, Frederica, DE 19946, on October 3, 2019. A summary is provided for the purpose of clarifying and reiterating those points discussed during the meeting.

The agenda, meeting minutes and attendance list are attached.

*We Bring You Delaware's Great Outdoors
through Science and Service*

2. QUESTIONS:

Question 1: Is the construction of the kiosk a part of the scope?

Response 1: The kiosk materials will be provided and delivered to the site by the Owner. The contractor shall be responsible for installation and assembly of the kiosk.

Question 2: Will there be a unit price for areas of full-depth patching?

Response 2: There are no unit prices included in the Base Bid. A unit price will be added for the full-depth patching as an addendum.

Question 3: Is there any pre-paving prep work that you are going to require? (on overlay area)

Response 3: Pre-paving prep work shall include the areas of full depth patching involving saw cutting, pavement removal and installation of patching pavement materials. DelDOT Section 401 specifications shall be implemented for preparation of pavement overlay. No milling is required.

Question 4: For the Post Oak tree's print has 13 and quantity is only 12 which is correct?

Response 4: The plan is correct showing 13 plantings. The schedule showing 12 is incorrect.

3. DRAWINGS:

1. **The following drawings will receive revisions to adjust lines and grades and will be issued in ADDENDUM #2:**

- a. C103 – Site Plan
- b. C104 – Entrance Details
- c. C105 – Landscaping Plan
- d. C106 – Erosion & Sediment Control Plan

4. SPECIFICATIONS:

None

5. ADDITIONAL INFORMATION:

- 1. Soil Boring Logs and Report

ALL OTHER TERMS AND CONDITIONS REMAIN THE SAME.

IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT:

Anthony Gonzon (anthony.gonzon@state.de.us)

Attachments: 1 - Pre-Bid Agenda and Meeting Minutes
2 - Pre-Bid Attendance List
3 - 000110 Table of Contents
4 - 004113 Bid Form
5 - 012200 Unit Prices
6 - Soil Boring Logs and Report

ATTACHMENT 1
PRE-BID AGENDA and MEETING MINUTES

Bowers Beach Parking Area Improvements – Phase I

Mandatory Pre-bid Meeting Agenda and Minutes

Date: October 3, 2019

Reference: **Bowers Beach Parking Area Improvements – Phase I
Contract No. NAT19001-BOWERS
Mandatory Pre-Bid Meeting**

Location: South Flack Avenue
Frederica, DE 19946

Attendees: Anthony Gonzon, DE Division of Fish & Wildlife (DFW)
Mark Strickland, Century Engineering
Ada Puzzo, Mayor, Town of Bowers
Bob McDevitt, Town of Bowers
Marge Ventura, Town of Bowers
Judy Martin, Town of Bowers

Contractors – see ATTENDANCE SHEET for all contractors in attendance.

MEETING AGENDA

1. Introductions

2. Administrative

- a. **Sign-In Sheet**
- b. **Questions during Bidding**
- c. **Bonds**
- d. **Wages / Payroll**
- e. **Bids Due**
- f. **Sub-Contractors**
- g. **On-Site Superintendent**
- h. **Completion of Work:**
 - Notice of Contract Award
 - Purchase Order Issuance
 - On-Site Mobilization
 - Substantial Completion
- i. **Access**
- j. **Permits**
- k. **Shop Drawings**

3. Scope of Work

- a. **Base Bid**

4. Field walk

MEETING MNUTES

1. Introductions

Anthony Gonzon, Bayshore Initiative coordinator, DE Division of Fish & Wildlife, DNREC, opened the meeting with brief introductions of project manager (Anthony Gonzon, DFW) and the engineering firm (Mark Strickland, Century Engineering). Also attending were several representatives of the Town of Bowers.

Anthony Gonzon and Mark Strickland provided administrative information and described the scope of work, followed by a site walk. During the meeting, the following points were clarified or emphasized:

2. Administrative

- a. **Sign-in Sheet:** All in attendance were reminded to fill in the sign-in sheet; otherwise you will not be considered in attendance and will not be permitted to submit a bid.

- b. **Questions During Bidding:**
 - All questions during the bidding phase shall be submitted via email to anthony.gonzon@delaware.gov.
 - Last Day for Questions shall be Wednesday, October 9, 2019 (4:30 PM, EST). Any questions received after this time will not be addressed.
 - Questions will be answered via Addendum.
 - All questions must be submitted as an email. Phone calls will not be replied to.
 - Do not contact Mark Strickland, anyone at Century Engineering or any representative of the Town of Bowers with questions.

- c. **Bonds:**
 - Performance bond and payment bond will be required for the work. Bond forms are included in the bid package and will be required upon notice of award of the contract, along with a certificate of insurance.
 - Bid bond is required for this work.

- d. **Wages / Payroll:** Prevailing wage and payroll reporting are applicable to this project. The project is considered a Highway Construction project by the Department of Labor.

- e. **Bids Due:** Bids are due Wednesday, October 23, 2019, 2:00 PM, local time.
 - Sealed bids shall be addressed to the following address with the outer envelope clearly marked:

“DNREC CONTRACT NO. FW-2-15 - SEALED BID - DO NOT OPEN”

Dept. of Natural Resources & Environmental Control

Division of Fish and Wildlife

89 Kings Highway, Dover DE 19901
Attn: Anthony T. Gonzon, Jr, Delaware Bayshore Initiative Coordinator

- Bids shall be publicly opened in the auditorium at the above stated time and location.
- Successful Bidder will be expected to enter into a Standard DNREC Contract Document. A sample is included in the project manual (pp. 00 52 12 – 1 through 00 52 12 – 3 in the Project Manual).

- f. **Sub-Contractors:** A completed list of sub-contractors shall be submitted with your bid. We remind bidders to name only one subcontractor for each of the trades.
- g. **On-Site Superintendent:** The contractor shall designate a superintendent who shall be on site for the duration of the project.
- h. **Completion of Work:**
1. **Notice of Contract Award:** Within thirty (30) days of receipt and acceptance of qualified low bid.
 2. **Purchase Order Issuance:** The issuance of a State of Delaware purchase order is contingent upon the successful Contractor submitting bonds on State-approved forms, signed contracts and insurance certificates to the State of Delaware within 20 days of Notice of Award. A purchase order will be issued within thirty days after these items have been submitted to the State of Delaware.
 3. **On-Site Mobilization:** Within 7 days after issuance of State of Delaware purchase order.
 4. **Substantial Completion:** The work shall be completed within **80 calendar** days of notice to proceed. ****NOTE:** The 140 days noted during the pre-bid meeting was incorrect**
- i. **Access:** The road between the boardwalk and the parking lot must be kept open at all times, except from brief temporary periods when moving equipment or materials between sites. DFW has a water control structure located north of the project site that may require access at any time by DFW staff. During waterfowl hunting seasons, the public will access a boat ramp via that road.
- j. **Permits:**
- A Sediment and Stormwater permit has been obtained for the base plan and will be provided to the awarded contractor.
- k. **Shop Drawings:**
- All shop drawings and Source of Supply documents will be submitted electronically the project manager.
 - The project team will have 15 days to review and respond to all shop drawings and Source of Supply documents. Please consider this when making submissions and scheduling the work.

3. **Scope of Work:** The project scope was presented. Items discussed included:

- a. **Base Bid:** Project involves resurfacing of a deteriorating parking area, full-depth entrance construction/reconstruction, pavement removal, grading, and creation of open space areas.
- b. Construction drawings and the project manual are posted to http://bids.delaware.gov/bids_detail.asp?i=5929&DOT=N for this project.

****ALL BIDDERS ARE RESPONSIBLE FOR CHECKING THE ABOVE WEBPAGE FOR ALL ADDENDA PRIOR TO SUBMITTING A BID****

4. Contractor Questions:

Question 1: Is the construction of the kiosk a part of the scope?

Response 1: The kiosk materials will be provided and delivered to the site by the Owner. The contractor shall be responsible for installation and assembly of the kiosk.

Question 2: Will there be a unit price for areas of full-depth patching?

Response 2: There are no unit prices included in the Base Bid. A unit price will be added for the full-depth patching as an addendum.

5. Field Walk: A site walk was conducted.

ATTACHMENT 2
PRE-BID ATTENDANCE LIST

MANDATORY PRE-BID CONFERENCE ATTENDANCE SHEET

Contract No. NAT19001-BOWERS

Bowers Beach Parking Area Improvements – Phase 1

October 2, 2019 - 10:00 AM

NAME	AGENCY/COMPANY	TELEPHONE	EMAIL
Kevin Lamborn	Carrow Construction	302-275-7592	Danny.carrow@carrowconstruction.com
Aaron Fibelkorn	Zack Excavating	302-387-9011	afiblekorn@icloud.com
Dwayne Bosley	Dixon Contracting	302-653-4623	DIXONCONDE@AOL.COM
Jeff Norman	George & Lynch	302-342-3126	jnorman@geolyn.com
Rick Mazol	Chesapeake Turf	302-922-1317	RICK@CHESAPEAKETURF.COM
Matt Tarr	GES	302-757-2883	MTARR@GESONCALL.COM
Mark Strickland	Century Engineering	302-734-9188	MSTRICKLAND@CENTURYENG.COM
Anthony Gonzon	DNREC - DFW	302-735-8673	anthony.gonzon@delaware.gov
Bob McDevitt	Town of Bowers	302-670-4766	
Ada Puzzo	Town of Bowers	302-382-2501	adaleecarter@comcast.net
Judy Martin	Town of Bowers	302-222-6341	judym24@hotmail.com
Marge Ventura	Town of Bowers	302-751-1730	marge.ventura@gmail.com

MANDATORY PRE-BID CONFERENCE ATTENDANCE SHEET

Contract No. NAT19001-BOWERS

Bowers Beach Parking Area Improvements – Phase 1

October 2, 2019 - 10:00 AM

NAME	AGENCY/COMPANY	TELEPHONE	EMAIL
Kevin Lamborn	Carrow Construction	302-275-7592	Danny.carrow@carrowconstruction.ca
Aaron Fibelkorn	Zack Excavating	302-387-9011	aFibelkorn@icloud.com
DWAYNE BOSLEY	DIXON CONTRACTING	302-653-4623	DIXONCONDE@AOL.COM
JEFF NORMAN	George & Lynda	302-342-3126	jnorman@geolynda.com
RICH MAZOL	CHESAPEAKE TURF LLC	302-922-1317	RICH@CHESAPEAKETURF.COM
MATT TARA	GES	302-757-2883	MTARA@GESONCALL.COM
MARK STRICKLAND	CENTURY ENGINEERING	302-734-9188	MSTRICKLAND@CENTURYENG.COM
Anthony Gonzon	DNREC - DFWD	302-735-8673	anthony.gonzon@delaware.gov
Bob M. Jewitt	Town of Bowers	302-670-9766	
Ada Puzzo	" "	302-382-2501	adaleecarter@comcast.net
Judy Martin	" "	302-222-6341	judyon24@hotmail.com
Marge Ventura	" "	302-751-1730	marge.ventura@gmail.com

ATTACHMENT 3
000110 TABLE OF CONTENTS

SECTION 00 01 10

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.

DOCUMENTS BOUND HEREWITH

Division	Section Title	Pages
DIVISION 00 - PROCUREMENT AND CONTRACT REQUIREMENTS		
00 01 07SEALS PAGE	1
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00 21 13INSTRUCTIONS TO BIDDERS	15
00 31 46PERMITS	2
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DIVISION 01 - GENERAL REQUIREMENTS		
01 00 01SUMMARY	2
01 14 00WORK RESTRICTIONS	1
01 22 00UNIT PRICES	2
01 26 00CONTRACT MODIFCATION PROCEDURES	2
01 29 00PAYMENT PROCEDURES	3
01 31 00PROJECT MANAGEMENT AND COORDINATION	3
01 31 50FIELD ENGINEERING	2
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01 40 00QUALITY REQUIREMENTS	7
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01 50 00TEMPORARY FACILITIES AND CONTROLS	7
01 60 00PRODUCT REQUIREMENTS	10
01 73 00EXECUTION	6
01 74 19CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL	9
01 77 00CLOSEOUT PROCEDURES	6
01 78 23OPERATIONS AND MAINTENANCE DATA	4
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DIVISION 02 – EXISTING CONDITIONS

02 41 19SELECTIVE DEMOLITION 4

DIVISION 31 – EARTHWORK

31 10 00SITE CLEARING 4

31 20 00EARTH MOVING 5

REFERENCED SPECIFICATIONS:

DELAWARE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (AUGUST 2016, OR MOST CURRENT AT THE DATE OF ADVERTISEMENT)

- SECTION 301 – GRADED AGGREGATE BASE COURSE
- SECTION 401 – BITUMINOUS PAVEMENT
- SECTION 402 - BITUMINOUS PAVEMENT MATERIALS, PATCHING
- SECTION 708 – GEOTEXTILES
- SECTION 762 – SAW CUTTING AND BUTT JOINTS
- SECTION 801 – TEMPORARY TRAFFIC CONTROL, GENERAL
- SECTION 805 – PLASTIC DRUMS
- SECTION 811 – FLAGGERS
- SECTION 817 – PAVEMENT MARKINGS
- SECTION 818 – SIGN PANELS
- SECTION 819 – SIGN POSTS
- SECTION 911 - PLANTINGS
- SECTION 1001 – BORROW
- SECTION 1004 – COARSE AGGREGATE
- SECTION 1005 – GRADED AGGREGATES
- SECTION 1006 – STONE FOR RIPRAP
- SECTION 1060 – GEOTEXTILE
- SECTION 1072 – SIGN POSTS

STATE OF DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL EROSION AND SEDIMENT CONTROL HANDBOOK (FEB. 2019 OR MOST CURRENT AT THE DATE OF ADVERTISEMENT)

- SECTION 3.1.5 – INLET PROTECTION
- SECTION 3.1.6 – CULVERT INLET PROTECTION
- SECTION 3.1.7 – COMPOST FILTER LOGS
- SECTION 3.4.1 - TOPSOILING
- SECTION 3.4.3 - VEGETATIVE STABILIZATION
- SECTION 3.4.5 – MULCHING
- SECTION 3.4.6 – STABILIZATION MATTING
- SECTION 3.4.7 - STABILIZED CONSTRUCTION ENTRANCE
- SECTION 3.4.8 - DUST CONTROL
- SECTION 3.6.1 - CONSTRUCTION SITE WASTE MGT & SPILL CONTROL
- SECTION 3.7.3 – SOIL STOCKPILE

APPENDICES

- 1) Department of Natural Resources and Environmental Control (DNREC)
 Division of Watershed Stewardship – Standard Plan Approval, PENDING
 Wetlands & Subaqueous Lands Section – Letter Dated 1/8/2018
- 2) State of Delaware Architectural Accessibility Board – Letter Dated 8/9/2019
- 3) Office of the State Fire Marshal - Site Plan Concurrence – Letter Dated 7/24/2019
- 4) State of Delaware Division of Facilities Management – Letter Dated 8/23/2019
- 5) State of Delaware Department of Labor – Letter Dated 4/22/2019
 Also provided in Section 00 73 46

END OF SECTION

ATTACHMENT 4
004113 BID FORM

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:

ADD

DEDUCT

UNIT PRICE No. 1: Full Depth Patching (SY) \$ _____ \$ _____

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)

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 *Owner*, **it is required that bidders list themselves as being the sub-contractor for all categories where he/she is qualified and intends to perform such work.** This form must be filled out completely with no additions or deletions.

<u>Subcontractor Category</u>	<u>Subcontractor</u>	<u>Address (City & State)</u>	<u>Subcontractors tax payer ID # or Delaware Business license #</u>
1. Pavement	_____	_____	_____
2. Sitework Not Included In Categories Above	_____	_____	_____

BID FORM
NON-COLLUSION STATEMENT

This is to certify that the undersigned bidder has neither directly nor indirectly, entered into any agreement, participated in any collusion or otherwise taken any action in restraint of free competitive bidding in connection with this proposal submitted this date (*to the Office of Management and Budget, Division of Facilities Management*).

All the terms and conditions of (*Project or Contract Number*) 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.

**AFFIDAVIT
OF
EMPLOYEE DRUG TESTING PROGRAM**

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

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

Contractor/Subcontractor Name: _____

Contractor/Subcontractor Address: _____

Authorized Representative (typed or printed): _____

Authorized Representative (signature): _____

Title: _____

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

My Commission expires _____. NOTARY PUBLIC _____.

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

ATTACHMENT 5
012200 UNIT PRICES

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 2. Delaware Department of Transportation Section 301 "GRADED AGGREGATE BASE COURSE".
 3. Delaware Department of Transportation Section 400 "BITUMINOUS MATERIALS".
 4. Delaware Department of Transportation Section 762 "SAW CUTTING AND BUTT JOINTS".

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

- D. List of Unit Prices: A list of unit prices is included at the end of this Section. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

- A. Unit Price No. 1 – Full Depth Patching.
1. Description: Addition/reduction in specified base bid area of full depth patching as defined on the approved plans. Payment shall be for saw cutting, existing pavement removal, furnishing materials and installation. Base bid area = 326 SY.
 2. Unit of Measurement: SY of Full Depth Patching Installed.

END OF SECTION 01 22 00

ATTACHMENT 6
SOIL BORING LOGS AND REPORT

February 12, 2018

Mr. Jeremy Ashe
Delaware Division of Fish and Wildlife
Office Number A247
89 Kings Highway
Dover, DE 19907

RE: Project No. 11711.GA
Geotechnical Evaluation
Bowers Beach Parking Area
Frederica, Delaware

Dear Mr. Ashe:

Duffield Associates, Inc. (Duffield) has completed our evaluation of the proposed parking lot improvements located at Bowers Beach in Frederica, Delaware. The following report documents the existing pavement conditions and summarizes the data obtained by our field program, as well as recommendations for the design and construction of site pavement improvements. These services were provided in general accordance with our agreement dated December 21, 2017.

To assist with our evaluation, Duffield was provided with a concept sketch of the proposed layout of the parking area. Based on our discussions and review of the provided concept sketch, the project includes complete removal of the existing pavement section, and construction of a new parking lot with an updated configuration. As part of the reconstruction, some of the currently paved areas are to be returned to landscaped grass areas.

The existing parking lot generally covered the entire site and appeared to consist of a “tar and chip” pavement. A majority of the pavement appeared to be in poor condition with extensive map cracking and rutting.

FIELD PROGRAM

On January 10, 2018, six Standard Penetration Test (SPT) borings were performed in general accordance with ASTM D 1586 in the vicinity of the proposed pavement construction and site improvements to depths of 10 feet below the existing ground surface. The test boring locations were determined in the field by our representative using offsets from existing site features as shown on the enclosed Test Boring Location Sketch. Five borings were performed within areas of the proposed pavement and one boring was performed within the proposed landscaped area. Test boring logs describing the observed subsurface conditions have also been enclosed.

At completion of the excavations, the test borings were backfilled with the auger cuttings and topped with an asphalt “cold patch”. Additional settlement of the materials backfilled in the test borings may occur, resulting in a depression or hole in the ground surface. Consequently, future maintenance and restoration of the site may be required.

SUBSURFACE CONDITIONS

Beneath a 2 to 3 inch thick surface layer of “tar and chip” asphalt, the subsurface conditions encountered in the test borings generally consisted of a 3 to 5 foot thick layer of medium to loose density silty sand overlying very soft to medium consistency marsh deposit consisting of silt with organics ranging in thickness from 1 to 4 feet typical to shallow surface soils along the river. A second layer of loose silty sand was observed underlying the marsh deposits.

It was noted that the borings were performed during an extended period of temperatures below freezing, and the initial sample collected near the ground surface visually appeared to be frozen. As a result, the observed density of the initial soil sample (S-1) was likely not representative of the natural, thawed soil.

Groundwater was observed at depths ranging from 4 to 6 feet below the existing ground surface in each of the test borings, but is likely influenced by the adjacent Delaware River. Groundwater mapping by Delaware Geological Survey (DGS) indicates average depth to groundwater in “normal,” “dry,” or “wet” conditions as less than 3 feet. It is estimated that variations in groundwater levels several feet shallower than those observed during this evaluation could be experienced during seasonal variations in precipitation.

DISCUSSION AND RECOMMENDATIONS

The following conclusions and recommendations are provided.

1. **Earthwork Operations and Utility Installation.** The site conditions were observed to consist of a layer of soft, loose soils overlying marsh deposits. While this surface is stable in its current conditions, it should be considered highly sensitive to disturbance due to construction activities. Site excavations or grading which extend below the current ground surface (i.e., installation of site utilities or subgrade undercuts) are likely to encounter soft subgrade conditions and groundwater. The conditions of these soils are not likely to improve with additional undercutting/excavation, which can result in further deterioration of the soil stability. The design of the site grading as well as the approach to stormwater management and utilities should consider approaches which limit site excavations where practical.
2. **Pavement Design.** Based on the subsurface conditions encountered, the results of the field and laboratory testing and the anticipated light loading of the parking lot, the pavement section below is recommended assuming the subgrade is prepared as recommended herein.

Bituminous Concrete Section

1½ inches Surface Course, Bituminous Concrete, Delaware Type C
(PG 64-22, 160 Gyration)

2½ inches	Base Course, Bituminous Concrete, Delaware Type B (PG 64-22, 160 Gyration)
8 inches	Subbase Graded Aggregate, Delaware Type B <u>Geotextile Fabric, ACF HSP-4 or equivalent</u>
12 inches	Total Depth

A layer of woven polypropylene geotextile fabric (e.g., ACF HSP-4 or equivalent) should be placed directly over the prepared subgrade. Adjacent rows of fabric should be overlapped a minimum of 24 inches. The fabric should be placed in a stretched (no wrinkles) state. The geotextile will act as a separator between the base course aggregate and the subgrade, helping to maintain the integrity of the base course.

All pavement materials and construction should be in accordance with Delaware Department of Transportation's "Standard Specifications for Construction and Materials," August 2016 (or most recent revision).

- 3. Subgrade Preparation.** At the start of construction, the proposed pavement areas should be stripped of all existing pavement materials and rough excavated. Following rough grading and prior to placement of subbase fill, it is recommended that the exposed subgrade in the proposed pavement areas be proofrolled using a minimum 10-ton static roller.

Proofrolling should be monitored by a qualified technician under the supervision of a geotechnical engineer familiar with this report. Yielding, frozen, or otherwise unsuitable subgrade conditions encountered, should be undercut to firm, nonfrozen subgrade conditions and backfilled with compacted structural fill in accordance with the recommendations of this report. Scarification and recompaction could also be performed in lieu of undercutting, especially if bulk excavation is performed to achieve the pavement subgrades. A geotechnical engineer's representative should also confirm the consistency and texture of the exposed soils with the conditions encountered by this evaluation, as described herein, since localized loose and yielding subgrade conditions may be encountered.

- 4. Fill and Compaction Requirements.** Imported borrow consisting of predominately granular soils conforming to the requirements of the Delaware Department of Transportation (DelDOT), Type C Borrow, should be utilized in undercut areas. It is recommended that a contingency item for undercutting and imported borrow be included in the bid documents.

All materials and construction should be in accordance with Delaware Department of Transportation's "Standard Specifications for Construction and Materials," August 2016 (or most recent revision). DelDOT Type B graded aggregate base course should be placed in loose lifts with a maximum thickness of 8 inches. According to DelDOT Specifications, graded aggregate base course utilized for pavement construction should be compacted to at least 98% of the maximum dry density as determined by ASTM D 698. The placement and compaction of structural fill should be monitored on a full-time basis by a qualified technician under the supervision of a geotechnical engineer.

5. **Protection of Subgrade Soils.** The shallow site soils are considered highly sensitive to deterioration. Exposure of these soils to precipitation and construction traffic will weaken the soils and result in yielding subgrade conditions. Subgrade soils disturbed by precipitation and construction traffic should be either scarified and recompacted, or undercut and replaced with structural fill, as previously discussed. If a winter construction schedule is proposed, provisions for maintaining a non-frozen subgrade should be utilized.

These recommendations have been prepared according to generally accepted pavement engineering practices and are based on the conditions observed at the site. These recommendations may require modifications based on the conditions encountered and exposed during construction excavation. Should any conditions encountered during construction differ from those described in this report, this office should be notified immediately in order to review, and possibly modify these recommendations. This report applies solely to the size, type, and location of the pavement areas described herein. In the event that changes are proposed, this report will not be considered valid unless the changes have been reviewed and the recommendations of this report modified and reapproved, in writing, by Duffield Associates, Inc.

We appreciate this opportunity to be of service to you and look forward to providing continued assistance to you on this project. If you have any questions concerning this report or require any further information, please do not hesitate to contact us.

Very truly yours,

DUFFIELD ASSOCIATES, INC.

Redacted - Original on File

Brian T. Lowe, E.I.
Geotechnical Engineer

Brian J. Devine, P.E.
Senior Geotechnical Engineer

BTL:BJD/acj
11711GA 0218-BOWERS PARKING PVMT.RPT

Enclosures: Site Location Sketch
 Test Boring Location Sketch
 Test Boring Logs
 General Notes



NOTE:

THIS SKETCH IS ADAPTED FROM TWO, 7.5 MINUTE SERIES U.S.G.S TOPOGRAPHIC MAP TITLED "FREDERICA" DATED 2016.

DATE: 6 FEBRUARY 2018
SCALE: 1"=2000'
PROJECT. NO. 11711.GA
SHEET: FIGURE 1

SITE LOCATION SKETCH

BOWERS BEACH
PARKING LOT IMPROVEMENTS

BOWERS BEACH~KENT COUNTY~DELAWARE

DESIGNED BY: BTL
DRAWN BY: BTL
CHECKED BY: BJD
FILE: A-11711GA-01

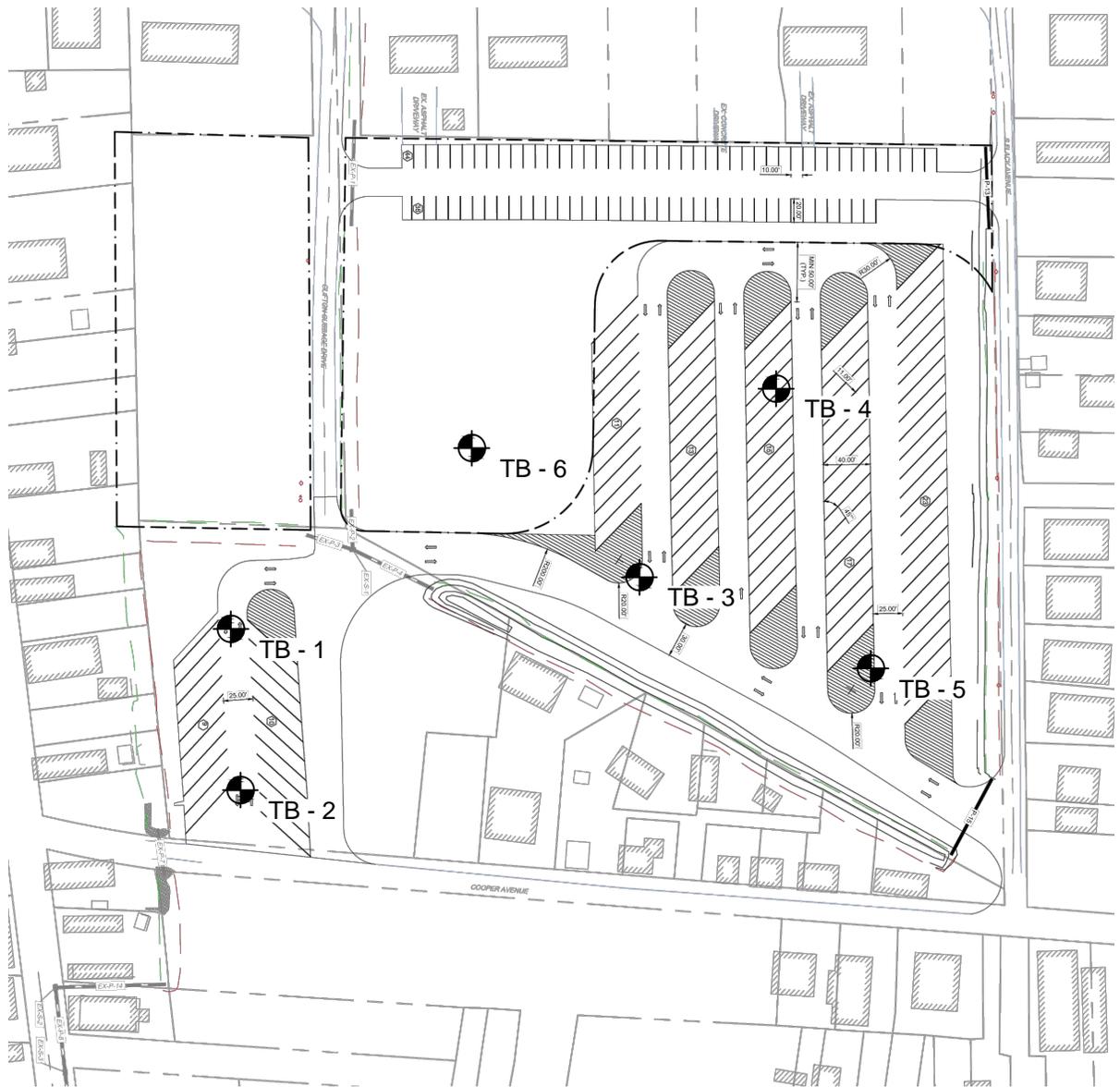


DUFFIELD ASSOCIATES
Soil, Water & the Environment

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KEY:

 - APPROXIMATE LOCATION OF TEST BORING
TB-1

NOTE:

THIS SKETCH IS ADAPTED FROM A DRAWING PREPARED BY THE DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL TITLED, "BOWERS BEACH PARKING LOT IMPROVEMENTS PROJECT" DATED OCTOBER 2017.

DATE:
6 FEBRUARY 2018

SCALE:
1" = 150'

PROJECT. NO.
11711.GA

SHEET:
FIGURE 2

**TEST BORING
LOCATION SKETCH**

**BOWERS BEACH
PARKING LOT IMPROVEMENTS**

BOWERS BEACH-KENT COUNTY-DELAWARE

DESIGNED BY: BTL

DRAWN BY: BTL

CHECKED BY: BJD

FILE: A-11711GA-02



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Geotechnical Evaluation
Bowers Beach
Parking Lot Improvements
Bowers Beach, Delaware
Project No. 11711.GA

Date Started : January 10, 2018
Date Completed : January 10, 2018
Logged by : BTL
Weather : Mostly Sunny
Driller/Agency : JCF/CGC Geoservices, LLC

Drilling Equipment : Truck-Mounted Diedrich D-50
Drilling Methods : HSA (SPT, ASTM D1586)
Surface Elevation : 4 feet ± Project Datum

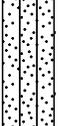
Depth in feet	Surf. Elev. 4 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				 Auger Cuttings  Remolded	 After Completion							
				DESCRIPTION								
0	3.8			BITUMINOUS CONCRETE(± 2 inches)								
2			SM	Brown, gray medium SAND, little silt, trace fine sand trace coarse sand (moist) (Sample Frozen)			S-1	20-16-10*	1.8			
4			SM	Brown, gray medium SAND, little silt, trace fine sand trace coarse sand (moist)			S-2	5-3-3-5	2.0	11.3	19.4	
6	-1.6 -2.0		MH	Black SILT, little organics (marsh vegetation), trace fine sand (marsh odor) (wet)			S-3A S-3B	3-5-3-2	2.0			
8	-4.0		SM	Gray medium SAND, little silt (faint marsh odor)			S-4	1-3-4-5	2.0			
10												
12												
14												
16												
18												
20												

- NOTES:
- Test boring terminated at ± 8.0 feet below existing ground surface (b.e.g.s.)
 - Water level through augers at ± 5.7 feet b.e.g.s. at completion of drilling.
 - Boring caved wet at ± 3.0 feet b.e.g.s. with augers removed.
 - * Indicates frozen soil. Blow counts are not considered representative.
 - Borehole backfilled with soil cuttings and topped with asphalt cold patch upon completion.
 - Soil descriptions performed in general accordance with ASTM D 2488, the Practice for Description and Identification of Soils (Visual-Manual Procedure).

Geotechnical Evaluation
Bowers Beach
Parking Lot Improvements
Bowers Beach, Delaware
Project No. 11711.GA

Date Started : January 10, 2018
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Driller/Agency : JCF/CGC Geoservices, LLC

Drilling Equipment : Truck-Mounted Diedrich D-50
Drilling Methods : HSA (SPT, ASTM D1586)
Surface Elevation : 4 feet ± Project Datum

Depth in feet	Surf. Elev. 4 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				 Auger Cuttings  Remolded	 After Completion							
				DESCRIPTION								
0	3.8			BITUMINOUS CONCRETE (± 1-3/4 inches)								
2			SM	Brown, gray fine SAND, some silt (moist) (Sample Frozen)			S-1	40-36-38*	2.0	9.0	22.8	
4	0.1		MH	Black SILT, little organics, trace fine sand (marsh odor) (wet)			S-2A	7-8-8-6	2.0			
			MH	Black SILT, little organics, trace fine sand (marsh odor) (wet)			S-2B					
6	-2.0		MH	Light gray SILT, trace fine to coarse sand trace gravel (wet)			S-3	1-1-1-3	1.8			
8	-4.0		MH				S-4	3-3-3-2	2.0			

NOTES:

1. Test boring terminated at ± 8.0 feet below existing ground surface (b.e.g.s.)
2. Wet-on-spoon conditions observed at ± 7.8 feet b.e.g.s.
3. Water level through augers at ± 3.7 feet b.e.g.s. at completion of drilling.
4. Boring caved wet at ± 2.6 feet b.e.g.s. with augers removed.
5. * Indicates frozen soil. Blow counts are not considered representative.

6. Borehole backfilled with soil cuttings and topped with asphalt cold patch upon completion.
7. Soil descriptions performed in general accordance with ASTM D 2488, the Practice for Description and Identification of Soils (Visual-Manual Procedure).

Geotechnical Evaluation
Bowers Beach
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Bowers Beach, Delaware
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Driller/Agency : JCF/CGC Geoservices, LLC

Drilling Equipment : Truck-Mounted Diedrich D-50
Drilling Methods : HSA (SPT, ASTM D1586)
Surface Elevation : 6 feet ± Project Datum

Depth in feet	Surf. Elev. 6 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				 Auger Cuttings  Remolded	 After Completion							
				DESCRIPTION								
0	5.8			BITUMINOUS CONCRETE (± 2-1/2 inches)								
2			SM	Brown, gray medium to fine SAND, little silt (moist) (Sample Frozen)			S-1	27-27-21*	2.0	7.6	17.0	
4	2.0			Gray medium SAND, little silt, trace fine sand, trace coarse sand, trace gravel (moist)			S-2	7-7-8-7	2.0			
6			MH	Black SILT, little organics, trace fine sand (marsh odor) (wet)			S-3	3-1-1-1	1.9	99.8	92.5	
8	-1.8			Black SILT, little organics, trace fine sand (marsh odor) (wet)			S-4A	2-3-3-2	2.0			
	-2.0		SM	Gray fine to medium SAND, little silt (wet)			S-4B					

NOTES:

1. Test boring terminated at ± 8.0 feet below existing ground surface (b.e.g.s.)
2. Wet-on-spoon conditions observed at ± 4.5 feet b.e.g.s.
3. Water level through augers at ± 4.1 feet b.e.g.s. at completion of drilling.
4. Boring caved wet at ± 2.0 feet b.e.g.s. with augers removed.
5. * Indicates frozen soil. Blow counts are not considered representative.

6. Borehole backfilled with soil cuttings and topped with asphalt cold patch upon completion.
7. Soil descriptions performed in general accordance with ASTM D 2488, the Practice for Description and Identification of Soils (Visual-Manual Procedure).

Geotechnical Evaluation
Bowers Beach
Parking Lot Improvements
Bowers Beach, Delaware
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Date Started : January 10, 2018
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Driller/Agency : JCF/CGC Geoservices, LLC

Drilling Equipment : Truck-Mounted Diedrich D-50
Drilling Methods : HSA (SPT, ASTM D1586)
Surface Elevation : 6 feet ± Project Datum

Depth in feet	Surf. Elev. 6 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				 Auger Cuttings  Remolded	 After Completion							
				DESCRIPTION								
0	5.8			BITUMINOUS CONCRETE (± 2-1/2 inches)								
2				Brown to dark gray medium SAND, little silt, trace fine sand, trace coarse sand (moist) (Sample Frozen)			S-1	15-11-7*	2.0			
4			SM	Brown medium to fine SAND, some silt (moist to wet in shoe)			S-2	5-6-6-6	2.0	11.3	27.3	
6				Brown medium to fine SAND, little silt (wet)			S-3	2-2-7-5	2.0			
8	-2.0			Brown medium to fine SAND, little silt (wet)			S-4	4-4-6-8	2.0			

NOTES:

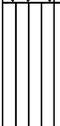
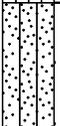
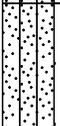
1. Test boring terminated at ± 8.0 feet below existing ground surface (b.e.g.s.)
2. Wet-on-spoon conditions observed at ± 4.5 feet b.e.g.s.
3. Water level through augers at ± 4.1 feet b.e.g.s. at completion of drilling.
4. Boring caved wet at ± 2.0 feet b.e.g.s. with augers removed.
5. * Indicates frozen soil. Blow counts are not considered representative.

6. Borehole backfilled with soil cuttings and topped with asphalt cold patch upon completion.
7. Soil descriptions performed in general accordance with ASTM D 2488, the Practice for Description and Identification of Soils (Visual-Manual Procedure).

Geotechnical Evaluation
Bowers Beach
Parking Lot Improvements
Bowers Beach, Delaware
Project No. 11711.GA

Date Started : January 10, 2018
Date Completed : January 10, 2018
Logged by : BTL
Weather : Mostly Sunny
Driller/Agency : JCF/CGC Geoservices, LLC

Drilling Equipment : Truck-Mounted Diedrich D-50
Drilling Methods : HSA (SPT, ASTM D1586)
Surface Elevation : 5 feet ± Project Datum

Depth in feet	Surf. Elev. 5 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				 Auger Cuttings  Remolded	 After Completion							
				DESCRIPTION								
0	4.8			BITUMINOUS CONCRETE (± 2-1/4 inches)								
			SP	Brown medium to fine SAND, trace silt (moist) (Sample Frozen)			S-1	21-19-11*	2.0			
2	3.0		ML	Gray, dark SILT and fine SAND, pockets of decomposed shells (faint marsh odor) (moist)			S-2	4-4-5-5	2.0	16.5	61.7	
4	1.0		SM	Light brown fine SAND, some silt, little gravel (wet)			S-3	3-6-10-11	1.1			
6	-1.0		SM	Light brown fine to medium SAND, trace silt, trace coarse sand (wet)			S-4	4-11-11-13	2.0			
8	-3.0											
10												
12												
14												
16												
18												
20												

NOTES:

1. Test boring terminated at ± 8.0 feet below existing ground surface (b.e.g.s.)
2. Wet-on-spoon conditions observed at ± 5.0 feet b.e.g.s.
3. Water level through augers at ± 4.4 feet b.e.g.s. at completion of drilling.
4. Boring caved wet at ± 2.0 feet b.e.g.s. with augers removed.
5. * Indicates frozen soil. Blow counts are not considered representative.

6. Borehole backfilled with soil cuttings and topped with asphalt cold patch upon completion.
7. Soil descriptions performed in general accordance with ASTM D 2488, the Practice for Description and Identification of Soils (Visual-Manual Procedure).

Geotechnical Evaluation
Bowers Beach
Parking Lot Improvements
Bowers Beach, Delaware
Project No. 11711.GA

Date Started : January 10, 2018
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Logged by : BTL
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Driller/Agency : JCF/CGC Geoservices, LLC

Drilling Equipment : Truck-Mounted Diedrich D-50
Drilling Methods : HSA (SPT, ASTM D1586)
Surface Elevation : 5 feet ± Project Datum

Depth in feet	Surf. Elev. 5 ft	GRAPHIC	USCS	Sample Condition	Water Levels	SAMPLES	Sample Number	Blows per 6 inches	Recovery (ft)	Moisture Content (%)	Percent Passing 200 Sieve	WATER LEVEL
				 Auger Cuttings  Remolded	 After Completion							
				DESCRIPTION								
0	4.8			BITUMINOUS CONCRETE (± 2 inches)								
2			SM	Brown, orange, light gray medium SAND, little silt, trace fine sand, trace coarse sand (moist) (Sample Frozen)			S-1	15-14-16*	2.0			
4	1.4		MH	Black SILT, little organics, trace fine sand (march odor) (wet)			S-2A	15-10-5-4	2.0			
4			MH	Black SILT, little organics, trace fine sand (march odor) (wet)			S-2B					
6	-0.4		SM	Light gray medium SAND, little silt (moist)			S-3A	1-1-3-2	2.0			
6			SM	Light gray medium SAND, little silt (moist)			S-3B					
8	-3.0		SM	Light gray medium SAND, little silt (wet)			S-4	2-1-3-3	2.0			

NOTES:

1. Test boring terminated at ± 8.0 feet below existing ground surface (b.e.g.s.)
2. Wet-on-spoon conditions observed at ± 6.0 feet b.e.g.s.
3. Water level through augers at ± 4.8 feet b.e.g.s. at completion of drilling.
4. Boring caved wet at ± 2.9 feet b.e.g.s. with augers removed.
5. * Indicates frozen soil. Blow counts are not considered representative.

6. Borehole backfilled with soil cuttings and topped with asphalt cold patch upon completion.
7. Soil descriptions performed in general accordance with ASTM D 2488, the Practice for Description and Identification of Soils (Visual-Manual Procedure).

GENERAL NOTES

DUFFIELD ASSOCIATES uses the following definitions and terminology to classify and correlate the field and laboratory samples.

VISUAL UNIFIED CLASSIFICATIONS: The soil samples are described by color, major constituent, modifiers (by percentage), and density (or consistency). Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a No. 200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a No. 200 sieve; they are described as: clays or clayey silts if they are cohesive and silts if they are noncohesive. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their strength or consistency and their plasticity.

The Unified Soil Classification symbols are:

COARSE GRAINED SOILS

GW - Well graded gravels
 GP - Poorly graded gravels
 GM - Silty gravels
 GC - Clayey gravels
 SW - Well graded sands
 SP - Poorly graded sands
 SM - Silty sands
 SC - Clayey sands

FINE GRAINED SOILS

ML - Silts of low plasticity
 CL - Clays of low to medium plasticity
 OL - Organic silt clays of low plasticity
 MH - Silts of high plasticity
 CH - Clays of high plasticity
 OH - Organic silt clays of high plasticity
 PT - Peat and highly organic soils

SIZE DESCRIPTION

F - Fine
 M - Medium
 C - Coarse
 G - Gravel

MODIFIERS (PERCENTAGE)

Tr - Trace 1 - 10%
 Ltl - Little 11 - 20%
 Some 21 - 35%
 & - And 36 - 50%

COLOR

Or - Orange	Blk - Black	Vc - Varicolored
Yel - Yellow	Gr - Gray	Dk - Dark
Br - Brown	R - Red	Lt - Light

DENSITY: COARSE GRAINED SOILS

Very loose	4 blows/ft or less
Loose	5 to 10 blows/ft
Medium	11 to 30 blows/ft
Dense	31 to 50 blows/ft
Very Dense	51 blows/ft or more

CONSISTENCY: FINE GRAINED SOILS

Very soft	2 blows/ft or less
Soft	3 to 4 blows/ft
Medium	5 to 8 blows/ft
Stiff	9 to 15 blows/ft
Very stiff	16 to 30 blows/ft
Hard	31 blows/ft or more

NOTE: The Standard Penetration Test "N" value is the number of blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler, except where otherwise noted.