APPENDIX M

Engineering Reports

M.1 | SIGNATURE EAST – ENGINEER'S REPORT

M.2 | SIGNATURE EAST – SITE DRAWINGS

M.3 | SIGNATURE SOUTH – ENGINEER'S REPORT

M.4 | SIGNATURE SOUTH – SITE DRAWINGS

APPENDIX M.1

Signature East – Engineer's Report

Table of Contents

1. Introduction 1
2. Stormwater Management Design Methodology 1
   - 2.1 Rainfall Data 2
   - 2.2 Site Soils 3
   - 2.3 Curve Numbers 3
   - 2.4 Time of Concentration 3
3. Pre-Development Site Conditions 3
   - 3.1 Point of Analysis #1 (East Riser Ditch) 4
     - 3.1.1 Existing Drainage Area #1 4
   - 3.2 Point of Analysis #2 (West Riser Ditch) 4
     - 3.2.1 Existing Drainage Area #2 5
4. Post-Development Site Conditions 5
   - 4.1 Point of Analysis #1 (East Riser Ditch) 5
     - 4.1.1 Proposed Drainage Area #1A 5
     - 4.1.2 Proposed Drainage Area #1B 6
   - 4.2 Point of Analysis #2 (West Riser Ditch) 6
     - 4.2.1 Proposed Drainage Area #2A 6
     - 4.2.2 Proposed Drainage Area #2B 6
     - 4.2.3 Proposed Drainage Area #2C 6
   - 4.3 Proposed Structural Stormwater Management Strategies 7
     - 4.3.1 Manufactured Treatment Devices 7
     - 4.3.2 Pervious Paving Systems 8
     - 4.3.3 Detention Basin 8
     - 4.3.4 Pipe Sizing 9
   - 4.4 Stormwater Quantity Controls 9
   - 4.5 Water Quality Controls 11
   - 4.6 Groundwater Recharge 12
   - 4.7 Tailwater 12
   - 4.8 Soil Erosion and Sediment Control 12
   - 4.9 Low-Impact Development and Nonstructural Stormwater Management Facilities 13
5. Conclusions 15

Appendices

A. Pre- vs. Post-Development Hydrographs - Current Adjusted Precipitation Depths
- McCuen-Spiess Sheet Flow Length Calculations
- 2-Year Storm Event
- 10-Year Storm Event
- 100-Year Storm Event

B. Pre- vs. Post-Development Hydrographs - Future Adjusted Precipitation Depths
- 2-Year Storm Event
- 10-Year Storm Event
- 100-Year Storm Event

C. Water Quality
- Water Quality Storm Hydrograph
- Water Quality Unit Flows

D. Design Calculations
- Basin Drain Time
- Emergency Spillway
- Groundwater Recharge Worksheet
- Off-site Stability
- West Riser Ditch Pump Station Analysis

E. Conveyance Calculations
- Pipe Sizing

F. Supporting documents
- Manufactured Treatment Device Certification & Details
- Underground Basin Manufacturer Specifications
- Buoyancy Calculations
- Stormwater Soil Log Findings by GZA GeoEnvironmental, Inc. dated March 20, 2026
- Geotechnical Report by Whitestone Associates dated May 20, 2015
- NOAA Atlas 14 Precipitation Estimate Report
- Previously Approved NJDEP Flood Hazard Area Verification and Individual Permit

G. Maps
- USGS Map
- Street Map
- Tax Map
- Site Aerial Map
- HUC-14 Sub-Watershed Map
- NJDEP Surface Waters Map
- FEMA FIRM Map
- Soil Map
- Overall Airport Drainage Exhibits
- Drainage Area Maps
  - Existing Drainage Area Map
  - Proposed Drainage Area Map
  - Water Quality Drainage Area Map
  - Inlet Drainage Area Map
  - MVSA Drainage Area Map

F. SUPPORTING DOCUMENTS

- **Manufactured Treatment Device Certification & Details**
- **Underground Basin Manufacturer Specifications**
- **Buoyancy Calcuations**
- **Stormwater Soil Log Findings by GZA GeoEnvironmental, Inc.**
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State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATERSHED PROTECTION AND RESTORATION
BUREAU OF NJPDES STORMWATER PERMITTING & WATER QUALITY MANAGEMENT
P.O. Box 420 Mail Code 501-02A
Trenton, New Jersey 08625-0420
609-633-7021 / Fax: 609-777-0432
www.njstormwater.org

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

SHAWN M. LATOURETTE
Commissioner

November 18, 2022

Zachariha J. Kent
Vice President of Product Management
Bio Clean Environmental Services, Inc., a Quikrete Company
398 Via El Centro
Oceanside, CA 92058

Re: MTD Lab Certification
Bio Clean High Capacity Kraken Filter Stormwater Treatment Device
Online Installation

TSS Removal Rate 80%

Dear Mr. Kent:

The Stormwater Management rules under N.J.A.C. 7:8-5.2(f) and 5.2(j) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Bio Clean Environmental Services, Inc., a Quikrete company, has requested a Laboratory Certification for the Bio Clean High Capacity Kraken Filter Stormwater Treatment Device (High Capacity Kraken Filter).

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated October 2022) for this device is published online at http://www.njcat.org/uploads/newDocs/HCKrakenFilterNJCATFinalReport.pdf.

The NJDEP certifies the use of the High Capacity Kraken Filter by Bio Clean Environmental Services, Inc. at a TSS removal rate of 80% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-

5.5. The MTFR is calculated based on a verified loading rate of 0.101 gpm/ft^2 of effective membrane filter area.

2. The High Capacity Kraken Filter shall be installed using the same configuration reviewed by NJCAT, and sized in accordance with the criteria specified in item 6 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 11.3 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the High Capacity Kraken Filter. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://www.conteches.com/kraken for any changes to the maintenance requirements.

6. Sizing Requirement:

The example below demonstrates the sizing procedure for the High Capacity Kraken Filter:

Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using a High Capacity Kraken Filter. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

The selection of the appropriate model of a High Capacity Kraken Filter is based upon both the maximum inflow drainage area and the MTFR. It is necessary to calculate the required model using both methods and to use the largest model determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the High Capacity Kraken Filter in this example is 0.25 acres. Based upon the information in Table 1 below, the following number of cartridges are required in a High Capacity Kraken Filter to treat the impervious area without exceeding the maximum allowable drainage area:

a. Twenty-eight (28) 10" cartridges;
b. Thirteen (13) 20" cartridges; or
c. Eight (8) 30" cartridges.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:
time of concentration = 10 minutes
i = 3.2 in/hr (page 74, Fig. 5-16 of Chapter 5 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs (354.58 gpm)
(Note: 1 cfs = 448.83 gpm)

Given the site runoff is 0.79 cfs and based on Table 1 below, the following minimum numbers of cartridges are required in a High Capacity Kraken Filter without exceeding the MTFR of the individual model:

a. Seventy-two (72) 10" cartridges;
b. Thirty-three (33) 20" cartridges; or
c. Twenty-one (21) 30" cartridges.

The MTFR evaluation results will be used since that method results in the highest minimum configuration determined by the two methods.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the NJCAT Verification Report in the Verification Appendix under Table A-1.

Table 1. High Capacity Kraken Filter Cartridge MTFRs and Maximum Allowable Drainage Area

Cartridge Height (in)	Cartridge Maximum Treatment Flow Rate (MTFR) (cfs)	Maximum Allowable Drainage Area (acres)
30	0.038	0.032
20	0.024	0.020
10	0.011	0.009

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Changi Wu of my office at chang.i.wu@dep.nj.gov.

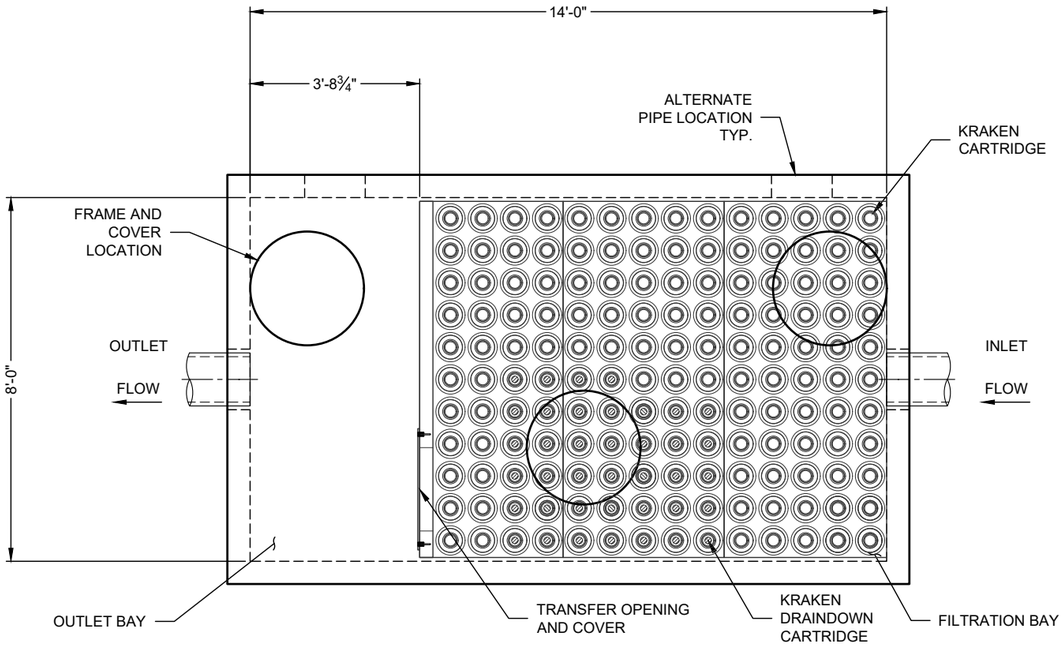
Sincerely,

Gabriel Mahon

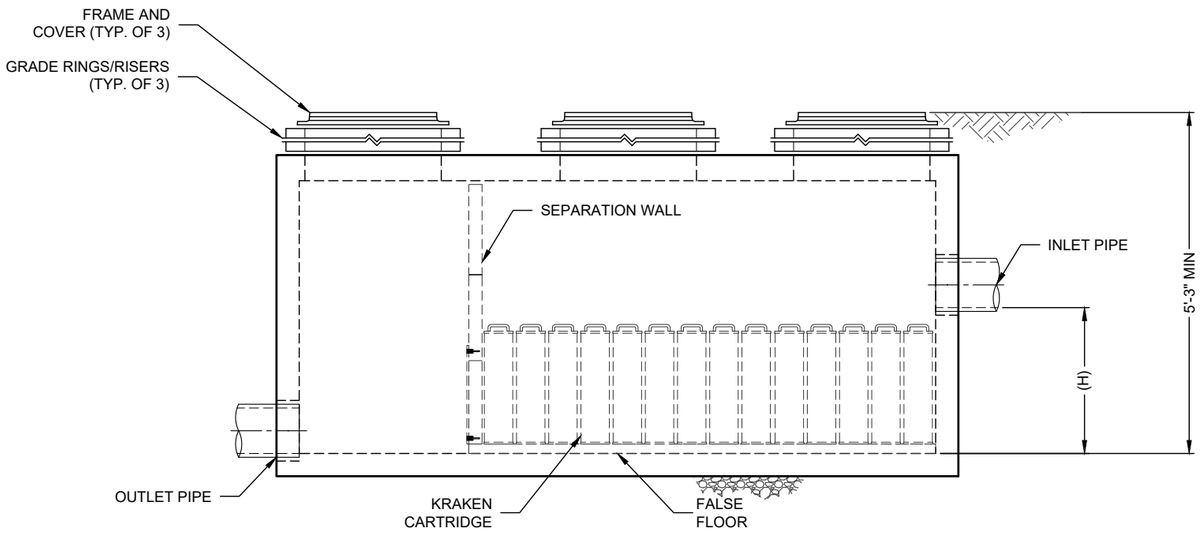
Gabriel Mahon, Chief
Bureau of NJPDES Stormwater Permitting & Water Quality Management
Division of Watershed Protection and Restoration
New Jersey Department of Environmental Protection

Attachment: Maintenance Plan

cc: Richard Magee, NJCAT



PLAN



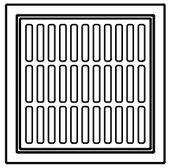
ELEVATION

THE KRAKEN®
FOR PATENT INFORMATION, GO TO www.ContechES.com/IP

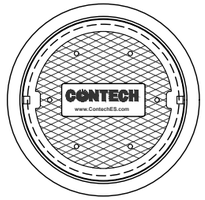
KRAKEN FILTER DESIGN NOTES

- KRAKEN FILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD
- A 8' x 14' OFFLINE STYLE KRAKEN FILTER (KFOV0814) IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (154)
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS NOTED OTHERWISE

CARTRIDGE HEIGHT	30"	20"	10"
RECOMMENDED HYDRAULIC DROP (H)	38.5"	28.5"	18.5"
SPECIFIC FLOW RATE (gpm/sf)	0.10	0.10	0.10
CARTRIDGE FLOW RATE (gpm)	17	10.6	4.9



FRAME AND GRATE
(SIZE MAY VARY)
(NOT TO SCALE)



FRAME AND COVER
(DIAMETER MAY VARY)
(NOT TO SCALE)

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
CARTRIDGE HEIGHT (SEE TABLE ABOVE)	*
# OF CARTRIDGES REQUIRED	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

UPSTREAM RIM ELEVATION	*
DOWNSTREAM RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS: *

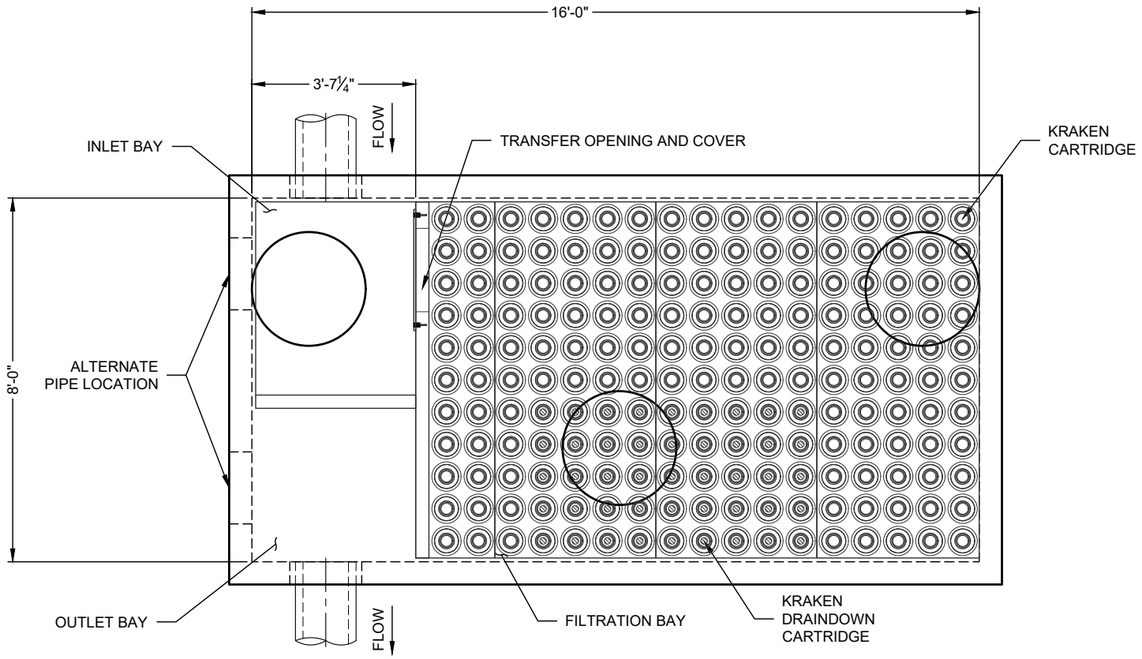
* PER ENGINEER OF RECORD *

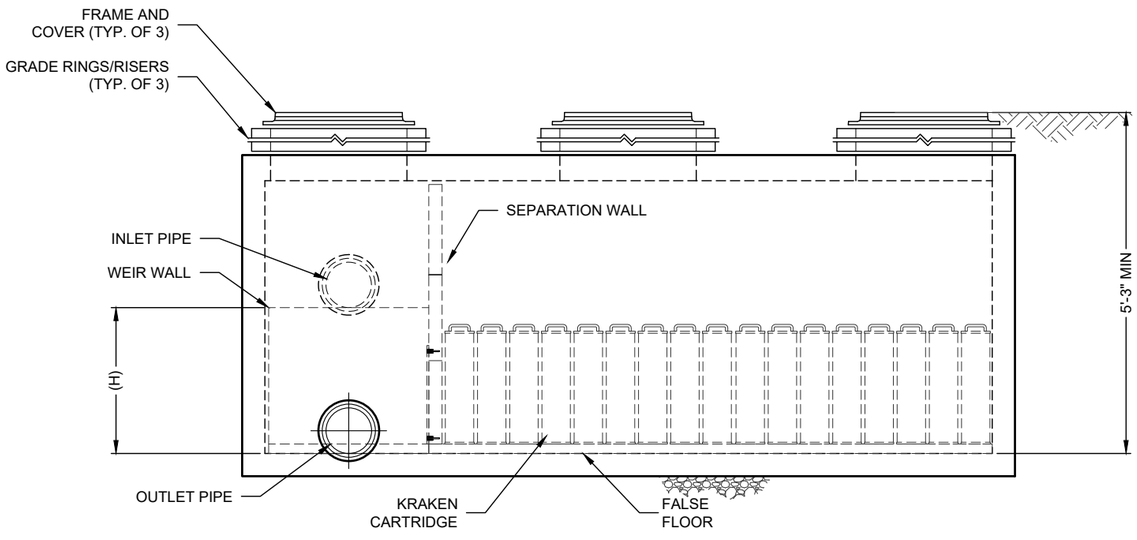
GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. ALTERNATE DIMENSIONS ARE IN MILLIMETERS [mm] UNLESS NOTED OTHERWISE.
4. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
5. KRAKEN FILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
6. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 8.75' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE KRAKEN FILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

CONTECH®
ENGINEERED SOLUTIONS LLC
A QUIKRETE® COMPANY
9100 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

HIGH CAPACITY (HC) KRAKEN FILTER
8' x 14' OFFLINE KRAKEN FILTER
STANDARD DETAIL





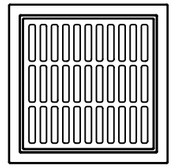
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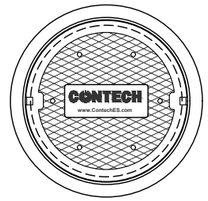
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- A 8' x 16' PEAK DIVERSION STYLE KRAKEN FILTER (KFPD0816) IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (187) AND IS AVAILABLE IN
- A LEFT INLET (AS SHOWN) OR A RIGHT INLET CONFIGURATION
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS NOTED OTHERWISE

CARTRIDGE HEIGHT	30"	20"	10"
RECOMMENDED HYDRAULIC DROP (H)	38.5"	28.5"	18.5"
SPECIFIC FLOW RATE (gpm/sf)	0.10	0.10	0.10
CARTRIDGE FLOW RATE (gpm)	17	10.6	4.9



FRAME AND GRATE
(SIZE MAY VARY)
(NOT TO SCALE)



FRAME AND COVER
(DIAMETER MAY VARY)
(NOT TO SCALE)

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
CARTRIDGE HEIGHT (SEE TABLE ABOVE)	*
# OF CARTRIDGES REQUIRED	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

UPSTREAM RIM ELEVATION	*
DOWNSTREAM RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS: *

* PER ENGINEER OF RECORD *

GENERAL NOTES
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5. KRAKEN FILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
6. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 10' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE KRAKEN FILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER OPENING COVER WHEN THE SYSTEM IS ACTIVATED.

CONTECH®
ENGINEERED SOLUTIONS LLC
A QUIKRETE® COMPANY
9100 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

HIGH CAPACITY (HC) KRAKEN FILTER
8' x 16' PEAK DIVERSION KRAKEN FILTER
STANDARD DETAIL

StormTrap Guide Specification

StormTrap
SingleTrap on Pad Foundation with Liner
Groundwater BELOW Invert

Revised 11/21/18

This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including ***MasterFormat, SectionFormat,*** and ***PageFormat,*** contained in the CSI ***Manual of Practice.***

The section must be carefully reviewed and edited by the Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all "Specifier Notes" when editing this section.

Section numbers are from ***MasterFormat 2016 Edition***. Update section numbers to versions if required.

Specifier Notes: This section covers "StormTrap®" precast concrete, modular, storm water detention modules. StormTrap is custom designed to meet the specific requirements of the project.

Consult StormTrap for assistance in editing this section for the specific application.

SECTION 33 46 23 – MODULAR BURIED STORMWATER STORAGE UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. StormTrap Precast concrete, modular stormwater detention.

1.02 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

B. Section 03 30 00 – Cast-in-Place Concrete

C. Section 03 40 00 – Precast Concrete

1.03 REFERENCE STANDARDS

A. AASHTO – Standard Specifications for Highway Bridges – Seventh (7^{th}) Edition

B. ACI 318 - Building Code Requirements for Structural Concrete.

C. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

D. ASTM C 857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

E. ASTM C 858 - Standard Specification for Underground Precast Concrete Utility Structures.

F. ASTM C 891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.

G. ASTM C 990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

H. ASTM A 1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

1.04 DESIGN REQUIREMENTS

A. Precast Concrete Modular Stormwater Detention shall comply with ASTM C858.

B. Underground precast concrete stormwater management system shall be sized in accordance with the design requirements provided by the Engineer of Record (EOR) and approved by the reviewing agency.

C. The system shall be designed so modules are aligned and have channels that extend to the bottom of the modules allowing for relatively unrestricted fluid flow in both directions.

D. Minimum Structural Design Loading: ASTM C 857.

1. Total Cover:

a. Minimum: As indicated on the drawings.

b. Maximum: As indicated on the drawings.

2. Concrete chamber shall be designed for AASHTO HS-20 wheel load.

3. Minimum Soil Pressure:

    a. SingleTrap Modules: As indicated on the drawings for concrete pad.

4. Vertical and lateral soil pressures shall be determined using:

    a. Groundwater: At or below invert of system.

    b. Lateral soil pressures to be based on Active earth pressure

        1) Lateral soil pressure = 35 pcf for 120 pcf backfill unit weight

    c. Vertical soil pressures

        1) Live load = HS-20-44 Dead load = 120 pcf cover fill unit weight

    d. Engineer to verify geotechnical requirements

1.05 QUALITY ASSURANCE

A. The manufacture of the concrete modules shall be performed at a precast production facility certified by the NPCA or PCI.

1.06 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures, except shop drawings shall be eleven inches (11”) by seventeen inches (17”).

B. Product Data: Submit manufacturer’s product data and installation instructions.

C. Record Documents:

1. Shop Drawings:

    a. Submit manufacturer’s shop drawings, including plans, elevations, sections, and details indicating layout, dimensions, foundation, cover, and joints.

    b. Indicate size and location of roof openings and inlet and outlet pipe openings.

    c. Indicate sealing of joints.

D. Operation and Maintenance Data: Submit manufacturer’s operation and maintenance instructions

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery of Accessories: Deliver to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage of Accessories:

1. Store in accordance with manufacturer’s instructions.

2. Store in clean, dry area, out of direct sunlight.

C. Handling: Protect materials during handling and installation to prevent damage.

1.08 WARRANTY

A. The Manufacturer shall provide a minimum five (5) year limited warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. StormTrap, LLC, 1287 Windham Parkway, Romeoville, Illinois 60446. Phone (877) 867-6872. Fax (331) 318-5347. Website www.stormtrap.com.

2.02 STORMWATER DETENTION

A. All material shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Stormwater Detention Modules:

1. Description: Engineered, precast concrete, modular stormwater detention.

2. Module Type: StormTrap SingleTrap.

3. Size: As indicated on the drawings.

4. Concrete: Manufacturer's Approved Mix design providing a minimum compressive strength of 6,000 psi at 28 days.

5. Reinforcing Bars: ASTM A 615, Grade 60.

6. Reinforcing Mesh: ASTM A 1064, Grade 80.

7. Cover for Reinforcing Bars: ACI 318

2.03 CONCRETE PAD (PROVIDED BY CONTRACTOR)

A. Concrete pad foundation shall be reinforced cast-in-place as specified in Section 03 30 00.

1. Foundation shall have a 1-foot overhang as indicated on the drawings.

2. Minimum Compressive Strength: 4,000 psi at 28 days.

3. Reinforcing Bar Design: As indicated on the drawings.

2.04 ACCESSORIES

A. Joint Tape:

1. ASTM C 990.

2. Seven eights inch (7/8") diameter, preformed butyl mastic joint sealer.

3. Approved by manufacturer.

B. Joint Wrap:

1. Eight inch (8") wide self-adhesive elastomeric resin bonded woven puncture resistant polymer wrap.

2. Approved by manufacturer.

C. Geomembrane Liner (Provided by Contractor)

1. One (1) – Layer BTL40 Liner (or approved equal)

2. Two (2) – Layers non-woven geotextile fabric.

3. Tape on pipe boot kits appropriately sized for inlet and outlet connections.

4. Approved by Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine area to receive stormwater detention modules. Notify Engineer if area is not acceptable. Do not begin installation until unacceptable conditions have been corrected.

B. Verify in field before installation, dimensions and soils conditions, including groundwater and soil bearing capacity.

3.02 INSTALLATION

A. Install stormwater detention modules in accordance with manufacturer's instructions and ASTM C 891.

B. Install modules plumb, on line, and to proper elevation.

C. Install modules with a maximum space of three quarters inch (3/4") between adjacent modules. If the space exceeds three quarters inch (3/4"), the modules shall be reset with appropriate adjustment made to line and grade to bring the space into compliance.

D. SingleTrap:

1. Concrete Pad Foundation: Place modules on level, cast-in-place concrete foundation with one foot (1') overhang as indicated on the drawings.

2. Cast-in-place concrete for foundation shall have a minimum compressive strength of 4,000 psi at twenty-eight (28) days.

E. Joint Tape:

1. Seal perimeter horizontal joint between modules with joint tape in accordance with ASTM C 891, 8.8 and 8.12.

2. Prepare surfaces and install joint tape in accordance with manufacturer's instructions.

F. Joint Wrap:

1. Seal exterior joints between adjacent modules with joint wrap in accordance with ASTM C 891.

2. Prepare surfaces and install joint wrap in accordance with manufacturer's instructions.

G. Geomembrane Liner: (Provided by Contractor)

1. Contractor to provide liner and install with minimal seams in accordance with the manufacturer's recommendations.

2. The geomembrane shall provide a water tight barrier for the bottom and sides of the stormwater detention modules.

3. Special care shall be taken not to damage or penetrate liner during setting of concrete structures or when pouring of concrete slab is required.

4. All seams shall be field welded by qualified technician.

5. Liner shall be installed so that there is one (1) layer of geotextile fabric covering both sides of the geomembrane for a sandwich effect.

H. Field Modifications to the modules is strictly prohibited without prior written consent of StormTrap.

I. Excavation and fill shall be as specified in Sections 31 00 00.

J. Fill:

1. Backfill material shall consist of a GW, GP, SW, or SP material as defined by the Unified Soil Classification System and that meets the gradation requirements as indicated on the drawings.

2. Native materials shall be separated from backfill materials with a geotextile filter fabric unless the drawings indicate separation is not required.

3. Deposit fill on both sides of modules at same time and to approximate same elevation.

4. Prevent wedging action against structure by stepping or serrating slopes bounding or within area to be backfilled.

5. Do not disrupt or damage joint wrap or geomembrane liner during backfilling.

K. Do not use stormwater detention modules that are damaged, as determined by manufacturer.

L. Contractor is responsible for installation in accordance with project plans, specifications, and all federal, state, and local regulations.

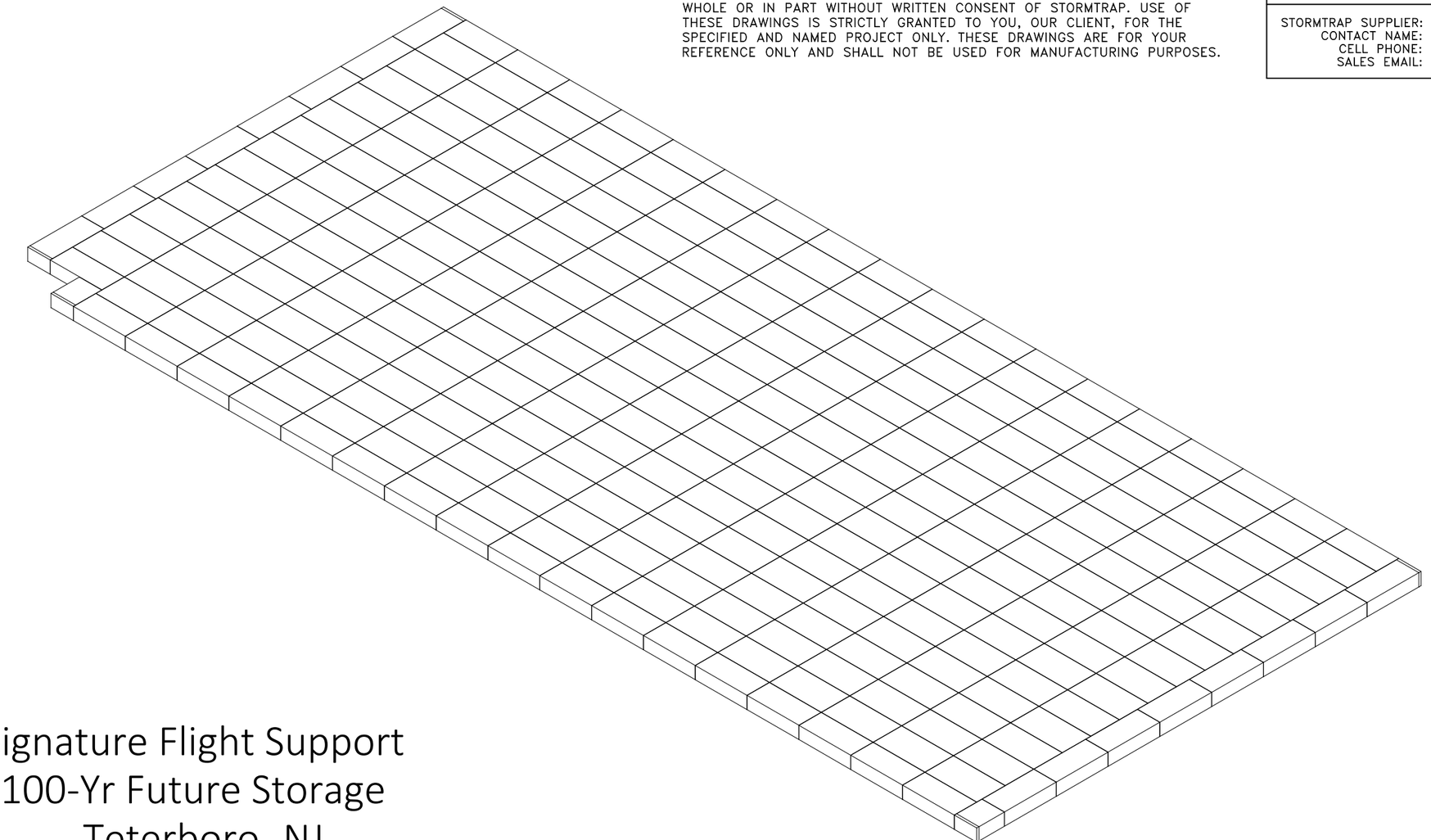
END OF SECTION 33 46 23

StormTrap®

MODULAR CONCRETE
STORMWATER MANAGEMENT

SHEET INDEX	
PAGE	DESCRIPTION
0.0	COVER SHEET
1.0	GENERAL NOTES
1.1	SINGLETRAP DESIGN CRITERIA
2.0	SINGLETRAP SYSTEM LAYOUT
2.1	SINGLETRAP FOUNDATION LAYOUT
3.0	SINGLETRAP INSTALLATION SPECIFICATION
3.1	SINGLETRAP INSTALLATION SPECIFICATION
4.0	SINGLETRAP BACKFILL SPECIFICATION
5.0	PIPE/ACCESS OPENING SPECIFICATION
6.0	SINGLETRAP MODULE TYPES

THE STORMTRAP DRAWINGS SHALL NOT BE ALTERED OR MANIPULATED IN WHOLE OR IN PART WITHOUT WRITTEN CONSENT OF STORMTRAP. USE OF THESE DRAWINGS IS STRICTLY GRANTED TO YOU, OUR CLIENT, FOR THE SPECIFIED AND NAMED PROJECT ONLY. THESE DRAWINGS ARE FOR YOUR REFERENCE ONLY AND SHALL NOT BE USED FOR MANUFACTURING PURPOSES.



Signature Flight Support
100-Yr Future Storage
Teterboro, NJ

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SHEET TITLE:

COVER SHEET

SHEET NUMBER:

0.0

GENERAL NOTES:

1. STRUCTURE PROXIMITY LOADING DISCLAIMER:

   STORMTRAP MODULES AND FOUNDATION ARE NOT DESIGNED TO ACCEPT ANY ADDITIONAL LOADING FROM ANY NEARBY STRUCTURES NEXT TO OR OVER THE TOP OF STORMTRAP. EXAMPLES OF NEARBY STRUCTURES MAY INCLUDE BUT ARE NOT LIMITED TO BUILDINGS, FOUNDATION ELEMENTS, RETAINING WALLS, LIGHT POLES, BOLLARDS, SIGNPOSTS, FENCES. ADDITIONALLY, STORMTRAP IS NOT RESPONSIBLE FOR INSTALLATION CONFLICTS ARISING FROM ANY OF THESE NEARBY STRUCTURES. IF ADDITIONAL LOADING CONSIDERATIONS ARE REQUIRED FOR STRUCTURAL DESIGN OF STORMTRAP, PLEASE CONTACT STORMTRAP IMMEDIATELY. FOR LIGHT POLES SHOWN OVER THE TOP OF THE SYSTEM, STORMTRAP WILL PROVIDE A 5'-0" LATERAL DISTANCE CAVITY AROUND THE LIGHT POLE TO ACCOMMODATE IT. THE EOR TO TAKE RESPONSIBILITY FOR ENSURING THE LIGHT POLE IS NOT INFLICTING ANY LOADING ON THE STORMTRAP MODULES AND FOUNDATION.

2. TREE LOADING DISCLAIMER:

   THE NUMBER OF TREES OR WEIGHT OF TOTAL PLANT MATERIAL PRESENT ON TOP OF A SINGLE STORMTRAP MODULE SHALL NOT EXCEED 16,000 LBS. THE REQUIREMENTS LISTED HERE APPLY AT BOTH THE TIME OF INSTALLATION AND FOR THE LIFE OF THE TREES AND PLANTS IN QUESTION. THE EOR AND LANDSCAPE ARCHITECT ARE RESPONSIBLE FOR ENSURING THAT TREE AND OTHER PLANT ROOTS DO NOT INTERFERE WITH OR COMPROMISE THE FUNCTIONAL AND STRUCTURAL INTEGRITY OF STORMTRAP'S UNDERGROUND MODULES. APPROPRIATE MEASURES SHOULD BE TAKEN TO PREVENT ROOT GROWTH INTO THE STORMTRAP SYSTEM FROM ADJACENT OR OVERHEAD TREES. FURTHERMORE, THE ROOTS OF THE TREES MUST BE CONTAINED TO PREVENT FUTURE DAMAGE TO THE STORMTRAP SYSTEM. STORMTRAP ACCEPTS NO LIABILITY FOR DAMAGES CAUSED BY TREES OR OTHER VEGETATION PLACED AROUND OR ON TOP OF THE SYSTEM.

3. PRE-TREATMENT/SEDIMENT/FILTER CHAMBER DISCLAIMER:

   FOR SYSTEMS CONTAINING PRE-TREATMENT, SEDIMENTATION AND/OR FILTER CHAMBERS; IF REQUIRED TO BE SEALED TO PREVENT SAND AND/OR PRE-TREATED WATER FROM MIGRATING INTO ADJOINING MODULES, IT IS THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT THOSE MODULES ARE SEALED.

4. OUTLET CONTROL STRUCTURE DISCLAIMER (IF SHOWN ON THESE PLANS):

   IF A WATERTIGHT SOLUTION IS REQUIRED FOR AN OUTLET CONTROL STRUCTURE, ALL EXTERIOR COLD JOINTS, INCLUDING JOINT BETWEEN TOP AND BASE MODULES, BETWEEN TOP AND BASE OF ADJOINING SYMONS WALLS, AND JOINTS BETWEEN MODULE AND ADJACENT END PANELS WILL BE THE SOLE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO PROVIDE AND INSTALL THE WATERTIGHT APPLICATION PER THE EOR'S SPECIFICATION.

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GENERAL NOTES

SHEET NUMBER:

1.0

STRUCTURAL DESIGN LOADING CRITERIA

LIVE LOADING: AASHTO HS-20 HIGHWAY LOADING
ADDITIONAL LOADING: AIRCRAFT
GROUND WATER TABLE: BELOW INVERT OF SYSTEM
SOIL BEARING PRESSURE: 3000PSF
SOIL DENSITY: 135 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE: 40 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE: N/A PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES: ASTM C857, ACI-318
BACKFILL TYPE: SEE SHEET 4.0 FOR BACKFILL OPTIONS

STORMTRAP SYSTEM INFORMATION

UNIT HEADROOM: 3'-0" SINGLETRAP
TOTAL STORAGE PROV: 102,602.57 CUBIC FEET

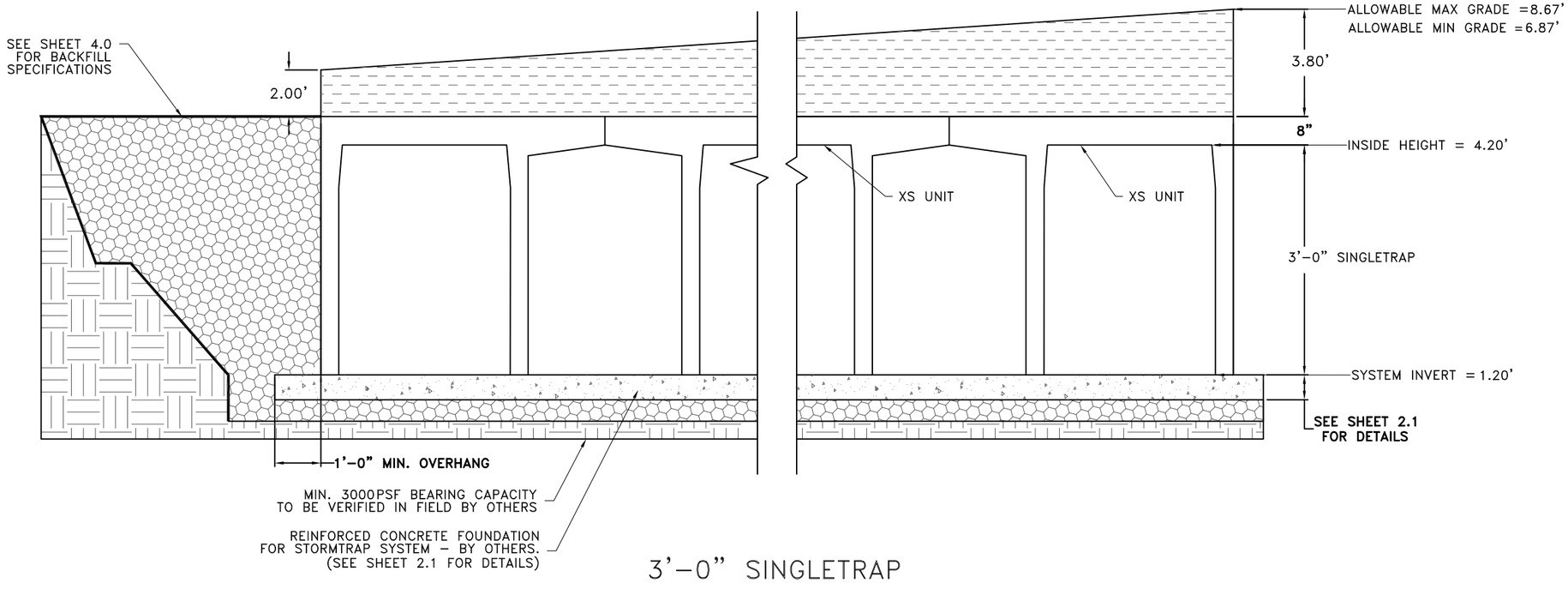
SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 2.00' MAX. 3.80' CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BE BELOW INVERT OF SYSTEM IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.
5. SYSTEM DESIGN MAY ALLOW FOR INCIDENTAL LEAKAGE AND WILL NOT BE SUBJECT TO LEAKAGE TESTING.

	GLOBAL 7500
AIRCRAFT DESIGN WEIGHT	110,000 LBS.
PERCENT ON MAIN GEARS	100%
NUMBER OF MAIN GEARS	2
WHEELS PER MAIN GEAR	2
MAIN GEAR WHEEL LDG.	27,500 LBS.
WHEEL CONTACT AREA	16.5in x 10in
ADDITIONAL LOADING	SURCHARGE
LATERAL SURCHARGE	700 PSF

AIRCRAFT LOADING GENERAL NOTES:

1. THE MAXIMUM VEHICLE WEIGHT OF THE GLOBAL 7500 AIRCRAFT CONSIDERED HEREIN SHALL NOT EXCEED 110,000 LBS. THE CALCULATIONS HERE CONSIDER 100% OF THIS WEIGHT TO BE DISTRIBUTED EQUALLY TO THE (2) MAIN GEARS; THE LOAD ON EACH MAIN GEAR IS DISTRIBUTED EQUALLY TO (2) WHEELS PER MAIN GEAR. IN TURN, THE MAXIMUM WHEEL LOAD SHALL NOT EXCEED 27,500 LBS.
2. THE AREA OF EACH MAIN GEAR WHEEL TIRE TAKEN TO BE IN CONTACT WITH THE GROUND SURFACE IS 16.5 IN X 10 IN.
3. THE MAIN GEAR CENTER-TO-CENTER SPACING CONSIDERED HERE IS 14 FT 5 IN. THE CENTER-TO-CENTER SPACING OF EACH MAIN GEAR WHEEL PAIR CONSIDERED HERE IS 30 IN.
4. WHEEL LOADS ARE DISTRIBUTED OVER A PROJECTED AREA WHICH INCREASES WITH DEPTH OF OVERHEAD SOIL COVER OR PAVEMENT. THIS PROJECTED AREA IS DEFINED BY ASTM C857. THE DISTRIBUTED WHEEL LOAD AND PROJECTED AREA HAVE BEEN CONSIDERED IN THE ROOF SLAB DESIGN.
5. AN IMPACT LOAD FACTOR EQUAL TO 1.0 HAS BEEN CONSIDERED IN THE ROOF SLAB DESIGN.
6. THE SYSTEM HAS NOT BEEN DESIGNED TO SUPPORT ANY LATERAL THRUST OR HORIZONTAL LOADING RESULTING FROM AIRCRAFT MOVEMENT OR ACCELERATION. AIRCRAFT SHALL NOT TAKE OFF OR LAND ON TOP OF THE SYSTEM.
7. UNITS SUPPORTING MANHOLES SHALL BE DESIGNED TO SUPPORT AN EQUIVALENT POINT LOAD EQUIVALENT TO A SINGLE AIRCRAFT TIRE (27,500 LBS) WHICH IS TRANSFERRED TO THE MODULE VIA THE MANHOLE RISER.
8. THE SOIL DENSITY CONSIDERED IN THIS DESIGN SHALL NOT EXCEED 135PCF.
9. THE DESIGN GWE CONSIDERED HERE IS LOCATED BELOW THE SYSTEM INVERT.
10. THE SYSTEM HAS BEEN DESIGNED FOR GRANULAR BACKFILL WITH A CORRESPONDING UNSATURATED ACTIVE LATERAL EARTH PRESSURE OF 40PSF.
11. LATERAL SURCHARGE LOADS ASSOCIATED WITH THE GLOBAL 7500 SHALL NOT EXCEED 700PSF. EOR TO VERIFY.
12. THE STORMTRAP SYSTEM SHALL NOT BE SUBJECTED TO LOADS FROM THE HANGAR, OTHER NEARBY STRUCTURES, OR ANY OTHER ITEMS NOT EXPLICITLY LISTED IN THE NOTES AND DESIGN CRITERIA ABOVE.



3'-0" SINGLETRAP

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SINGLETRAP DESIGN CRITERIA

SHEET NUMBER:

1.1

BILL OF MATERIALS

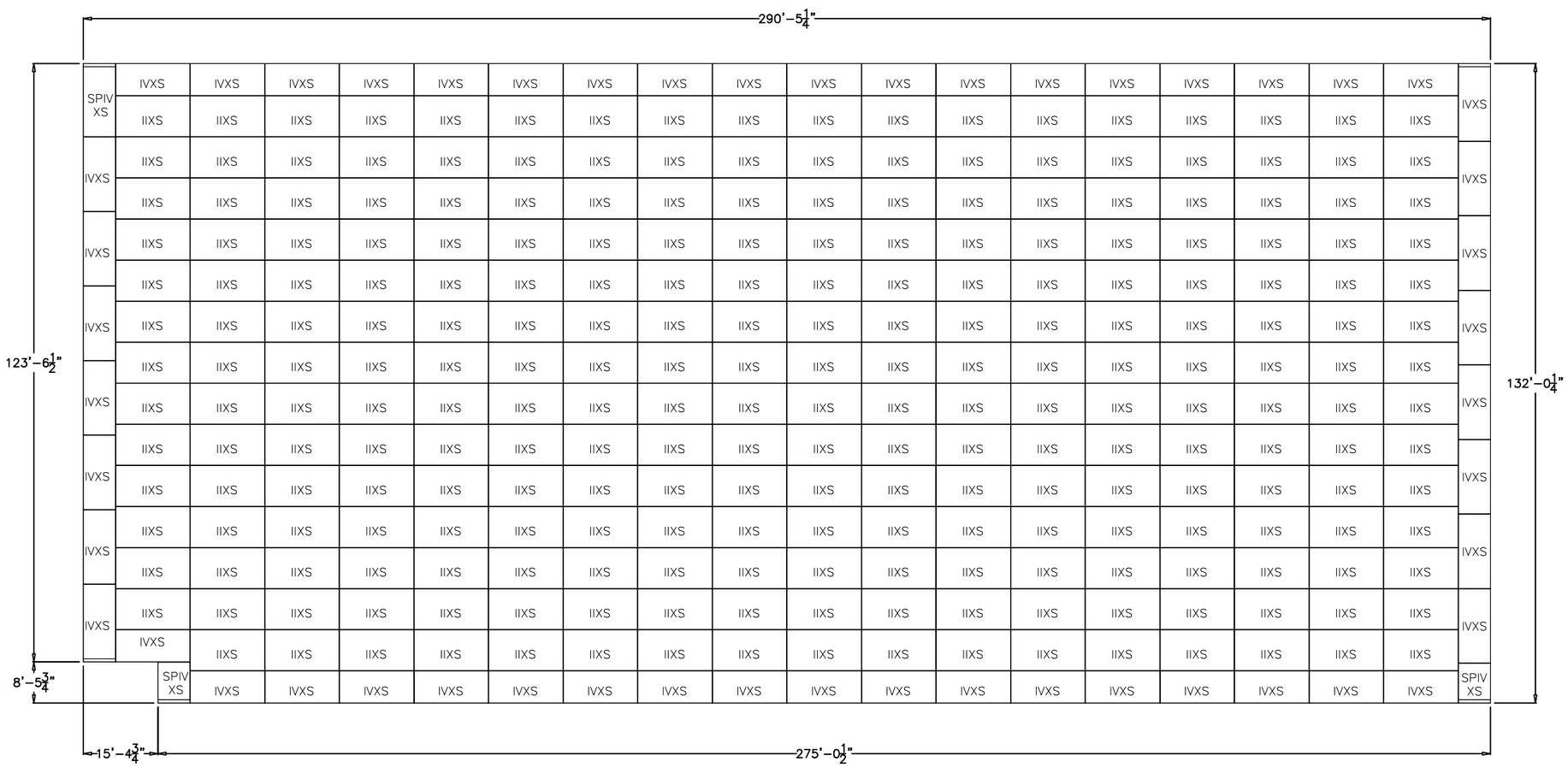
QTY.	UNIT TYPE	DESCRIPTION	WEIGHT
0	I	3'–0" SINGLETRAP	–
251	IIXS	3'–0" SINGLETRAP	18112
0	III	3'–0" SINGLETRAP	–
51	IVXS	3'–0" SINGLETRAP	15728
0	VII	3'–0" SINGLETRAP	–
0	VII–1	3'–0" SINGLETRAP	–
0	VII–2	3'–0" SINGLETRAP	–
0	VII–3	3'–0" SINGLETRAP	–
0	VII–4	3'–0" SINGLETRAP	–
0	SPIII	3'–0" SINGLETRAP	VARIES
3	SPIVXS	3'–0" SINGLETRAP	VARIES
0	T2 PANEL	6" THICK PANEL	–
5	T4 PANEL	8" THICK PANEL	2319
0	T7 PANEL	6" THICK PANEL	–
55	JOINTWRAP	150' PER ROLL	
72	JOINTTAPE	14.5' PER ROLL	
TOTAL PIECES = 305			
TOTAL PANELS = 5			
HEAVIEST PICK WEIGHT = 18,112			

DESIGN CRITERIA

ALLOWABLE MAX GRADE = 8.67'
ALLOWABLE MIN GRADE = 6.87'
INSIDE HEIGHT ELEVATION = 4.20'
SYSTEM INVERT = 1.20'

NOTES:

1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP – INDICATES A MODULE WITH MODIFICATIONS.
5. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.
7. IN ORDER FOR STORMTRAP TO GENERATE APPROVAL DRAWINGS, CIVIL ENGINEERING DRAWINGS MUST BE PROVIDED TO STORMTRAP AND SHALL INCLUDE ALL PIPE SIZES, PIPE MATERIAL, PIPE INVERT ELEVATIONS, ACCESS OPENING SIZE AND SHAPE. IN ADDITION, FINAL GRADING PLANS SHALL ALSO INCLUDE MINIMUM AND MAXIMUM GRADES OVER THE TOP OF THE STORMTRAP SYSTEM.



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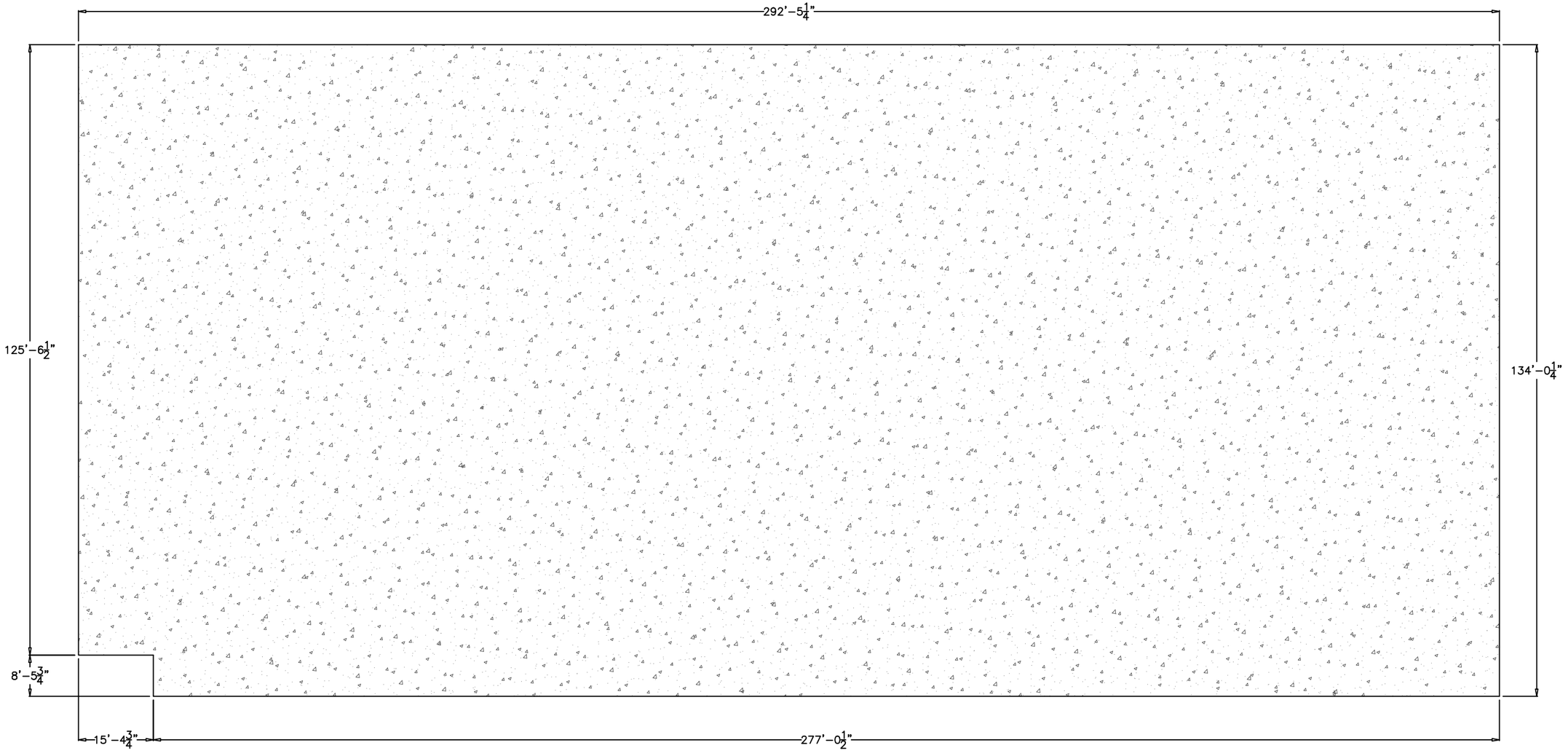
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SHEET TITLE:

SINGLETRAP
SYSTEM LAYOUT

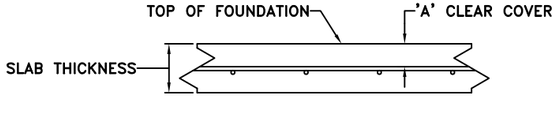
SHEET NUMBER:

2.0



CONCRETE FOUNDATION NOTES:

1. CONCRETE FOUNDATION TO BE SUPPLIED AND INSTALLED BY OTHERS.
2. CONCRETE STRENGTH @ 28 DAYS, 5%-8% ENTRAINED AIR, 3"-5" MAX SLUMP.
3. NET ALLOWABLE SOIL PRESSURE AS INDICATED ON SHEET 1.1.
4. SOIL CONDITIONS TO BE VERIFIED ON SITE BY OTHERS.
5. REBAR: ASTM A615 GRADE 60, BLACK BAR.
6. DIMENSION OF FOUNDATION MUST HAVE 1'-0" OVERHANG BEYOND EXTERNAL FACE OF MODULE.
7. DIMENSION OF STORMTRAP SYSTEM ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
8. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
9. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.



STORMTRAP FOUNDATION DETAIL

HS-20 & AIRCRAFT LOADING - (ACI 318, ST2)				
MAXIMUM SYSTEM COVER	SLAB THICKNESS	CONCRETE STRENGTH	REINFORCEMENT (BOTH DIRECTIONS)	'A' CLEAR COVER
3'-1" - 4'-0"	8"	4500 PSI	#5 @ 12" O.C.	3.375"

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SINGLETRAP FOUNDATION LAYOUT

SHEET NUMBER:

2.1

STORMTRAP INSTALLATION SPECIFICATION

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891 (STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES). THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS ARE PROVIDED FOR EMPHASIS. THE MENTION OF THESE ITEMS DOES NOT PRECLUDE THE INSTALLING CONTRACTOR FROM FOLLOWING ASTM C891 IN ITS ENTIRETY AND IMPLEMENTING ALL APPROPRIATE MEASURES. THE INSTALLING CONTRACTOR OWNS AND IS RESPONSIBLE FOR THE STORMTRAP SYSTEM UPON REMOVAL OF THE MODULES FROM THE DELIVERY TRUCK THROUGH 'FINAL CONSTRUCTION'. FINAL CONSTRUCTION IS ACHIEVED WHEN ALL MODULES ARE SET, FULLY BACKFILLED, AND WHEN FINAL FINISHED GRADES ARE REACHED. THE CONTRACTOR IS RESPONSIBLE FOR ANY COUNTERMEASURES NECESSARY TO RESIST UPLIFT/BUOYANCY BEFORE 'FINAL CONSTRUCTION' IS ACHIEVED.

2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.

3. STORMTRAP MODULES SHALL BE PLACED ON A LEVEL CONCRETE FOUNDATION (SEE SHEET 2.1) WITH A 1'-0" OVERHANG ON ALL SIDES THAT SHALL BE POURED IN PLACE BY INSTALLING CONTRACTOR. A QUALIFIED GEOTECHNICAL ENGINEER WILL BE EMPLOYED, BY OWNER, TO PROVIDE ASSISTANCE IN EVALUATING THE EXISTING SOIL CONDITIONS TO ENSURE THAT THE SOIL BEARING PRESSURE MEETS OR EXCEEDS THE STRUCTURAL DESIGN LOADING CRITERIA AS SPECIFIED ON SHEET 1.1.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED ¾" (SEE DETAIL 2). IF THE SPACE EXCEEDS ¾", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT.

6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE STORMTRAP MODULES AND THE CONCRETE FOUNDATION SHALL BE SEALED TO THE FOUNDATION WITH PRE-FORMED MASTIC JOINT SEALER ACCORDING TO ASTM C891, 8.8 AND 8.12 (SEE DETAIL 1). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL.

7. ALL EXTERIOR ROOF AND EXTERIOR VERTICAL WALL JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 2, 3, & 4). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

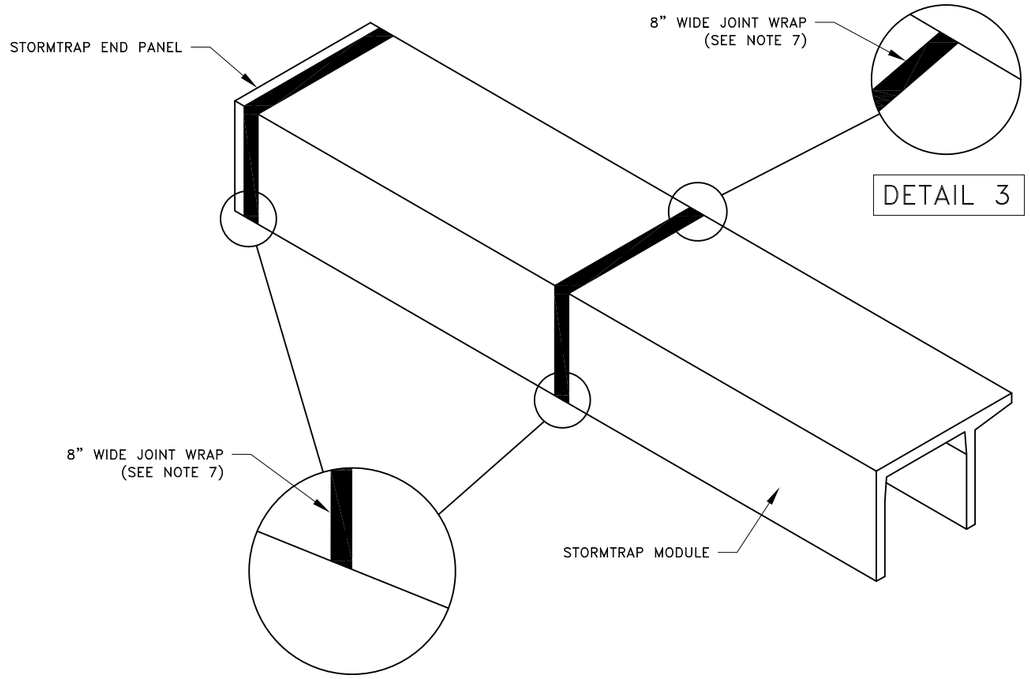
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

   7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

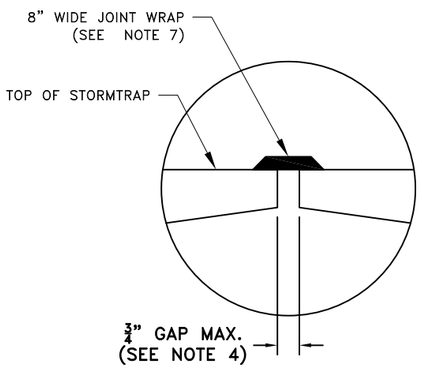
8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.

9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.

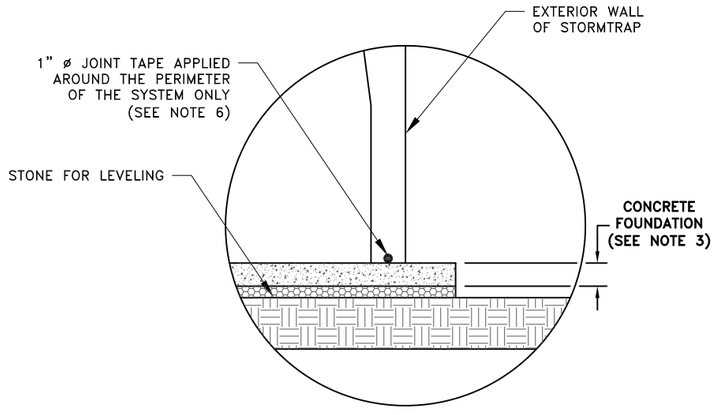
10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.



DETAIL 4



DETAIL 2



DETAIL 1

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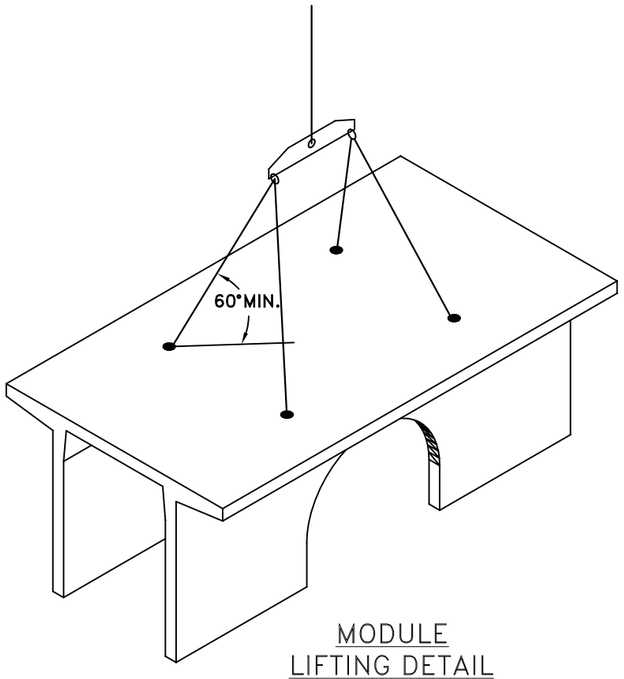
SINGLETRAP
INSTALLATION
SPECIFICATION

SHEET NUMBER:

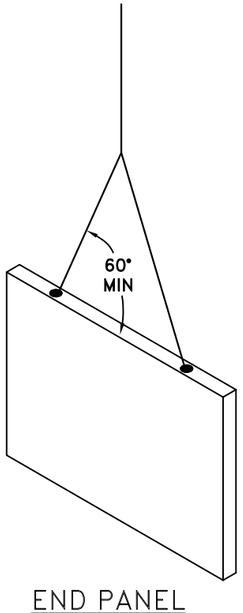
3.0

STORMTRAP MODULE LIFTING SPECIFICATION

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ALL (4) CHAINS/CABLES ARE SECURED PROPERLY TO THE LIFTING ANCHORS AND IN EQUAL TENSION WHEN LIFTING THE STORMTRAP MODULE.
2. MINIMUM 7'–0" CHAIN/CABLE LENGTH TO BE USED TO LIFT STORMTRAP MODULES (SUPPLIED BY CONTRACTOR).
3. CONTRACTOR TO ENSURE MINIMUM LIFTING ANGLE IS 60° FROM TOP SURFACE OF STORMTRAP MODULE. SEE DETAIL.
4. IT IS UNDERSTOOD AND AGREED THAT AT ALL TIMES DURING WHICH HOISTING AND RIGGING EQUIPMENT IS BEING SUPPLIED TO THE PURCHASER, OPERATOR OF SUCH EQUIPMENT SHALL BE IN CHARGE OF HIS ENTIRE EQUIPMENT AND SHALL AT ALL TIMES BE THE JUDGE OF THE SAFETY AND PROPERTY OF ANY SUGGESTION TO HIM FROM THE SELLER, ITS AGENTS OR EMPLOYEES. PURCHASER AGREES TO SAVE, INDEMNIFY AND HOLD HARMLESS SELLER FROM ALL LOSS, CLAIMS, DEMANDS OR CAUSES OF ACTION, WHICH MAY ARISE FROM THE EXISTENCE OR OPERATION OF SAID EQUIPMENT.



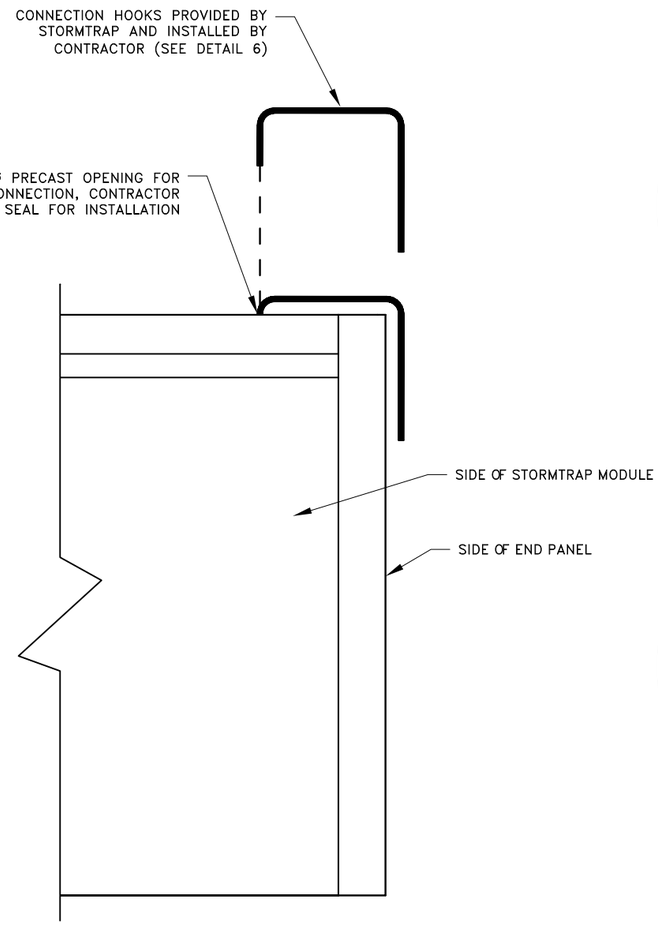
MODULE
LIFTING DETAIL



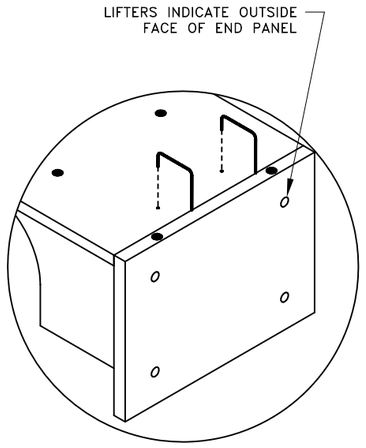
END PANEL
LIFTING DETAIL

END PANEL ERECTION/INSTALLATION SPECIFICATION

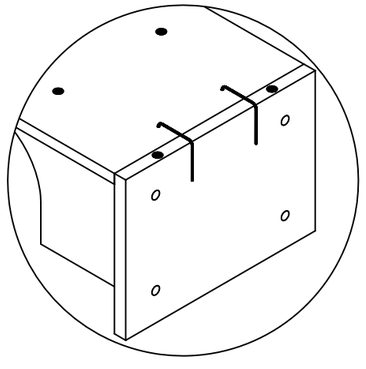
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS). SIDE WITH LIFTERS INDICATES OUTSIDE FACE.
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOK IS ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



PANEL CONNECTION
ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

StormTrap
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1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
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ENGINEER INFORMATION:

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30 Independence Blvd
Suite 200
Warren, NJ
908–668–8300

PROJECT INFORMATION:

Signature Flight Support
100–Yr Future Storage

Teterboro, NJ

CURRENT ISSUE DATE:

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REV.	DATE:	ISSUED FOR:	DWN BY:
1	08/11/2025	PRELIMINARY	SG

SCALE:

NTS

SHEET TITLE:

SINGLETRAP
INSTALLATION
SPECIFICATION

SHEET NUMBER:

3.1

ZONE CHART

ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1	FOUNDATION AGGREGATE	#5 (¾") STONE ANGULAR AGGREGATE (SEE NOTE 4)
ZONE 2	BACKFILL	UNIFIED SOILS CLASSIFICATION (GW, GP, SW, SP) OR SEE BELOW FOR APPROVED BACKFILL OPTIONS
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

APPROVED ZONE 2 BACKFILL OPTIONS

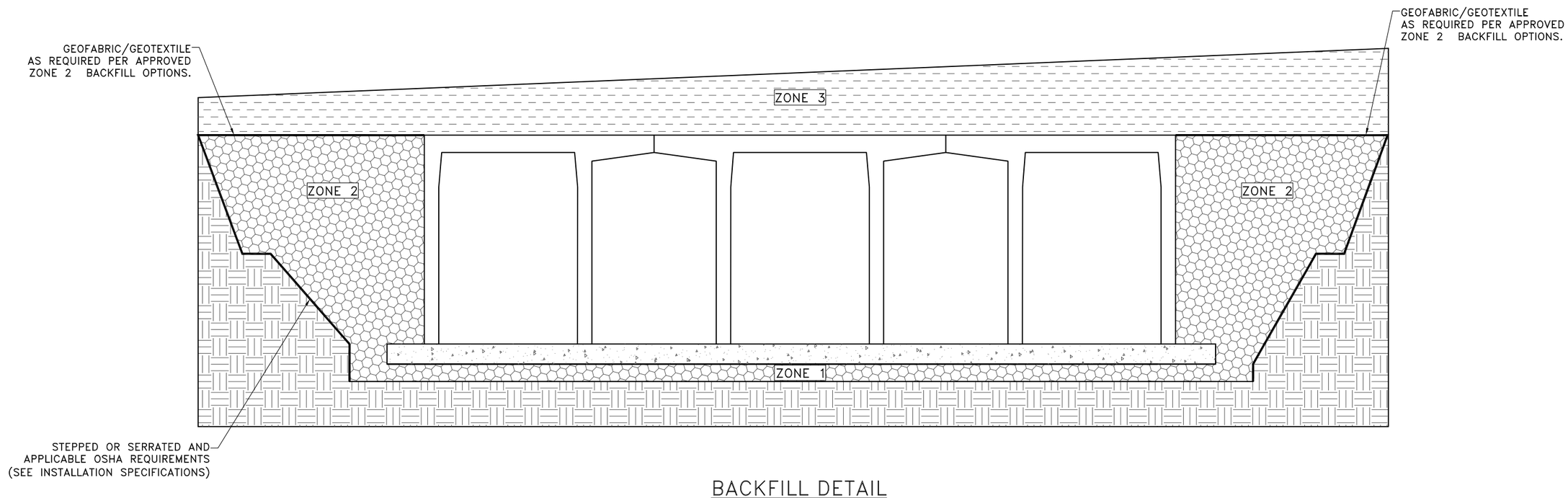
OPTION	REMARKS
¾" STONE AGGREGATE	THE STONE AGGREGATE SHALL CONSIST OF CLEAN AND FREE DRAINING ANGULAR MATERIAL. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL (ASTM SIZE #57) AS DETERMINED BY THE GEOTECHNICAL ENGINEER.
SAND	IMPORTED PURE SAND IS PERMITTED TO BE USED AS BACKFILL IF IT IS CLEAN AND FREE DRAINING. THE SAND USED FOR BACKFILLING SHALL HAVE LESS THAN 40% PASSING #40 SIEVE AND LESS THAN 5% PASSING #200 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE SAND BACKFILL.
CRUSHED CONCRETE AGGREGATE	CLEAN, FREE DRAINING CRUSHED CONCRETE AGGREGATE MATERIAL CAN BE USED AS BACKFILL FOR STORMTRAP'S MODULES. THE SIZE OF THIS MATERIAL SHALL HAVE 100% PASSING THE 1" SIEVE WITH 0% TO 5% PASSING THE #8 SIEVE. THIS MATERIAL SHALL BE SEPARATED FROM NATIVE MATERIAL USING GEOFABRIC AROUND THE PERIMETER OF THE BACKFILL.
ROAD PACK	STONE AGGREGATE 100% PASSING THE 1-1/2" SIEVE WITH LESS THAN 12% PASSING THE #200 SIEVE (ASTM SIZE #467). GEOFABRIC AS PER GEOTECHNICAL ENGINEER RECOMMENDATION.

FILL DEPTH	TRACK WIDTH	MAX VEHICLE WEIGHT (KIPS)	MAX GROUND PRESSURE
12"	12"	51.8	1690 psf
	18"	56.1	1219 psf
	24"	68.1	1111 psf
	30"	76.7	1000 psf
	36"	85.0	924 psf

NOTE:
TRACK LENGTH NOT TO EXCEED 15'-4".
ONLY TWO TRACKS PER VEHICLE.

STORMTRAP ZONE INSTALLATION SPECIFICATION/PROCEDURE

1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST BE DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MUST BE FREE-DRAINING MATERIAL. SEE ZONE 2 BACKFILL CHART ON THIS PAGE FOR APPROVED BACKFILL OPTIONS. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS). ALL MODULES MUST BE SET AND ALL SIDES MUST BE FULLY BACKFILLED BEFORE TRAVEL OVERTOP THE SYSTEM IS PERMITTED. SEE NOTE 2 FOR EXCEPTIONS AND LIMITATIONS.
2. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED IN MINIMUM 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN LIVE LOAD LISTED ON SHEET 1.1 TRAVEL OVERTOP THE SYSTEM. IF TRAVEL OVER THE SYSTEM OCCURS BEFORE THE MINIMUM DESIGN COVER IS ACHIEVED, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. VEHICLES AND MACHINERY USED TO PLACE FILL MATERIAL ON TOP OF THE SYSTEM SHALL TRAVEL PARALLEL TO THE LONGITUDINAL AXIS OF THE STORMTRAP MODULES WHENEVER POSSIBLE.
3. THE VIBRATORY FUNCTION OF ANY ROLLER, COMPACTOR, VEHICLE, ETC. SHALL NOT BE USED OVERTOP THE SYSTEM WITHOUT PRIOR APPROVAL FROM STORMTRAP. IN SOME CASES, HAND COMPACTION MAY BE NECESSARY TO ENSURE THAT THE ALLOWABLE DESIGN LOADING IS NOT EXCEEDED.
4. STONE AGGREGATE FOUNDATION IN ZONE 1 IS FOR LEVELING PURPOSES.



BACKFILL DETAIL

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SCALE:

NTS

SHEET TITLE:

SINGLETRAP BACKFILL SPECIFICATION

SHEET NUMBER:

4.0

ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'–0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 4'–0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 2'–0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED. SEE SHEET 2.0 FOR SIZES AND LOCATIONS.

2. UNLESS OTHERWISE SPECIFIED, PLASTIC COATED STEPS ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'–0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED AT A DISTANCE BETWEEN 10" MIN AND 14" MAX BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.

3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.

4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.

5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.

6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE SECTIONS. (PROVIDED BY OTHERS)

PIPE OPENING SPECIFICATION

1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'–0".

2. CONNECTING PIPES MAY BE INSTALLED WITH A 1'–0" CONCRETE COLLAR AND AN AGGREGATE CRADLE (AS REQUIRED) FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON–SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI MAY BE USED.

3. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON–SHRINK GROUT.

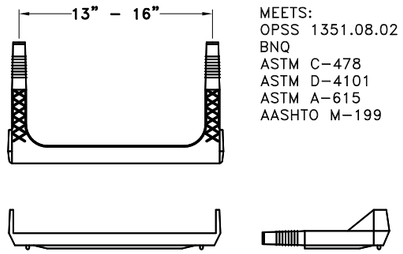
PIPE INSTALLATION INSTRUCTIONS

1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.

2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.

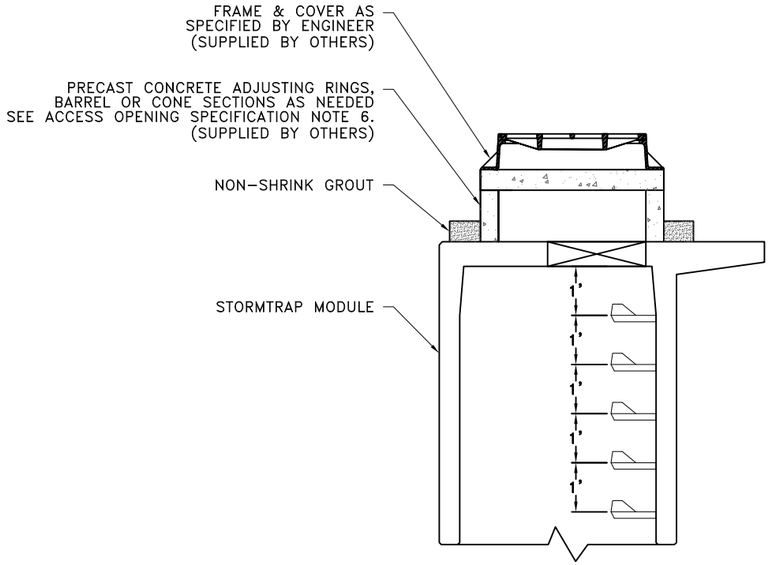
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET INCLUDING BUT NOT LIMITED TO CONCRETE COLLARS, AGGREGATE CRADLES, GRADE RINGS, RISER SECTIONS, ETC., ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.

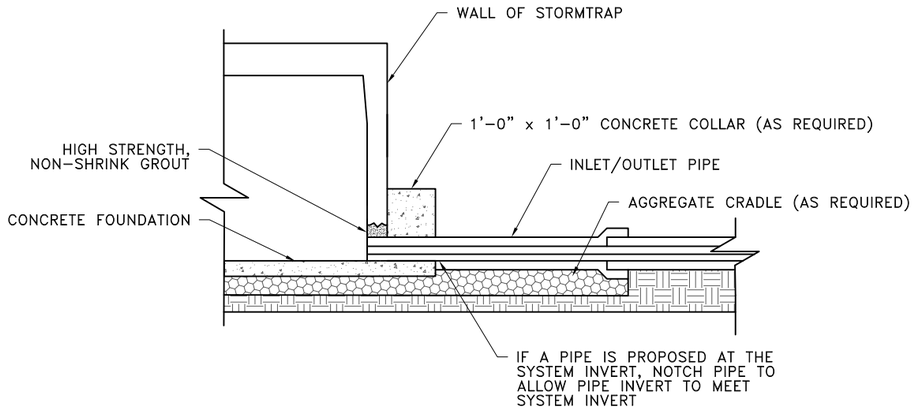


MEETS:
OPSS 1351.08.02
BNQ
ASTM C–478
ASTM D–4101
ASTM A–615
AASHTO M–199

STEP DETAIL



RISER/STAIR DETAIL



NOTCHED PIPE CONNECTION DETAIL
WHEN PIPE INVERT IS AT
INVERT OF STORMTRAP SYSTEM

StormTrap®
PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]
1287 WINDHAM PARKWAY
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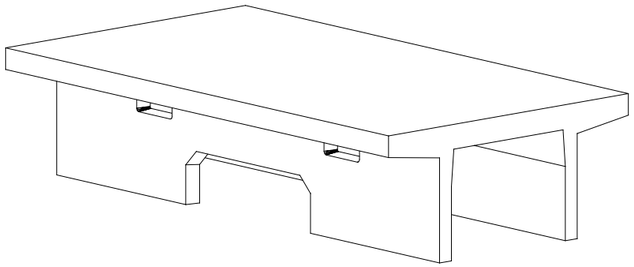
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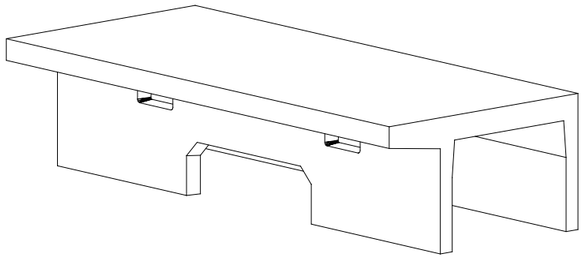
PIPE / ACCESS OPENING SPECIFICATION

SHEET NUMBER:

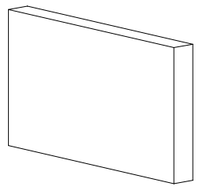
5.0



TYPE IIXS



TYPE IVXS



TYPE IV
END PANEL

NOTES:
1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP – INDICATES A MODULE WITH MODIFICATIONS.
3. P – INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

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NTS

SHEET TITLE:

SINGLETRAP
MODULE TYPES

SHEET NUMBER:

6.0

Pervious Pavement
BOUYANCY CALCULATION
FOR

SIGNATURE EAST

Borough of Teterboro, Bergen County, New Jersey
Date: 4/10/2026
BENJ #: NJC240059
Prepared by:
BOHLER
125 Half Mile Road, Red Bank, NJ 07701

Prepared By:	ECW
Checked By:	BE

UG BASIN DIMENSION		
DEPTH UNDER SHWT	1.45	FT
SURFACE AREA	10,012	SQ. FT.
UNIT WEIGHT OF WATER	62.4	lb/CU.FT.
PIPE SIZE	0.67	FT.
LENGTH OF PIPE	242	FT.
UNIT WEIGHT OF STONE	130	lb/CU.FT.
UNIT WEIGHT OF OVERBURDEN	125	lb/CU.FT.

CALC. VOLUME & WEIGHT OF WATER DISPLACED		
VOLUME OF UG BASIN =	14,517	CU.FT.
WATER DISPLACED =	905,886	lb

CALC. WEIGHT OF STONE INSIDE LINER		
VOLUME OF PIPE =	85	CU. FT.
VOLUME OF STONE =	14,432	CU. FT.
WEIGHT OF STONE =	1,125,699	lb

NOTE: IF WEIGHT OF STONES IS ALREADY MORE THAN WATER DISPLACED THEN OK.

CALC. WEIGHT OF OVER BURDEN				
USE 1:1 RATIO UPLIFT ON TOP AREA OF THE BASIN				
BURRIED DEPTH VARIES FROM	4	TO	5.45	FT
THEREFORE, AVERAGE DEPTH OF OVERBURDEN IS			4.73	FT
VOLUME OF OVERBURDEN	47,307	CU. FT.		
WEIGHT OF OVERBURDEN	5,913,338	lb		
TOTAL WEIGHT (FINISHED)	7,039,037	lb		OK
RATIO	7.8	:1		

NOTE: CARE SHOULD BE TAKEN DURING CONSTRUCTION TO BURYING PIPING NETWORK AS SOON AS IT IS COMPLETED. PIPING COULD BE BUOYANT IF LEFT EXPOSED DURING CONSTRUCTION WITHOUT OVERBURDEN.

Vault Buoyancy Estimate

Project Information:

Project Name:	**Signature Aviation East Side Ramp Expansion & Hanger - Teterboro Airport**		
Project Number:	**863508 (SEQ 10&15)**		
Location:	**Teterboro, NJ**		
Designed by:	**TKM**	**Site Designation**	**A-70 (VAULT 1&2)**
Date:	**4/6/26**	**Model number**	**HC KFPD0816**

Assumptions:

Water Table Depth Below Grade =	1	ft
Unit Weight of Water =	62.4	lb/cu-ft
Unit Weight of Unsaturated Soil =	120.0	lb/cu-ft
Unit Weight of Saturated Soil =	57.6	lb/cu-ft
Concrete Weight =	155.0	lb/cu-ft
Wall Thickness =	0.67	ft
Top Slab Thickness =	1.83	ft
Top Slab Opening Area =	36.91	sq-ft
Pipe Opening Area =	11.06	sq-ft
Base Slab Thickness =	0.67	ft
Base Slab Extension =	0	ft
Soil Height Over Extension =	0	ft

Site Information:

Finished Grade EL	7.90	ft
Top of Structure EL	7.90	ft
Groundwater EL	6.90	ft
Outlet Pipe Invert EL	1.30	ft
Vault Invert EL	1.30	ft
Outside Bottom of Structure EL	0.63	ft
Inside Width	8.00	ft
Inside Length	16.00	ft

System Information:

Concrete Volumes		
Volume of Top Slab =	228.83	cu-ft
Volume of Vault Section =	154.56	cu-ft
Volume of Base Slab =	108.51	cu-ft
Volume of Base Slab Extension =	0	cu-ft
Soil Volumes		
Overlying Saturated Soil =	0	cu-ft
Overlying Unsaturated Soil =	0	cu-ft
Saturated Soil Above Extension =	0	cu-ft
Unsaturated Soil Above Extension =	0	cu-ft

Notes:

Buoyancy estimate is provided by Contech as a guideline only. Engineer of Record to confirm.

Assumptions:
- -Structure is assumed to be empty
- -Weight of internal components not considered
- -Frictional forces not considered
- -Forces attributted to pipe connections not considered

System Weights:

Top Slab Weight =	35,469	lb
Vault Section Weight =	23,956	lb
Base Slab Weight =	16,819	lb
Base Slab Extension Weight =	0	lb
Castings Weight =	2,591	lb
Saturated Soil Weight =	0	lb
Unsaturated Soil Weight =	0	lb
Total Downward Weight =	**78,836**	lb

Buoyant Force:

Upward Buoyant Force =	Volume of Water Displaced * Unit Weight of Water = 1015.46 cu-ft * 62.4 lb/cu-ft	
Upward Buoyant Force =	**63,365**	lb

System Net Downward Force =	**15,471** lb	(negative number indicates anti-flotation measure needed)
Safety Factor =	**1.24**	(recommended Safety Factor of 1.2 or greater)

No Additional Anti-Flotation Measures Recommended

Vault Buoyancy Estimate

Project Information:

Project Name:	**Signature Aviation East Side Ramp Expansion & Hanger - Teterboro Airport**		
Project Number:	**863508 (SEQ 20&25)**		
Location:	**Teterboro, NJ**		
Designed by:	**TKM**	**Site Designation**	**A-70 (Vault 3&4)**
Date:	**4/6/26**	**Model number**	**HC KFOV0814**

Assumptions:

Water Table Depth Below Grade =	1	ft
Unit Weight of Water =	62.4	lb/cu-ft
Unit Weight of Unsaturated Soil =	120.0	lb/cu-ft
Unit Weight of Saturated Soil =	57.6	lb/cu-ft
Concrete Weight =	155.0	lb/cu-ft
Wall Thickness =	0.67	ft
Top Slab Thickness =	2.00	ft
Top Slab Opening Area =	29.91	sq-ft
Pipe Opening Area =	17.37	sq-ft
Base Slab Thickness =	0.67	ft
Base Slab Extension =	0	ft
Soil Height Over Extension =	0	ft

Site Information:

Finished Grade EL	7.90	ft
Top of Structure EL	7.90	ft
Groundwater EL	6.90	ft
Outlet Pipe Invert EL	1.30	ft
Vault Invert EL	1.30	ft
Outside Bottom of Structure EL	0.63	ft
Inside Width	8.00	ft
Inside Length	14.00	ft

System Information:

Concrete Volumes		
Volume of Top Slab =	226.73	cu-ft
Volume of Vault Section =	132.23	cu-ft
Volume of Base Slab =	95.99	cu-ft
Volume of Base Slab Extension =	0	cu-ft
Soil Volumes		
Overlying Saturated Soil =	0	cu-ft
Overlying Unsaturated Soil =	0	cu-ft
Saturated Soil Above Extension =	0	cu-ft
Unsaturated Soil Above Extension =	0	cu-ft

Notes:

Buoyancy estimate is provided by Contech as a guideline only. Engineer of Record to confirm.

Assumptions:
- -Structure is assumed to be empty
- -Weight of internal components not considered
- -Frictional forces not considered
- -Forces attributted to pipe connections not considered

System Weights:

Top Slab Weight =	35,143	lb
Vault Section Weight =	20,496	lb
Base Slab Weight =	14,879	lb
Base Slab Extension Weight =	0	lb
Castings Weight =	2,278	lb
Saturated Soil Weight =	0	lb
Unsaturated Soil Weight =	0	lb
Total Downward Weight =	**72,796**	lb

Buoyant Force:

Upward Buoyant Force =	Volume of Water Displaced * Unit Weight of Water = 898.34 cu-ft * 62.4 lb/cu-ft	
Upward Buoyant Force =	**56,056**	lb

System Net Downward Force =	**16,740**	lb	(negative number indicates anti-flotation measure needed)
Safety Factor =	**1.30**		(recommended Safety Factor of 1.2 or greater)

No Additional Anti-Flotation Measures Recommended

Vault Buoyancy Estimate

Project Information:

Project Name:	**Signature Aviation East Side Ramp Expansion & Hanger - Teterboro Airport**		
Project Number:	**863508 (SEQ 30&35)**		
Location:	**Teterboro, NJ**		
Designed by:	**TKM**	**Site Designation**	**B-50 (VAULT 1&2)**
Date:	**4/6/26**	**Model number**	**HC KFPD0816**

Assumptions:

Water Table Depth Below Grade =	1	ft
Unit Weight of Water =	62.4	lb/cu-ft
Unit Weight of Unsaturated Soil =	120.0	lb/cu-ft
Unit Weight of Saturated Soil =	57.6	lb/cu-ft
Concrete Weight =	155.0	lb/cu-ft
Wall Thickness =	0.67	ft
Top Slab Thickness =	1.83	ft
Top Slab Opening Area =	36.91	sq-ft
Pipe Opening Area =	11.06	sq-ft
Base Slab Thickness =	0.67	ft
Base Slab Extension =	0	ft
Soil Height Over Extension =	0	ft

Site Information:

Finished Grade EL	8.10	ft
Top of Structure EL	8.10	ft
Groundwater EL	7.10	ft
Outlet Pipe Invert EL	1.28	ft
Vault Invert EL	1.28	ft
Outside Bottom of Structure EL	0.61	ft
Inside Width	8.00	ft
Inside Length	16.00	ft

System Information:

Concrete Volumes		
Volume of Top Slab =	228.83	cu-ft
Volume of Vault Section =	162.03	cu-ft
Volume of Base Slab =	108.51	cu-ft
Volume of Base Slab Extension =	0	cu-ft
Soil Volumes		
Overlying Saturated Soil =	0	cu-ft
Overlying Unsaturated Soil =	0	cu-ft
Saturated Soil Above Extension =	0	cu-ft
Unsaturated Soil Above Extension =	0	cu-ft

Notes:

Buoyancy estimate is provided by Contech as a guideline only. Engineer of Record to confirm.

Assumptions:
- -Structure is assumed to be empty
- -Weight of internal components not considered
- -Frictional forces not considered
- -Forces attributted to pipe connections not considered

System Weights:

Top Slab Weight =	35,469	lb
Vault Section Weight =	25,114	lb
Base Slab Weight =	16,819	lb
Base Slab Extension Weight =	0	lb
Castings Weight =	2,591	lb
Saturated Soil Weight =	0	lb
Unsaturated Soil Weight =	0	lb
Total Downward Weight =	**79,994**	lb

Buoyant Force:

Upward Buoyant Force =	Volume of Water Displaced * Unit Weight of Water = 1051.09 cu-ft * 62.4 lb/cu-ft	
Upward Buoyant Force =	**65,588**	lb

System Net Downward Force =	**14,406** lb	(negative number indicates anti-flotation measure needed)
Safety Factor =	**1.22**	(recommended Safety Factor of 1.2 or greater)

No Additional Anti-Flotation Measures Recommended

Vault Buoyancy Estimate

Project Information:

Project Name:	**Signature Aviation East Side Ramp Expansion & Hanger - Teterboro Airport**		
Project Number:	**863508 (SEQ 40&45)**		
Location:	**Teterboro, NJ**		
Designed by:	**TKM**	**Site Designation**	**B-50 (VAULT 3&4)**
Date:	**4/6/26**	**Model number**	**HC KFOV0814**

Assumptions:

Water Table Depth Below Grade =	1	ft
Unit Weight of Water =	62.4	lb/cu-ft
Unit Weight of Unsaturated Soil =	120.0	lb/cu-ft
Unit Weight of Saturated Soil =	57.6	lb/cu-ft
Concrete Weight =	155.0	lb/cu-ft
Wall Thickness =	0.67	ft
Top Slab Thickness =	2.00	ft
Top Slab Opening Area =	29.91	sq-ft
Pipe Opening Area =	17.37	sq-ft
Base Slab Thickness =	0.67	ft
Base Slab Extension =	0	ft
Soil Height Over Extension =	0	ft

Site Information:

Finished Grade EL	8.10	ft
Top of Structure EL	8.10	ft
Groundwater EL	7.10	ft
Outlet Pipe Invert EL	1.28	ft
Vault Invert EL	1.28	ft
Outside Bottom of Structure EL	0.61	ft
Inside Width	8.00	ft
Inside Length	14.00	ft

System Information:

Concrete Volumes		
Volume of Top Slab =	226.73	cu-ft
Volume of Vault Section =	139.11	cu-ft
Volume of Base Slab =	95.99	cu-ft
Volume of Base Slab Extension =	0	cu-ft
Soil Volumes		
Overlying Saturated Soil =	0	cu-ft
Overlying Unsaturated Soil =	0	cu-ft
Saturated Soil Above Extension =	0	cu-ft
Unsaturated Soil Above Extension =	0	cu-ft

Notes:

Buoyancy estimate is provided by Contech as a guideline only. Engineer of Record to confirm.

Assumptions:
- -Structure is assumed to be empty
- -Weight of internal components not considered
- -Frictional forces not considered
- -Forces attributted to pipe connections not considered

System Weights:

Top Slab Weight =	35,143	lb
Vault Section Weight =	21,562	lb
Base Slab Weight =	14,879	lb
Base Slab Extension Weight =	0	lb
Castings Weight =	2,278	lb
Saturated Soil Weight =	0	lb
Unsaturated Soil Weight =	0	lb
Total Downward Weight =	**73,863**	lb

Buoyant Force:

Upward Buoyant Force =	Volume of Water Displaced * Unit Weight of Water = 929.86 cu-ft * 62.4 lb/cu-ft	
Upward Buoyant Force =	**58,023**	lb

System Net Downward Force =	**15,839** lb	(negative number indicates anti-flotation measure needed)
Safety Factor =	**1.27**	(recommended Safety Factor of 1.2 or greater)

No Additional Anti-Flotation Measures Recommended

StormTrap
MODULAR CONCRETE STORMWATER MANAGEMENT
1287 Windham Parkway, Romeoville, IL 60446

PREPARED BY:	DATE	REVIEWED BY:
MRK	February 3, 2026	--

SHEET NUMBER	JOB NUMBER
TITLE	-

Signature Aviation East Ramp

Teterboro, NJ

3' - 0" SingleTrap STII



StormTrap
MODULAR CONCRETE STORMWATER MANAGEMENT
1287 Windham Parkway, Romeoville, IL 60446

MADE BY	DATE
MRK	February 3, 2026

Signature Aviation East Ramp
Teterboro, NJ
FLOTATION CHECK - TYPE I

SHEET NUMBER

JOB NUMBER

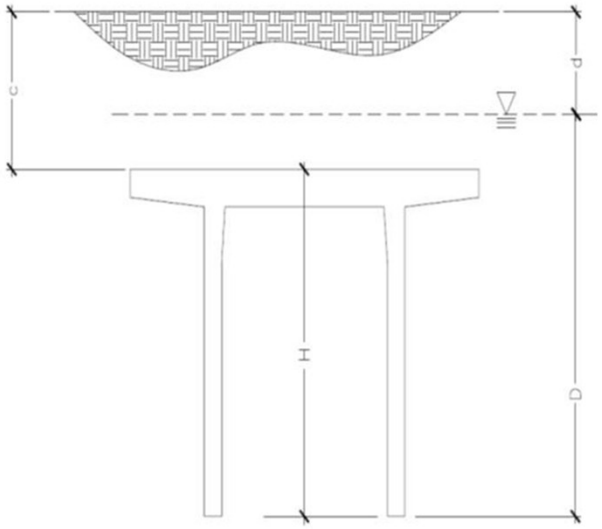
FLOTATION CHECK

Note: High water table at a certain height, with the system sealed against water infilltration (assume inside is completely empty).

Unit Properties:

Type of Unit =	Int XS	T2
Width: B =	8.4167 ft	
Length: L =	15.3333 ft	
Height: H =	3.6667 ft	
Top Unit Inside Height: H_i =	3.0000 ft	
Bottom Unit Inside Height: H_i =	0.0000 ft	
Top Slab Thickness: t_{ts} =	8.0 in	
Bottom Slab Thickness: t_{bs} =	0.0 in	
Foundation Thickness: t_p =	0.0 in	
Type of Foundation =	Concrete	
Top Unit Weight: W =	18,112.0 lbs	T2
Bottom Unit Weight: W =	0,000.0 lbs	T1
	Single Trap	

Invert	1.20
GWE	6.33
T.O.S.	4.87
Min Grade	7.33



Cover: c =	2.46333 ft	
Soil Density: ρ_s =	98 pcf	
Water Table: d =	1.00000 ft	*(from grade)*
Water Density: ρ_w =	62.4 pcf	
Water Table Height: D =	5.1300 ft	
Factor of Safety =	1.25	
Total Dead Load: DL =	49,246 lbs	
Total Buoyant Load: F =	29,528 lbs	
Factor of Saftey: SF =	1.668	> 1.25
	GOOD	

StormTrap
MODULAR CONCRETE STORMWATER MANAGEMENT
1287 Windham Parkway, Romeoville, IL 60446

MADE BY	DATE
MRK	February 3, 2026

Signature Aviation East Ramp
Teterboro, NJ
FLOTATION CHECK - TYPE III

SHEET NUMBER

JOB NUMBER

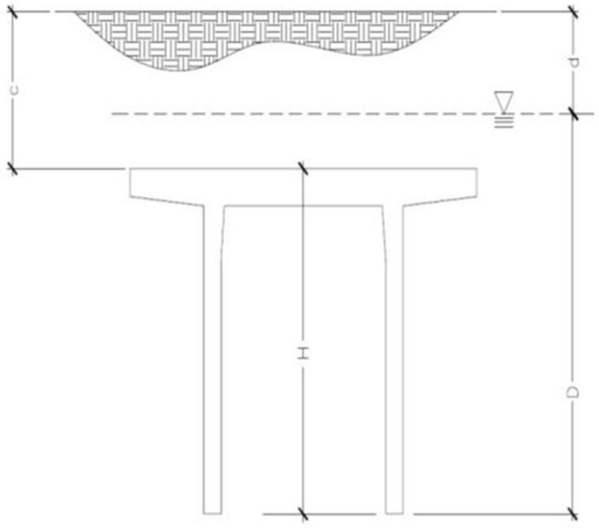
FLOTATION CHECK

Note: High water table at a certain height, with the system sealed against water infilltration (assume inside is completely empty).

Unit Properties:

Type of Unit =	Ext XS	T4
Width: B =	6.6250 ft	
Length: L =	15.3333 ft	
Height: H =	3.6667 ft	
Top Unit Inside Height: H_i =	3.0000 ft	
Bottom Unit Inside Height: H_i =	0.0000 ft	
Top Slab Thickness: t_{ts} =	8.0 in	
Bottom Slab Thickness: t_{bs} =	0.0 in	
Foundation Thickness: t_p =	0.0 in	
Type of Foundation =	Concrete	
Top Unit Weight: W =	15,728.0 lbs	T4
Bottom Unit Weight: W =	0,000.0 lbs	T3
	Single Trap	

Invert	1.20
GWE	6.33
T.O.S.	4.87
Min Grade	7.33



Cover: c =	2.46333 ft	
Soil Density: ρ_s =	98 pcf	
Water Table: d =	1.00000 ft	*(from grade)*
Water Density: ρ_w =	62.4 pcf	
Water Table Height: D =	5.1300 ft	
Factor of Safety =	1.25	
Total Dead Load: DL =	40,234 lbs	
Total Buoyant Load: F =	23,242 lbs	
Factor of Saftey: SF =	1.731	> 1.25
	GOOD	



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www.gza.com

March 20, 2026
File No. 26.0093326.00

Mr. Jim Hopkins
Signature Aviation USA, LLC
3821 North Liberty Street
Winston Salem, North Carolina 27105

Re: Stormwater Soil Log Findings
Proposed Stormwater Management Facilities – New Hangar
TAA No. T-0393
Borough of Teterboro, Bergen County, New Jersey
Signature Aviation USA, LLC

Dear Mr. Hopkins:

This letter transmits the results of soil logs and seasonal high water table observations performed by GZA GeoEnvironmental, Inc. (GZA) at the location of proposed stormwater management facilities proposed to service a new hangar and airport ramp which may be constructed at the Teterboro Airport south of and adjacent to the existing Signature TEB South facility in the Borough of Teterboro, Bergen County, New Jersey.

GZA was on-site between March 12, 2026 and March 18, 2026 to observe the excavation of the requested ten test pits (TP-3 through TP-8 and TP-20 through TP-23) in the location of potential stormwater management facilities. TP-3 through TP-8 were excavated using a SANY SY800 track-mounted excavator in the location of proposed underground detention basin, while TP-20 through TP-23 were excavated in an area where pervious pavement with underdrains is being proposed. A copy of the site location map, plot plan and soil logs are included with this letter. As indicated on the Existing Conditions plan and plot plan, much of the site is characterized as existing wetlands including test pits TP-3 through TP-8. Permission to dig in the wetlands area was obtained by others prior to the beginning of field work.

The results of the test pits indicated the presence of a surface topsoil layer underlain by thin layers of loam, silty clay loam, silt loam and sandy loam soils uniformly underlain by clayey subsoils which were present at depths of approximately 5 to 5.5 feet below the existing ground surface at the test locations. Mottling and groundwater seepage was relatively shallow with mottling often present below the surface. Based on the observed subsurface conditions, the seasonal high groundwater levels are

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present at depths of less than 24 inches and in accordance with the procedures outlined in Chapter 12 of the NJDEP Stormwater BMP manual, it is our opinion that the site soils are considered Hydrologic Soil Group (HSG) D which is consistent with the current NRCS USDA WebSoil Survey soil mapping of the property, and as such, would not be conducive to infiltration.

Please contact us if you have any questions concerning this information.

Very truly yours,

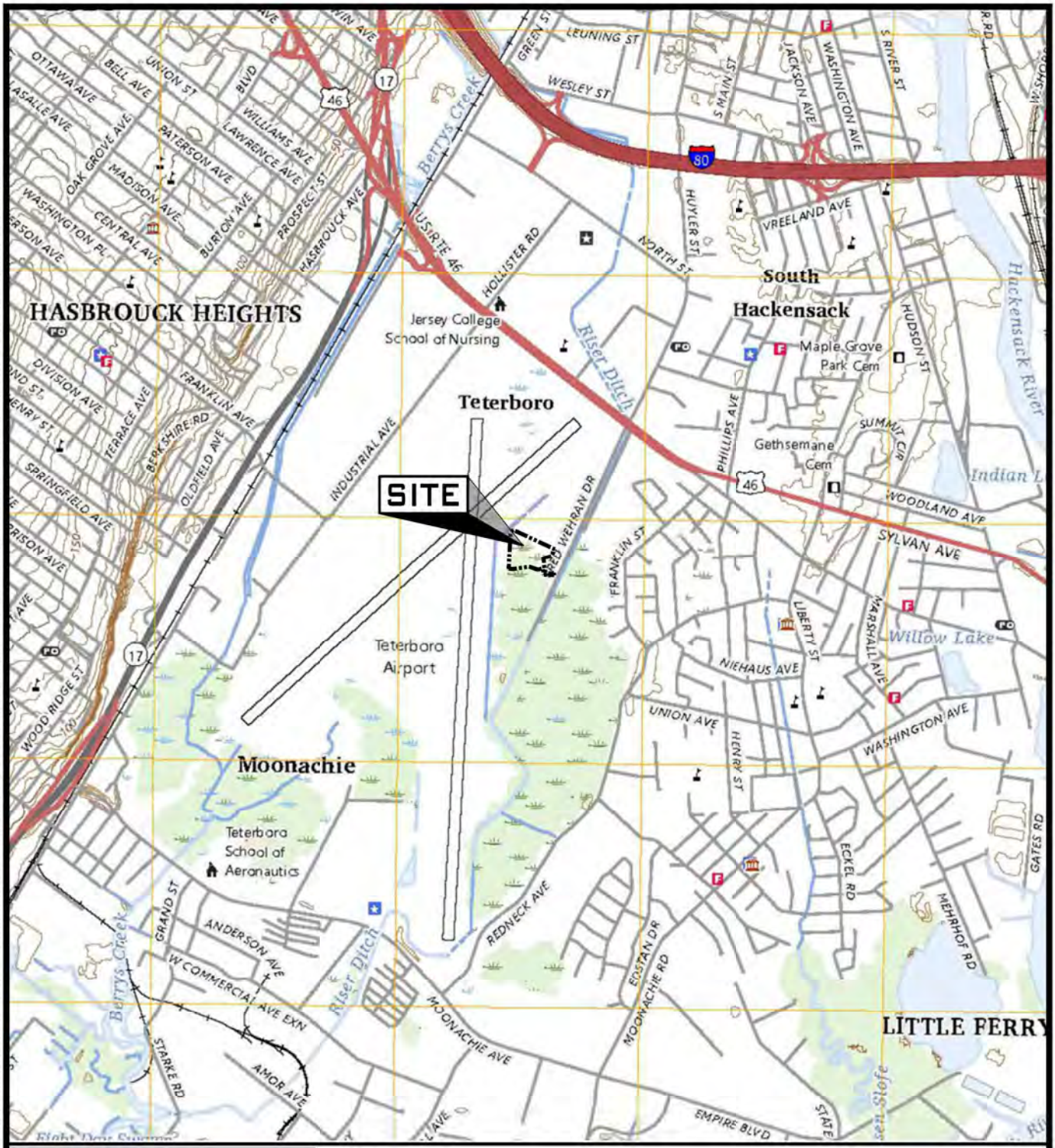
GZA GeoEnvironmental, Inc.

Cory S. Karinja, P.E.
Senior Project Manager

Christopher P. Tansey, P.E.
Associate Principal

Robert E. Schwankert, P.E.
Consultant/Reviewer

CSK:CPT/csk
(1 copy submitted via email)
Attachments: 1. Site Location Map
2. Plot Plan
3. Test Pit Logs (TP-3 through TP-8, TP-20 through TP-23)
4. USDA Soil Textural Triangle





SOURCE: "Weehawken Quadrangle, NJ, 7.5 Minute Series (Topographic)," USGS, 2023.

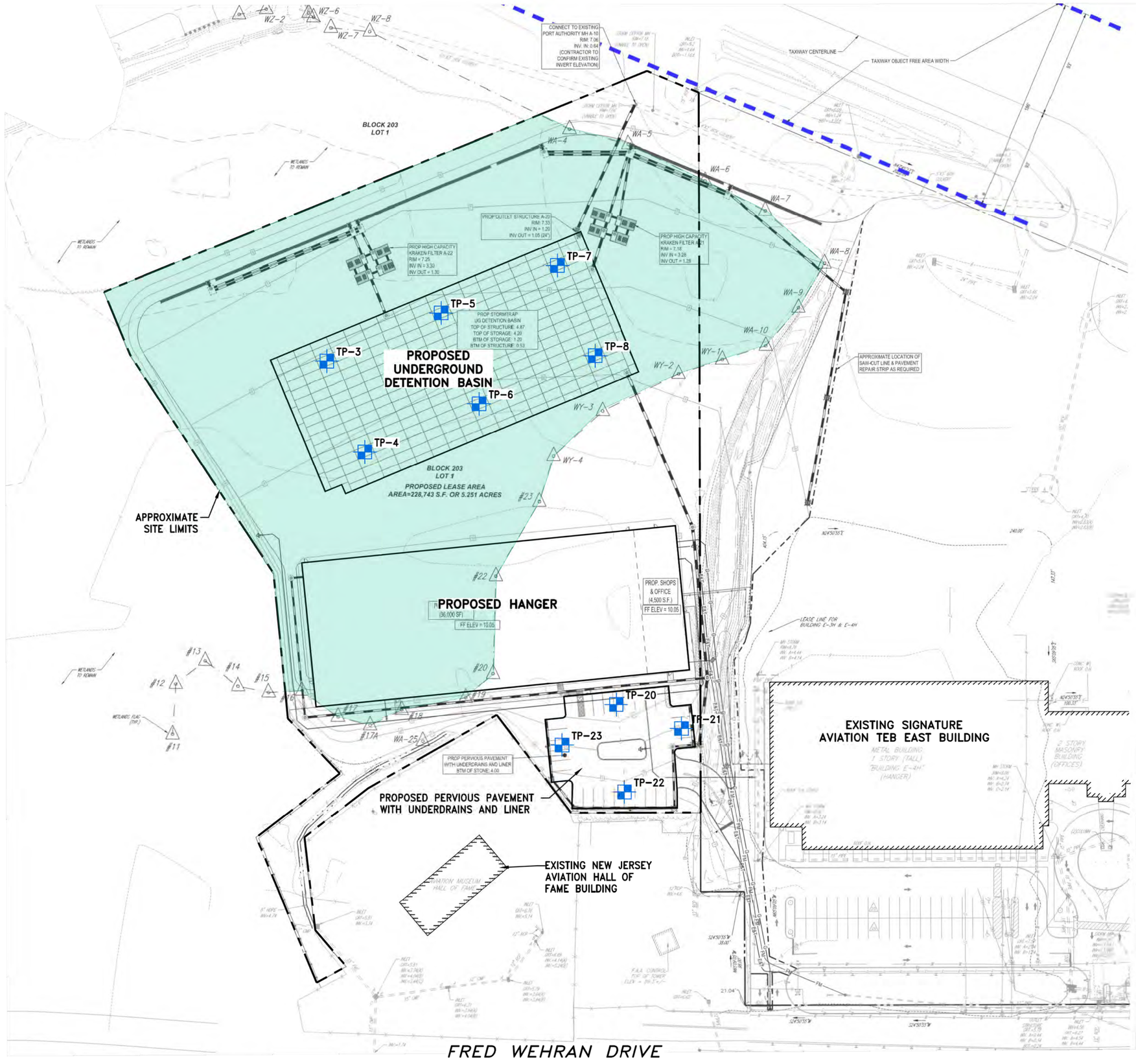
0 1,000' 2,000' 4,000'

SCALE IN FEET 1" = 2,000'

N W E S

PROJ. MGR.: CSK DESIGNED BY: CSK DRAWN BY: VJD DATE: 3/19/26	SITE LOCATION MAP PROPOSED HANGER BOROUGH OF TETERBORO, NEW JERSEY SIGNATURE AVIATION USA, LLC	JOB NO. 26.0093326.00 PLATE 1

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GZA–J:\26\CNJ\CNJ REPORTS\S\0093326 – SIGNATURE AVIATION USA – TETERBORO EAST_DMAV\CAD\26.0093326.00\26009332600–P1.DWG PLAN FEBRUARY 13, 2026 Vincent DeMarinise



GRAPHIC SCALE

60 0 30 60 120

1 inch = 60 ft.

KEY:

TP-1 NUMBER AND APPROXIMATE LOCATION OF TEST PITS PERFORMED FOR THIS STUDY

LIMITS OF WETLANDS ON THE PROPERTY

NOTES:

1. This drawing is part of GZA GeoEnvironmental, Inc. Report No. 26.0093326.00 and should be read together with the report for complete evaluation.
2. General layout was obtained from a drawing prepared by Bohler Eng., entitled "Soil Test Exhibit" dated 10/22/25 (revised 3/6/26), scale 1"= 40'.

PLOT PLAN

PROPOSED HANGER
BOROUGH OF TETERBORO, NEW JERSEY
SIGNATURE AVIATION USA, LLC

GZA GeoEnvironmental, Inc.
Engineers and Scientists
Known for excellence. Built on trust.
www.gza.com

JOB NO.	FILE NO.			
26.0093326.00	–			
DR. BY	CHK. BY	DATE	SCALE	PLATE
VJD	CSK	3/19/26	1"= 60'	2

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GZA–I:\26\CNJ\CNJ REPORTS\S\0093326 – SIGNATURE AVIATION USA – TETERBORO EAST_DWA\CAD\26.0093326.00\260093326OO–P2.DWG PLAN MARCH 19, 2026 Vincent DeMarinise

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-3
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +5.5
Final Test Pit Depth (ft.): 13
Date Start - Finish: 3/18/2026 - 3/18/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/18/26		3.5	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1.5	0-16	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, weak medium crumb, wet, friable, clear wavy boundary, many fine medium roots	1		
2			16-57	Brown (10YR, 4/3) loam, moderate medium subangular blocky, very moist to wet, friable, clear smooth boundary, few fine roots, common medium prominent yellowish red (5YR, 5/8) mottles encountered throughout layer	2		
3					3		
4					4		
5					5		
6	S2	6	57-96	Brown (7.5YR, 4/4) sandy clay, moderate coarse subangular blocky, wet, firm, clear smooth boundary, common coarse distinct light gray (5YR, 7/1) mottles encountered throughout layer	6		
7					7		
8					8		
9	S3	9	96-156	Dark grayish brown (10YR, 4/2) silty clay, massive, wet, firm	9		
10					10		
11					11		
12					12		
13					13		
14				End of exploration at 13 feet. Moderate groundwater seepage encountered @ 3.5' Mottling @ 16" Estimated Seasonal High Water @ 16"			
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3A

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:29 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-4
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +6
Final Test Pit Depth (ft.): 12
Date Start - Finish: 3/18/2026 - 3/18/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/18/26		2.5	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1.5	0-8	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, weak medium crumb, wet, friable, abrupt smooth boundary, many fine to medium roots	1		
2			8-36	Pale brown (10YR, 6/3) silty clay loam, moderate medium subangular blocky, very moist to wet, firm, clear wavy boundary, many coarse prominent yellowish red (5YR, 5/8) mottles encountered from 16 inches to 60 inches	2		
3	S2	3			3		
4			36-60	Dark yellowish brown (10YR, 4/4) sandy loam, moderate fine granular, wet, friable, abrupt smooth boundary, common medium distinct yellowish red (5YR, 5/8) mottles encountered throughout layer	4		
5					5		
6	S3	6	60-88	Dark reddish gray (5YR, 4/2) silty clay, massive, wet, firm, abrupt smooth boundary, few fine distinct light gray (5YR, 7/1) mottles encountered throughout layer	6		
7					7		
8				Grayish brown (10YR, 4/2) silty clay, massive, wet, firm	8		
9					9		
10	S4	10	88-144		10		
11					11		
12					12		
13				End of exploration at 12 feet. Slight groundwater seepage encountered @ 2.5' Mottling @ 16" Estimated Seasonal High Water @ 16"			
14							
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3B

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:30 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-5
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +5.5
Final Test Pit Depth (ft.): 12
Date Start - Finish: 3/18/2026 - 3/18/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/18/26		3.5	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-12	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, weak medium crumb, wet, friable, abrupt wavy boundary, many fine to medium roots	1		
2				Dark yellowish brown (10YR, 3/6) silt loam, moderate medium subangular blocky, wet, friable, clear smooth boundary, many medium distinct yellowish red (5YR, 5/8) and light gray (5YR, 7/1) mottles encountered from 15 inches to 60 inches	2		
3	S1	3	12-60		3		
4					4		
5					5		
6				Weak red (2.5YR, 4/2) silty clay, massive, wet, firm, abrupt smooth boundary, common medium prominent yellowish red (5YR, 5/8) mottles encountered throughout layer	6		
7			60-96		7		
8	S2	7.5			8		
9				Dark gray (5YR, 4/1) silty clay, massive, wet, firm	9		
10			96-144		10		
11					11		
12					12		
13				End of exploration at 12 feet. Slight groundwater seepage encountered @ 3.5' Mottling @ 15" Estimated Seasonal High Water @ 15" Note: Ponded surface water atop surface nearby			
14							
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3C

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:30 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-6
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +6
Final Test Pit Depth (ft.): 13
Date Start - Finish: 3/18/2026 - 3/18/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/18/26		4	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1.5	0-10	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, weak medium crumb, wet, friable, abrupt wavy boundary, many fine to medium roots	1		
2			10-60	Yellowish brown (10YR, 5/4) loam, moderate medium subangular blocky, wet, friable, clear wavy boundary, many coarse prominent yellowish red (5YR, 5/8) and light gray (5YR, 7/1) mottles encountered throughout layer	2		
3					3		
4					4		
5					5		
6	S2	6	60-94	Dark reddish gray (5YR, 4/2) silty clay, strong coarse subangular blocky, wet, firm, abrupt smooth boundary, common medium distinct yellowish red (5YR, 5/8) mottles encountered throughout layer	6		
7					7		
8					8		
9					9		
10	S3	10	94-156	Dark gray (10YR, 4/1) silty clay, massive, wet, firm	10		
11					11		
12					12		
13					13		
14				End of exploration at 13 feet. Slight groundwater seepage encountered @ 4' Moderate groundwater seepage encountered @ 5' Mottling @ 10" Estimated Seasonal High Water @ 10"			
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3D

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:31 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-7
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +5.5
Final Test Pit Depth (ft.): 12.5
Date Start - Finish: 3/13/2026 - 3/13/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/13/26		4	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1.5	0-10	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, weak medium crumb, wet, friable, abrupt smooth boundary, many fine to medium roots	1		
2			10-60	Dark yellowish brown (10YR, 4/4) sandy loam, weak fine subangular blocky, very moist to wet, friable, abrupt smooth boundary, common medium distinct yellowish red (5YR, 5/8) mottles encountered from 18 inches to 60 inches	2		
3					3		
4					4		
5					5		
6			60-126	Brown (7.5YR, 4/4) silty clay, strong coarse angular blocky, wet, firm, abrupt smooth boundary, common medium faint light gray (5YR, 7/1) and reddish yellow (5YR, 6/8) mottles encountered throughout layer	6		
7					7		
8	S2	8			8		
9					9		
10					10		
11	S3	11	126-150	Dark gray (7.5YR, 4/1) silty clay, massive, wet, firm	11		
12					12		
13				End of exploration at 12.5 feet. Slight groundwater seepage encountered @ 4' Mottling @ 18" Estimated Seasonal High Water @ 18"			
14							
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3E

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:31 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-8
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +5.5
Final Test Pit Depth (ft.): 12.5
Date Start - Finish: 3/13/2026 - 3/13/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/13/26		4	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1.5	0-15	Topsoil - Very dark brown (7.5YR, 4/4) silty clay loam, weak medium crumb, wet, friable, abrupt smooth boundary, many fine to medium roots	1		
2			15-60	Dark grayish brown (10YR, 4/2) sandy loam, weak medium subangular blocky, very moist to wet, friable, abrupt smooth boundary, many fine to coarse prominent yellowish red (5YR, 5/8) and light gray (5YR, 7/1) mottles encountered from 23 inches to 60 inches - wet @ 18"	2		
3					3		
4					4		
5					5		
6			60-96	Brown (7.5YR, 4/4) silty clay, strong coarse angular blocky, wet, firm, abrupt smooth boundary, few medium faint light gray (5YR, 7/1) mottles encountered throughout layer	6		
7	S2	7			7		
8					8		
9			96-150	Brown (7.5YR, 4/2) silty clay, massive, platy, wet, firm	9		
10					10		
11	S3	11			11		
12					12		
13				End of exploration at 12.5 feet. Groundwater seepage encountered @ 4' Mottling @ 23" Estimated Seasonal High Water @ 23"			
14							
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3F

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:31 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-20
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +6.5
Final Test Pit Depth (ft.): 11.5
Date Start - Finish: 3/13/2026 - 3/13/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/13/26		2	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-12	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, weak fine crumb, wet, friable, clear wavy boundary, many fine to medium roots	1		
2			12-24	Fill - Reddish black (10R, 2.5/1) sandy loam, weak fine crumb, wet, friable, abrupt smooth boundary, few fine roots	2		
3	S2, T1	2.5		Dark yellowish brown (10YR, 1/4) sandy loam, weak fine crumb, very moist to wet, friable, abrupt smooth boundary, common medium to coarse distinct yellowish red (5YR, 5/8) and light gray (5YR, 7/1) mottles encountered throughout layer	3		
4			24-66		4		
5					5		
6	S3	6		Brown (7.5YR, 4/4) silty clay, massive, wet, firm, few medium distinct yellowish red (5YR, 5/8) and light gray (5YR, 7/1) mottles encountered throughout layer	6		
7			66-108		7		
8					8		
9					9		
10	S4	10		Dark gray (5YR, 4/1) silty clay, massive, wet, firm	10		
11			108-138		11		
12				End of exploration at 11.5 feet. Slight groundwater seepage encountered @ 2' Mottling @ 24" Estimated Seasonal High Water @ 24"			
13							
14							
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3G

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:32 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-21
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +6.5
Final Test Pit Depth (ft.): 10
Date Start - Finish: 3/13/2026 - 3/13/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/13/26		4.5	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1.5	0-16	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, weak medium crumb, wet, friable, abrupt wavy boundary, many fine to coarse roots	1		
2			16-60	Pale brown (10YR, 6/3) silt loam, moderate medium angular blocky, very moist to wet, friable, abrupt smooth boundary, few fine roots, few medium distinct yellowish red (5YR, 5/8) and light gray (5YR, 7/1) mottles encountered throughout layer	2		
3					3		
4					4		
5					5		
6	S2	5.5	60-96	Brown (7.5YR, 4/4) sandy loam, weak fine crumb, wet, friable, abrupt smooth boundary, common coarse prominent reddish yellow (5YR, 6/6) and light gray (5YR, 7/1) mottles encountered throughout layer	6		
7					7		
8					8		
9	S3	9	96-120	Dark reddish brown (5YR, 3/3) silty clay, massive, wet, firm	9		
10					10		
11				End of exploration at 10 feet. Slight groundwater seepage encountered @ 4.5' Moderate groundwater seepage encountered @ 5' Mottling @ 16" Estimated Seasonal High Water @ 16" Note: Sidewalls collapsing from 3' to 8'			
12							
13							
14							
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3H

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:32 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-22
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +6.5
Final Test Pit Depth (ft.): 11.5
Date Start - Finish: 3/13/2026 - 3/13/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/13/26		3.8	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1	0-10	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, moderate medium crumb, wet, friable, clear wavy boundary, many fine to medium roots	1		
			10-18	Dark yellowish brown (10YR, 4/6) silt loam, moderate medium subangular blocky, very moist to wet, friable, clear smooth boundary, few fine to medium roots, common medium distinct yellowish red (5YR, 5/8) and light gray (5YR, 7/1) mottles encountered from 12 inches to 18 inches			
2	S2	2			2		
3			18-60	Light brownish gray (10YR, 6/2) silt loam, moderate medium angular blocky, wet, firm, clear smooth boundary, many fine to coarse prominent yellowish red (5YR, 5/8) mottles encountered throughout layer - color change to dark yellowish brown (10YR, 4/4) @ 3'	3		
4	S3	4			4		
5					5		
6	S4	6	60-96	Reddish brown (5YR, 4/4) clay, massive, wet, firm, clear smooth boundary, common coarse distinct reddish yellow (5YR, 6/8) mottles encountered throughout layer	6		
7					7		
8					8		
9			96-138	Dark brown (10YR, 3/3) silty clay, massive, wet, firm	9		
10	S5	10			10		
11					11		
12				End of exploration at 11.5 feet. Slight groundwater seepage encountered @ 3.8' Mottling @ 12" Estimated Seasonal High Water @ 12"			
13							
14							
15							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3I

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:33 PM

TEST PIT LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Signature Aviation USA, LLC
Proposed Stormwater Facilities
Teterboro, NJ

EXPLORATION NO.: TP-23
SHEET: 1 of 1
PROJECT NO: 26.0093326.00
REVIEWED BY: Cory Karinja

Logged By: Jon Shoudt
Contractor: Clear Ground Development
Operator: Jessie

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +6.5
Final Test Pit Depth (ft.): 9.5
Date Start - Finish: 3/13/2026 - 3/13/2026

Type of Excavator: Track Excavator
Excavator Model: SANY SY80U

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
3/13/26		4.5	Initial

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1.5	0-16	Topsoil - Very dark brown (10YR, 2/2) silty clay loam, weak medium crumb, wet, friable, clear wavy boundary, common fine to medium roots	1		
2			16-60	Pale brown (10YR, 6/3) silt loam, moderate medium subangular blocky, very moist to wet, friable, abrupt smooth boundary, few fine roots, common coarse prominent yellowish red (5YR, 5/8) mottles encountered throughout layer	2		
3					3		
4					4		
5	S2	5	60-66	Dark gray (10YR, 4/1) clay loam, moderate coarse angular blocky, moist, firm, clear irregular boundary, common coarse prominent yellowish red (5YR, 5/8) mottles encountered throughout layer	5		
6	S3	6	66-96	Brown (7.5YR, 4/4) loamy sand, moderate medium crumb, wet, friable, abrupt smooth boundary	6		
7					7		
8					8		
9	S4	9	96-114	Dark reddish brown (5YR, 3/2) silty clay, massive, wet, firm	9		
10				End of exploration at 9.5 feet. Slight groundwater seepage encountered @ 4.5' Rapid groundwater seepage encountered @ 6' Mottling @ 16" Estimated Seasonal High Water @ 16" Note: Sidewalls collapsing throughout			
11							
12							
13							
14							
15							

REMARKS

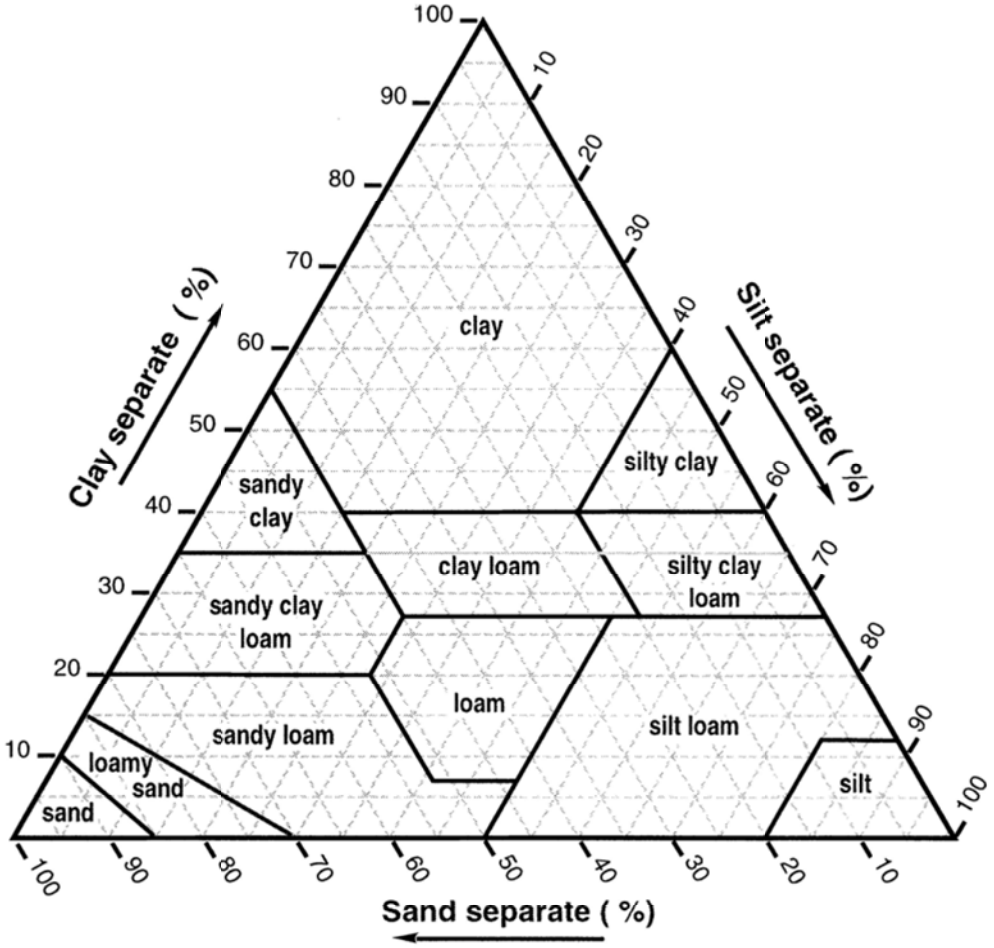
See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3J

3B - CNJ TEST PIT USDA; 3/20/2026; 3:43:33 PM

Texture Triangle:

Fine Earth Texture Classes (———)



USDA SOIL CLASSIFICATION SYSTEM

PLATE 4

WHITESTONE ASSOCIATES, INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERS & CONSULTANTS

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WARREN, NJ 07059
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May 20, 2015

via email

BOHLER ENGINEERING NJ, LLC
35 Technology Drive
Warren, New Jersey 07059

Attention: Keith B. Cahill, P.E.
Principal

Regarding: PRELIMINARY GEOTECHNICAL INVESTIGATION & SWM AREA EVALUATION SERVICES PROPOSED HANGAR DEVELOPMENT FRED WEHRAN DRIVE BOROUGH OF TETERBORO, BERGEN COUNTY, NEW JERSEY WHITESTONE PROJECT NO.: GJ1513346.000

Dear Mr. Cahill:

Whitestone Associates, Inc. (Whitestone) has completed a preliminary geotechnical investigation at the above referenced site. The results of the limited evaluation and preliminary recommendations presented below are based on the soil conditions disclosed from a limited number of borings and test pits performed during Whitestone's field investigation. Recommendations for further investigation also are included herein.

The purpose of the preliminary subsurface soils investigation was to assess anticipated geologic features, shallow groundwater and/or estimated seasonal high groundwater, existing fill, and the potential feasibility of shallow foundations and/or expected earthwork requirements. While the scope of this preliminary investigation will not be sufficient to formulate detailed design recommendations and a more comprehensive geotechnical investigation ultimately will be required, this preliminary investigation may be used to assess potentially development impactive geotechnical issues to support preliminary studies regarding the feasibility of developing the property.

1.0 SUMMARY OF FINDINGS

In general, the subsurface conditions preliminarily indicate conditions suitable for shallow foundation. Groundwater and indications of seasonal high groundwater were encountered at marginal depths below the surface. As such, excavations for foundations and utilities should anticipate dewatering during construction and permanent structures below the groundwater table will need to be designed to resist buoyancy. The exploration also indicated the presence of moisture-sensitive soils that will impact the planned construction. Based on past experience, earthwork activities will require soil moisture control efforts. Depending on the time of year of construction, site work should anticipate overexcavation of moisture sensitive soils in structural areas, using mechanical and/or chemical subgrade stabilization techniques, and exercising detailed attention to construction methods while maintaining strict moisture control. Re-use of site soils will be limited and should expect a significant drying effort. Earthwork schedules and budgets should include contingencies for soil exchange and/or stabilization.

2.0 PROJECT DESCRIPTION

2.1 Site Location and Existing Conditions

The subject site is located at the end of Fred Wehran Drive, in the Borough of Teterboro, Bergen County, New Jersey. The subject property comprises approximately 7.0 acres and consists of an undeveloped wetland area located within the existing Teterboro Airport facility. No existing utilities were identified within the site boundaries.

2.2 Proposed Construction

Based on project information provided by Bohler Engineering NJ, LLC (Bohler), proposed site redevelopment will include filling approximately 6.2 acres of existing wetlands and constructing an approximately 30,000 square feet hangar building, an approximately 7,500 square feet office building adjoining the hangar to the south, and associated new pavements and utilities. No new retaining walls currently are planned. Finished floor elevation of the building is anticipated to be at an elevation of 10.33 feet above mean sea level, requiring approximately three feet of fill.

A new SWM facility is anticipated, however, the type, size, or final location of the proposed SWM facility has not been determined at this time. Whitestone assumes that the SWM area will be less than 10,000 square feet and designed with a bottom elevation approximately four feet to five feet below existing grades. Based on conversations with Bohler, the proposed SWM areas likely will be located within the eastern and/or southern portions of the site.

3.0 FIELD AND LABORATORY WORK

3.1 Fieldwork

Field exploration at the project site was conducted by means of three soil test borings (identified as B-1 through B-3) performed with a truck-mounted drill rig using hollow stem augers and split-spoon sampling techniques and four soil profile pits (identified as SPP-1 through SPP-4) performed with a rubber tire backhoe. The borings and profile pits were performed in the vicinity of the proposed hangar footprint and within the wetland's limits of disturbance at locations outlined on the March 2, 2015 *Soil Boring Location* Plan prepared by Bohler. Soil borings and profile pits extended to depths ranging from approximately 12.0 feet below ground surface (fbgs) to 45.0 fbgs. All test locations subsequently were backfilled to the surface with excavated soils from the investigation. The locations of the soil borings and profile pits are shown on the accompanying *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* are provided in Appendix A.

The soil borings and profile pits were conducted in the presence of a Whitestone engineer who performed field tests, recorded visual classifications, and collected samples of the various strata encountered. The borings were located in the field using normal taping procedures and estimated right angles. These locations are presumed to be accurate within a few feet.

Soil borings and Standard Penetration Tests (SPTs) were conducted in general accordance with American Society for Testing and Materials (ASTM) designation D 1586. The SPT resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations.

Groundwater level observations, if encountered, were recorded during and immediately after the completion of field operations prior to backfilling the borings. Seasonal variations, temperature effects, man-made effects, and recent rainfall conditions may influence the levels of the groundwater, and the observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

3.2 Laboratory Testing Program

Representative samples of a selected stratum encountered was subjected to a laboratory testing program that included moisture content determinations (ASTM D-2216), Atterberg Limits (ASTM D-4318), and washed gradation analyses (ASTM D-422) in order to perform supplementary engineering soil classifications in general accordance with ASTM D-2487. The soil stratum tested was classified by the Unified Soil Classification System (USCS) and results of the laboratory testing are summarized in the following table. Quantitative test results are provided in Appendix B.

PHYSICAL/TEXTURAL ANALYSES SUMMARY							
Boring	**Sample**	**Depth (fbgs)**	**% Passing No. 200 Sieve**	**Moisture Content (%)**	**Liquid Limit (%)**	**Plastic Index (%)**	**USCS Classification**
B-1	S-3	4.0 – 6.0	12.9	6.2	Non-Plastic		SM
B-2	S-8	23.0 – 25.0	15.3	21.1	Non-Plastic		GM
B-3	S-6	13.0 – 15.0	81.8	12.6	22	12	CL

4.0 SUBSURFACE CONDITIONS

The subsurface soil conditions encountered within the test borings consisted of the following generalized strata in order of increasing depth. *Records of Subsurface Exploration* are provided in Appendix A.

Surface Materials: The soil borings were performed within existing wetlands areas and encountered approximately four inches to 1.5 feet of topsoil material at the surface.

Glacial Deposits: Underlying the surface materials, the test borings and profile pits encountered glacially deposited soils consisting of: silty sand (USCS: SM), and lean clay (USCS: CL) with variable amounts of sand. The glacial soils were encountered to depths ranging between approximately 12.0 fbgs and 38.0 fbgs. The SPT N-values recorded within these coarse-grained glacial soils ranged from approximately 10 bpf to 13 bpf, generally indicating a medium dense relative density. Unconfined compressive strength values recorded within the fine grained portions of the glacial deposits ranged from 0.25 tons per square foot (tsf) to 4.0 tsf, indicating medium stiff to hard relative consistencies.

Residual Material: Beneath the glacial deposits, two of the borings encountered residual materials consisting of silty gravel (USCS: GM) with a variable amount of sand. The residual materials extended to depths ranging between 28.0 fbgs and 43.0 fbgs and returned STP N-Values ranging from 18 bpf to 35 bpf indicating medium dense to dense relative densities.

Weathered Rock/ Bedrock: Underlying the residual deposits, the borings were terminated in the weathered rock/ bedrock interface at depths ranging between approximately 33.0 fbgs and 45.0 fbgs.

Groundwater: Static groundwater was observed in all borings and profile pits at depths ranging from approximately 4.5 fbgs to 5.0 fbgs, corresponding to elevations of approximately three feet above mean sea level (msl) and 3.5 feet above msl. Indications of seasonal high groundwater, as evidenced my mottling within the soil strata, were identified at the bottom of the topsoil as shallow as 1.0 fbgs. Indications of seasonal high groundwater may not be evident in recently formed topsoil, and as such, Whitestone expects that groundwater levels likely at least reach the surface during wet periods as evidenced by surface vegetation conditions. Groundwater levels should be expected to fluctuate seasonally and following periods of precipitation.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Whitestone's findings indicate that the proposed structures may be supported on conventional shallow foundations designed to bear within the underlying glacial deposits, residual materials, and/or properly placed and compacted fill materials. Special consideration should be given to proper subgrade preparation and concrete placement for any new footings. The following recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered within the limited exploration. If there are any significant changes to the project characteristics or if significantly different subsurface conditions are encountered during construction, Whitestone should be consulted so that the recommendations of this report can be reviewed.

5.1 Site Preparation

Surface Cover Stripping: Prior to stripping operations, all utilities should be identified and secured. Any topsoil and/or organic materials should be removed entirely from below proposed new construction areas. The resulting excavations should be backfilled to elevations consistent with proposed construction subgrades in accordance with the recommendations of Section 5.2.

Surface Preparation/Proofrolling: Prior to placing any fill or subbase materials to raise or restore grades to the desired building pad elevation, the existing exposed soils should be compacted to a firm and unyielding surface with several passes in two perpendicular directions of a minimum 10 ton, vibratory drum roller in areas of granular soils. In areas of fine-grained soil, the roller should be operated in static mode and/or a sheeps foot roller should be used. The surface should be proofrolled with a loaded tandem axle truck in the presence of the geotechnical engineer to help identify loose pockets which may require removal and replacement or further investigation. Fill and backfill should be placed and compacted in accordance with Section 5.2.

Weather Performance Criteria: Because a majority of the site soils will soften when exposed to water, every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to rainfall. Accordingly, excavation and fill placement procedures should be performed during favorable weather conditions. Overexcavation of saturated soils and replacement with controlled structural fill per Section 4.2 of this report may be required prior to resuming work on disturbed subgrade soils.

Subgrade Protection and Inspection: Every effort should be made to minimize disturbance of the on-site soils by construction traffic and surface runoff. The on-site soils may deteriorate when subjected to repeated construction traffic and may require removal and replacement. These materials also may require

wetting and recompaction during dry periods or discing, drying, and aeration during wet periods. The contractor should be responsible for protection of subgrades and minimization of exposure of the site soils to precipitation by covering stockpiles and subgrades with plastic and preventing ponding of water by sealing subgrades before precipitation events and grading the site to allow proper drainage of surface water. All rutting from construction equipment should be removed prior to any forecasted or actual precipitation. The services of the geotechnical engineer should be retained to inspect soils conditions during construction and verify the suitability of prepared foundation and pavement subgrades for support of design loads.

Groundwater Control: Static groundwater was observed at all test locations at depths ranging from 4.5 fbgs to five fbgs, corresponding to elevations of three feet above msl and 3.5 feet above msl, and seasonal high ground water was identified as shallow as 1.0 fbgs. Additionally, based on conversations with Bohler, the anticipated flood plain elevation for the proposed site is approximately 9.5 feet above msl. As such, Whitestone preliminarily anticipates that static groundwater may be deeper than proposed building foundation excavations during drier periods, however, groundwater should be anticipated during excavations for deeper utilities and during wet periods at marginal depths below the existing ground surface. Additionally, static groundwater, and trapped or perched water will likely be encountered within the natural site soils during proposed excavations of on-site soils. As such, construction phase dewatering, surface runoff, trapped, or perched water should be anticipated for this site.

Since excessive amounts of groundwater may accumulate during periods of wet weather, Whitestone recommends that foundation construction occur during periods of relatively dry weather. Every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations to precipitation.

Because the subsurface soils will soften when exposed to water, every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations to rainfall. Overexcavation of saturated soils and replacement with controlled structural fill may be required prior to resuming work on disturbed subgrade soils.

5.2 Structural Fill and Backfill

Imported Fill Material: Any imported material placed as structural fill or backfill to restore design grades should consist of clean, relatively well graded sand or gravel with a maximum particle size of three inches and five percent to 15 percent of material finer than a #200 sieve. Silts, clays, and silty or clayey sands and gravels with higher percentage of fines and with a liquid limit less than 40 and a plasticity index less than 20 may be considered subject to the owner's approval, provided that the required moisture content and compaction controls are met. The material should be free of clay lumps, organics, and deleterious material. Any imported structural fill material should be approved by a qualified geotechnical engineer prior to delivery to the site.

On-site Material: Whitestone anticipates that the natural site soils generally may be suitable for reuse as structural fill and/or backfill provided moisture contents are controlled within two percent of the optimum and the soils are placed during favorable weather conditions. The on-site materials are moisture sensitive and will be increasingly difficult to reuse and compact where wetted beyond the optimum moisture content. On-site materials placed as fill should be sealed on a daily basis using a smooth drum roller to promote drainage and prevent ponding of stormwater. Materials of that are, or become, exceedingly wet will require discing, aerating, and possibly an extended time to dry during favorable weather. Immediate re-use of on-site soil as backfill is not expected. Alternatively, imported fill materials may be required to attain the desired grades and expedite earthwork operations during wet weather periods.

Submerged Fill: If necessary, up to two feet of an open-graded, crushed, three-quarter inch stone may be placed in the wet to provide a working mat, expedite dewatering efforts and enable subsequent placement of structural fill or backfill. Prior to placing submerged fill materials, free water and disturbed materials should be removed to the extent recommended by the geotechnical engineer. A fines barrier geotextile, such as Mirafi 140N or equivalent, should be placed at the base and sides of the overexcavation to separate the stone from underlying and adjacent soils. The fabric also should be placed on top of the stone prior to subsequent fill placement if fill soils with a substantial amount of fines are to be used to restore grade. Submerged fill placement will likely be necessary if the option of overexcavation and recompaction/replacement of existing fill materials beneath the proposed building footprint is chosen.

Compaction and Placement Requirements: All fill and backfill should be placed in maximum nine-inch loose lifts and compacted to 95 percent of the maximum dry density within two percent of the optimum moisture content as determined by ASTM D 1557 (Modified Proctor). Whitestone recommends using a small hand-held vibratory compactor to compact the on-site soils within the proposed footing excavations.

5.3 Preliminary Foundation Design Criteria

Shallow Foundations: The existing natural site soils preliminarily are expected to be capable of supporting conventional shallow footings. However, localized overexcavation and replacement/ recompaction of loose and potentially unstable existing site materials may be required from beneath foundations based on the results of Standard Penetration Testing. Following supplemental evaluation of existing subgrade soils and overexcavation of any loose and potentially unstable or objectionable materials, the proposed structures may be supported on conventional spread footings designed to bear within firm approved naturally occurring site soils, and/or on properly placed and compacted structural fill. Foundations bearing within these materials typically may be designed to impart a maximum allowable net bearing pressure ranging from 2,000 psf to 4,000 psf depending on actual loads, column spacing, and settlement tolerances.

Inspection/Overexcavation Criteria: Whitestone recommends that the suitability of the bearing soils along and below the footing bottoms be verified by a geotechnical engineer prior to placing steel reinforcement and concrete for the footings. The inspection procedures for footing bottoms should include performing at least two dynamic cone penetrometer (DCP) tests at each column location. The DCP testing should be performed continuously to a minimum depth of five feet below footing subgrade. The results of the DCP tests should be reviewed by the geotechnical engineer in comparison to the SPT results from this subsurface investigation. If unsuitable bearing conditions are encountered, these materials should be overexcavated and replaced with controlled compacted structural backfill to provide a suitable footing subgrade. Any overexcavation to be restored with structural fill will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation can be reduced if the grade is restored with lean concrete or approved flowable fill. The bottom of overexcavation should be compacted with vibrating plates or plate tampers ("jumping jacks") to compact locally disturbed materials.

Frost Coverage: Footings subject to frost action should be placed at least 36 inches below adjacent exterior grades or the depth required by local building codes to provide protection from frost penetration. Interior footings not subject to frost action may be placed at a minimum of 18 inches below slab subgrade.

Seismic Site Class: Based on a review of the subsurface conditions relevant to the *2009 International Building Code - New Jersey Edition*, the subject site may be assigned a Site Class D. Based on the seismic zone and soil profile, liquefaction considerations are not expected to have a substantial impact on design.

5.4 *SWM Area Test Results*

Estimated Seasonal High Groundwater Levels: The methods used in determining the estimated seasonal high Groundwater (ESHGW) level include evaluating the soil morphology within a test excavation and identifying irregular spots or blotches of different colors or minerals unlike that of the surrounding soils (mottles). Mottling is the result of the oxidation of minerals within a soil structure as a water level slowly fluctuates. Groundwater and/or seasonal high groundwater levels were observed within the soil profile pits performed as part of this investigation at depths as shallow as approximately 1.0 fbgs, however, groundwater levels are anticipated to also reach the flood elevation of 9.5 feet above msl.

Infiltration Testing: Due to the relatively shallow nature of seasonal high indications, infiltration preliminarily is not expected to be feasible.

6.0 SUPPLEMENTAL POST INVESTIGATION SERVICES

A supplemental subsurface investigation designed to address site-specific conditions for proposed construction should be performed following the development of final grading plans and structural loads. The supplemental investigation should include an evaluation of the existing conditions, as well as appropriate laboratory analyses to further evaluate the moisture sensitivity of the on-site soils.

7.0 CLOSING

Whitestone appreciates the opportunity to be of continued service to Bohler Engineering NJ, LLC and Signature Flight Support Services. Please note that Whitestone has the capability to perform the additional geotechnical engineering services recommended herein.

Please contact us with any questions or comments regarding this report.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Kyle J. Kopacz, E.I.T.
Geotechnical Engineer

STATE OF NEW JERSEY
LAURENCE W. KELLER
No. 24GE04577300
LICENSED PROFESSIONAL ENGINEER

Laurence W. Keller, P.E.
Principal, Geotechnical Services
NJ Professional Engineer License No. 24GE04577300

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Enclosures
Copy: Derek M. Jordan, P.E., Bohler Engineering NJ, LLC

FIGURE 1
Test Location Plan

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LEASE AREA FOR BUILDING E-3H (AIR GROUP)
AREA 205,283 S.F. OR 4.713

LEGEND

B-1 — BORING LOCATION (APPROX.)

SPP-1 — SOIL PROFILE PIT LOCATION (APPROX.)

REFERENCE

THIS PLAN IS BASED UPON A MARCH 2, 2015 SOIL BORING LOCATION PLAN PREPARED BY BOHLER ENGINEERING NJ, LLC.

TITLE:

TEST LOCATION PLAN

CLIENT: BOHLER ENGINEERING NJ, LLC

WHITESTONE ASSOCIATES, INC.
35 TECHNOLOGY DRIVE
WARREN, NEW JERSEY 07059
908.668.7777 • 908.754.5936 FAX

PROJECT: PROPOSED HANGAR DEVELOPMENT
FRED WEHRAN DRIVE
BOROUGH OF TETERBORO, BERGEN COUNTY, NEW JERSEY

PROJECT #:	BY:	PROJ. MGR.:	DATE:	SCALE:	FIGURE:
GJ1513346.000	GR	LWK	05/07/15	1"=60'	1

APPENDIX A
Records of Subsurface Exploration

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Page 1 of 1

Project:	Proposed Hanger Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC

				Water Depth | Elevation (feet bgs) | (feet msl)	Cave-In Depth | Elevation (feet bgs) | (feet msl)
Surface Elevation:	± 8.0 feet above msl	**Date Started:**	5/4/2015		
Termination Depth:	25.0 feet bgs	**Date Completed:**	5/4/2015		
Proposed Location:	Building	**Logged By:**	KK	**During:** 3.0 | 5.0	
Drill / Test Method:	HSA / SPT	**Contractor:**	MC	**At Completion:** 5.0 | 3.0	**At Completion:** 7.0 | 1.0
		Equipment:	Geoprobe	**24 Hours:** --- | ---	**24 Hours:** --- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		1 - 2 - 3 - 6	9	5	1.0	TS		12" Topsoil	
							GLACIAL DEPOSITS		Reddish-Brown Silty Fine Sand, Wet, Medium Dense (SM)	
2 - 4	S-2		8 - 7 - 6 - 6	20	13				As Above (SM)	
4 - 6	S-3		2 - 4 - 6 - 5	22	5	5.0			As Above (SM)	
						6.0				
6 - 8	S-4		5 - 11 - 13 - 11	22	24				Tan Brown Lean Clay, Wet, Hard (CL)	Qu = 2.5 tsf
8 - 10	S-5		4 - 7 - 7 - 18		14				As Above (CL)	
						10.0				
13 - 15	S-6		5 - 3 - 3 - 3	24	6				As Above, Grayish-Brown, Medium Stiff (CL)	Qu = 0.5 tsf
						15.0				
18 - 20	S-7		1 - 2 - 2 - 1	22	20				As Above (CL)	Qu = 0.25 tsf
						20.0				
23 - 25	S-8		1 - 1 - 1 - 1	24	2				As Above (CL)	Qu = 0.5 tsf
						25.0				
									Boring Log B-1 Terminated at a Depth of 25.0 Feet Below Ground Surface	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Page 1 of 2

Project:	Proposed Hanger Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC
Surface Elevation:	± 8.0 feet above msl	**Date Started:**	5/5/2015
Termination Depth:	33.0 feet bgs	**Date Completed:**	5/5/2015
Proposed Location:	Building	**Logged By:**	KK
Drill / Test Method:	HSA / SPT	**Contractor:**	MC
		Equipment:	Geoprobe

Water Depth | Elevation (feet bgs) | (feet msl)		Cave-In Depth | Elevation (feet bgs) | (feet msl)	
During:	4.0 | 4.0		
At Completion:	5.0 | 3.0	**At Completion:**	11.5 | -3.5
24 Hours:	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.3	TS		4" Topsoil	
0 - 2	S-1		3 - 3 - 4 - 3	6	7		GLACIAL DEPOSITS		Tan Brown Silty Sand, Moist, Loose (SM)	
2 - 4	S-2		8 - 7 - 6 - 7	12	13				As Above, Medium Dense, Wet (SM)	
4 - 6	S-3		3 - 5 - 6 - 6	12	11	5.0			As Above (SM)	
6 - 8	S-4		4 - 5 - 6 - 8	14	11				Tan Brown Lean Clay, Wet, Stiff (CL)	Qu = 1.5 tsf
8 - 10	S-5		6 - 10 - 11 - 10	19	21				As Above, Grayish-Brown, Very Stiff (CL)	Qu = 2.5 tsf
						10.0				
13 - 15	S-6		4 - 5 - 5 - 5	17	10				As Above, Stiff (CL)	Qu = 1.5 tsf
						15.0				
18 - 20	S-7		1 - 1 - 2 - 2	20	3				As Above, Medium Stiff (CL)	Qu = 0.75 tsf
						20.0				
						23				
23 - 25	S-8		WOH - 2 - 6 - 13	14	8		RESIDUAL		Reddish-Brown Silty Gravel with Sand, Wet, Loose (GM)	
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Project:	Proposed Hanger Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC

Surface Elevation:	± 8.0 feet above msl	**Date Started:**	5/5/2015		**Water Depth | Elevation (feet bgs) | (feet msl)**		**Cave-In Depth | Elevation (feet bgs) | (feet msl)**
Termination Depth:	33.0 feet bgs	**Date Completed:**	5/5/2015				
Proposed Location:	Building	**Logged By:**	KK	**During:**	4.0 | 4.0		
Drill / Test Method:	HSA / SPT	**Contractor:**	MC	**At Completion:**	5.0 | 3.0	**At Completion:**	11.5 | -3.5
		Equipment:	Geoprobe	**24 Hours:**	--- | ---	**24 Hours:**	--- | #####

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						25.0	RESIDUAL		Reddish-Brown Silty Gravel with Sand, Wet (GM)	
28 - 29.5	S-9	X	12 - 25 - 30 - 50/0"		55	28.0	WR		Weathered Rock Sampled As Above, Wet, Hard (GM)	
						30.0				
						33.0			Boring Log B-2 Terminated at a Depth of 33.0 Feet Below Ground Surface Due to Auger Refusal on Bedrock	
						35.0				
						40.0				
						45.0				
						50.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Project:	Proposed Hanger Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC

Surface Elevation:	± 8.0 feet above msl	**Date Started:**	5/5/2015		**Water Depth | Elevation (feet bgs) | (feet msl)**		**Cave-In Depth | Elevation (feet bgs) | (feet msl)**
Termination Depth:	45.0 feet bgs	**Date Completed:**	5/5/2015				
Proposed Location:	Building	**Logged By:**	KK	**During:**	3.0 | 5.0		
Drill / Test Method:	HSA / SPT	**Contractor:**	MC	**At Completion:**	4.5 | 3.5	**At Completion:**	9.0 | -1.0
		Equipment:	Geoprobe	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.5	TS		6" Topsoil	
0 - 2	S-1		1 - 6 - 5 - 7	7	11		GLACIAL DEPOSITS		Tan Brown Silty Fine Sand, Moist, Medium Dense (SM)	
2 - 4	S-2		6 - 5 - 6 - 7	13	11				As Above, Wet (SM)	
4 - 6	S-3		4 - 5 - 5 - 6	15	10	5.0			As Above (SM)	
						6.0				
6 - 8	S-4		8 - 13 - 15 - 19	12	27				Gray Lean Clay, Wet, Hard (CL)	Qu = 4.0 tsf
8 - 10	S-5		6 - 8 - 10 - 11	17	18				As Above (CL)	
						10.0				
13 - 15	S-6		3 - 2 - 3 - 3	13	5				As Above, Medium Stiff (CL)	Qu = 0.5 tsf
						15.0				
18 - 20	S-7		1 - 1 - 1 - 1	19	2				As Above (CL)	Qu = 0.5 tsf
						20.0				
23 - 25	S-8		2 - 3 - 2 - 2	18	5				As Above (CL)	
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Project:	Proposed Hanger Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC

Surface Elevation:	± 8.0 feet above msl	**Date Started:**	5/5/2015		**Water Depth | Elevation (feet bgs) | (feet msl)**		**Cave-In Depth | Elevation (feet bgs) | (feet msl)**
Termination Depth:	35.0 feet bgs	**Date Completed:**	5/5/2015				
Proposed Location:	Building	**Logged By:**	KK	**During:**	4.0 | 4.0		
Drill / Test Method:	HSA / SPT	**Contractor:**	MC	**At Completion:**	5.0 | 3.0	**At Completion:**	11.5 | -3.5
		Equipment:	Geoprobe	**24 Hours:**	--- | ---	**24 Hours:**	--- | #####

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						25.0	GLACIAL DEPOSITS		Gray Lean Clay, Wet (CL)	
						30.0				
33 - 35	S-9	X	5 - 6 - 6 - 11	24	12				As Above (CL)	
						35.0				
						38.0				
38 - 40	S-10	X	15 - 16 - 19 - 21	18	35		WR		Reddish-Brown Silty Gravel with Sand, Moist (GM)	
						40.0				Auger Grinding @ 42.0 fbgs
43 - 43	S-11	X	50/0"	NR	50/0"				No Recovery, Assumed As Above (WR)	
						45.0				
									Boring Log B-3 Terminated at a Depth of 45.0 Feet Below Ground Surface	
						50.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-1

Project:	Proposed Hangar Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC

				Water Depth (feet bgs)	Elevation (feet msl)	Estimated Seasonal High Groundwater Depth (feet bgs)	Elevation (feet msl)
Surface Elevation:	± 8.0 feet above msl	**Date Started:**	4/29/2015				
Termination Depth:	12.0 feet bgs	**Date Completed:**	4/29/2015				
Proposed Location:	Building	**Logged By:**	KK	**During:** 5.0	3.0		
Excavating Method:	Test Pit Excavation	**Contractor:**	MC	**At Completion:** 5.0	3.0	**At Completion:** 1.5	6.5
Test Method:	Visual Observation	**Rig Type:**	Backhoe	**24 Hours:** ---	---		

SAMPLE INFORMATION			DEPTH		HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet				
			0.0				
				0 - 1.5	TOPSOIL	18" Black Topsoil	
			1.0				
				1.5 - 12	GLACIAL DEPOSITS	Grayish-Brown (2.5Y 5/2) SILTY SAND; 5% Gravel; Crumb Structure; Moist; Few Roots; 50% Mottling @ 1.5 fbgs to 2.5 fbgs; Abrupt Boundary	
1.5 - 2.5	S-1	BAG	2.0				
			3.0				
			4.0				
			5.0 ▽▽▼				
			6.0				
			7.0				
			8.0				
			9.0				
			10.0				
			11.0				
			12.0				
						Soil Profile Pit SPP-1 Terminated at a Depth of 12.0 Feet Below Ground Surface	
			13.0				
			14.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-2

Project:	Proposed Hangar Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC

				Water Depth (feet bgs)	Elevation (feet msl)	Estimated Seasonal High Groundwater Depth (feet bgs)	Elevation (feet msl)
Surface Elevation:	± 8.0 feet above msl	**Date Started:**	4/29/2015				
Termination Depth:	12.0 feet bgs	**Date Completed:**	4/29/2015				
Proposed Location:	Building	**Logged By:**	KK	**During:** 4.0	4.0		
Excavating Method:	Test Pit Excavation	**Contractor:**	MC	**At Completion:** 5.0	3.0	**At Completion:** 1.0	7.0
Test Method:	Visual Observation	**Rig Type:**	Backhoe	**24 Hours:** ---	---		

SAMPLE INFORMATION			DEPTH	HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet			
			0.0			
			0 - 1	TOPSOIL	12" Black Topsoil	
			1.0			
			1 - 12	GLACIAL DEPOSITS	Grayish-Brown (2.5YR 5/2) SANDY LOAM; No Coarse Fragments; Crumb Structure; Moist to Wet; Firm; Few Fine to No Roots; 50% Mottling @ 1.0 fbgs to 2.5 fbgs; Clear Boundary	
			2.0			
			3.0			
3 - 5	S-1	BAG				
			4.0 ▽			
			5.0 ▽			
			6.0			
			7.0			
			8.0			
			9.0			
			10.0			
			11.0			
			12.0			
					Soil Profile Pit SPP-2 Terminated at a Depth of 12.0 Feet Below Ground Surface	
			13.0			
			14.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-3

Project:	Proposed Hangar Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC

				Water Depth (feet bgs)	Elevation (feet msl)	Estimated Seasonal High Groundwater Depth (feet bgs)	Elevation (feet msl)
Surface Elevation:	± 8.0 feet above msl	**Date Started:**	4/29/2015				
Termination Depth:	12.0 feet bgs	**Date Completed:**	4/29/2015				
Proposed Location:	Building	**Logged By:**	KK	**During:**	3.5 / 4.5		
Excavating Method:	Test Pit Excavation	**Contractor:**	MC	**At Completion:**	5.0 / 3.0	**At Completion:**	1.0 / 7.0
Test Method:	Visual Observation	**Rig Type:**	Backhoe	**24 Hours:**	--- / ---		

SAMPLE INFORMATION			DEPTH	HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet			
			0.0			
			0 - 1	TOPSOIL	12" Black Topsoil	
			1.0			
			1 - 12	GLACIAL DEPOSITS	Grayish-Brown (2.5YR 5/2) SILTY LOAM; No Coarse Fragments; Crumb Structure; Moist to Wet; Firm; No Roots; 50% Mottling @ 1.0 fbgs; Clear Boundary	
			2.0			
			3.0			
			4.0			
			5.0			
			6.0			
			7.0			
			8.0			
			9.0			
			10.0			
			11.0			
			12.0			
					Soil Profile Pit SPP-3 Terminated at a Depth of 12.0 Feet Below Ground Surface	
			13.0			
			14.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Soil Profile Pit No.: SPP-4

Project:	Proposed Hangar Development	**WAI Project No.:**	GJ1513346.000
Location:	Fred Wehran Drive; Borough of Teterboro, Bergen County, NJ	**Client:**	Bohler Engineering NJ, LLC

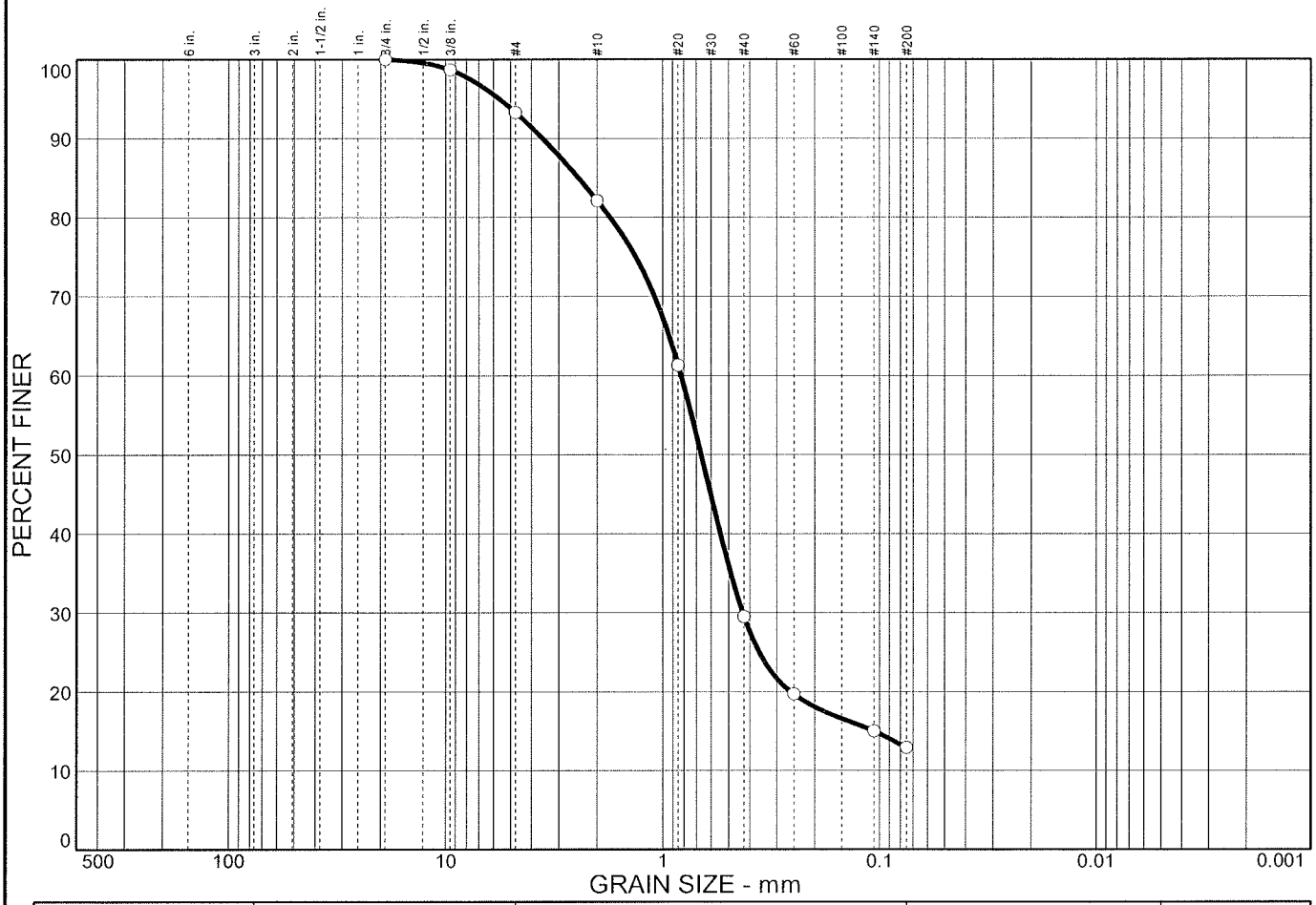
				Water Depth (feet bgs)	Elevation (feet msl)	Estimated Seasonal High Groundwater Depth (feet bgs)	Elevation (feet msl)
Surface Elevation:	± 8.0 feet above msl	**Date Started:**	4/29/2015				
Termination Depth:	12.0 feet bgs	**Date Completed:**	4/29/2015				
Proposed Location:	Building	**Logged By:**	KK	**During:** 3.0	5.0		
Excavating Method:	Test Pit Excavation	**Contractor:**	MC	**At Completion:** 5.0	3.0	**At Completion:** 1.5	6.5
Test Method:	Visual Observation	**Rig Type:**	Backhoe	**24 Hours:** ---	---		

SAMPLE INFORMATION			DEPTH	HORIZON	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	Number	Type	feet			
			0.0			
			0 - 1	TOPSOIL	12" Black Topsoil	
			1.0			
			1 - 12	GLACIAL DEPOSITS	Grayish-Brown (2.5YR 5/2) SILTY LOAM; No Coarse Fragments; Crumb Structure; Moist to Wet; Firm; No Roots; 50% Mottling @ 1.5 fbgs to 2.0 fbgs; Clear Boundary	
			2.0			
			3.0 ▼			
			4.0			
			5.0 ▽			
			6.0			
			7.0			
			8.0			
			9.0			
			10.0			
			11.0			
			12.0			
			13.0		Soil Profile Pit SPP-4 Terminated at a Depth of 12.0 Feet Below Ground Surface	
			14.0			
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed

APPENDIX B
Laboratory Test Results

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	6.7	80.4	12.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	98.7		
#4	93.3		
#10	82.1		
#20	61.3		
#40	29.5		
#60	19.7		
#140	15.0		
#200	12.9		

* (no specification provided)

Soil Description

Silty sand

Atterberg Limits

PL= NP LL= PI= NP

Coefficients

D_{85}= 2.44 D_{60}= 0.824 D_{50}= 0.667
D_{30}= 0.431 D_{15}= 0.106 D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

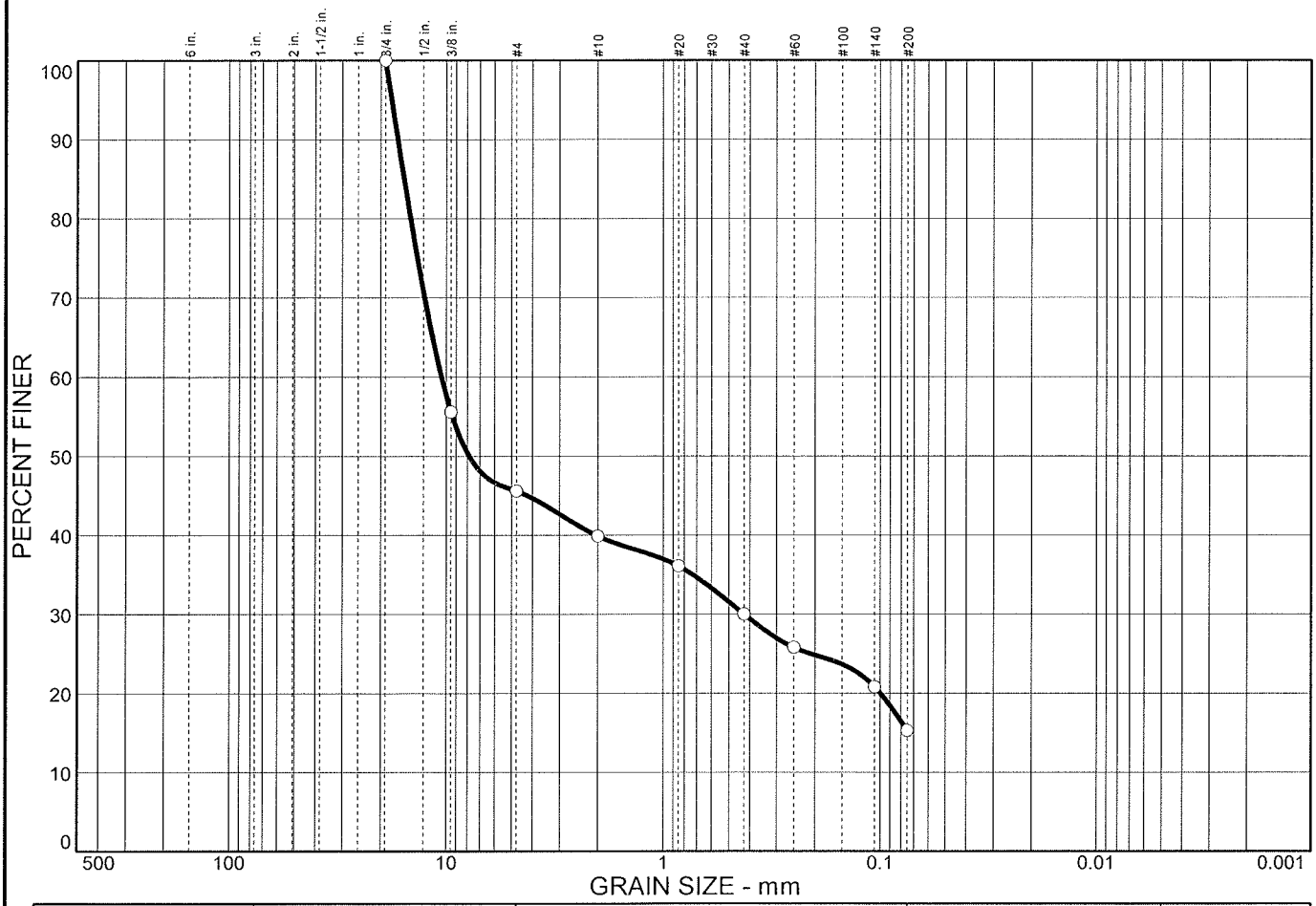
W_n = 6.2%

Sample No.: S-3 **Source of Sample:** B-1 **Date:** 05/13/2015
Location: **Elev./Depth:** 4.0' - 6.0'

WHITESTONE ASSOCIATES, INC.

Client: Bohler Engineering NJ, LLC
Project: Proposed Hangar Development
Fred Wehran Drive, Borough of Teterboro, Bergen County, NJ
Project No: GJ1513346.000 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	54.4	30.3	15.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	55.6		
#4	45.6		
#10	39.9		
#20	36.1		
#40	30.0		
#60	25.8		
#140	20.8		
#200	15.3		

* (no specification provided)

Soil Description

Silty gravel with sand

Atterberg Limits

PL= NP LL= PI= NP

Coefficients

D_{85}= 15.6 D_{60}= 10.5 D_{50}= 7.85
D_{30}= 0.425 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= GM AASHTO=

Remarks

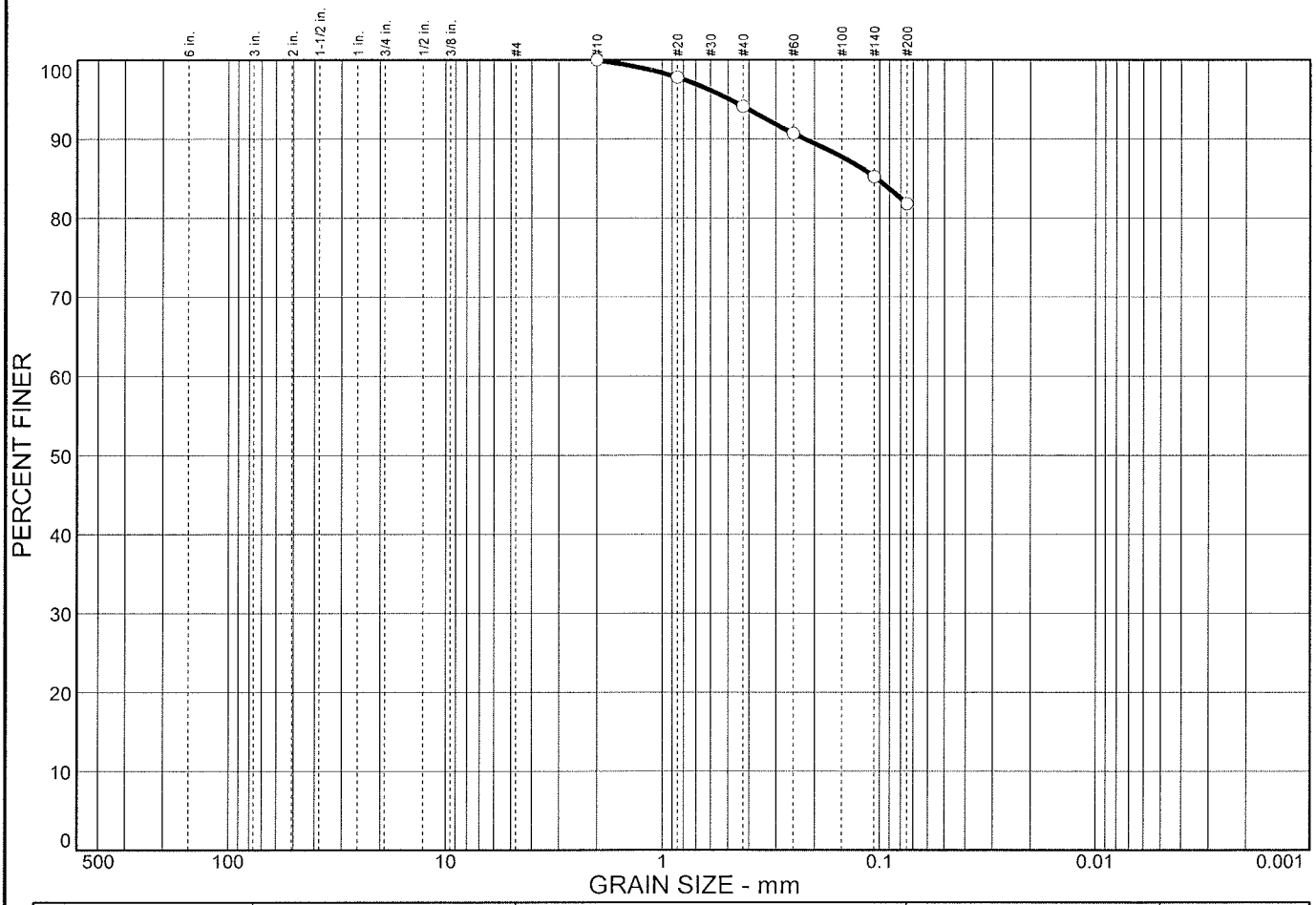
W_n = 21.1%

Sample No.: S-8 **Source of Sample:** B-2 **Date:** 05/13/2015
Location: **Elev./Depth:** 23.0' - 25.0'

WHITESTONE ASSOCIATES, INC.

Client: Bohler Engineering NJ, LLC
Project: Proposed Hangar Development
Fred Wehran Drive, Borough of Teterboro, Bergen County, NJ
Project No: GJ1513346.000 **Plate**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	18.2	81.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	97.8		
#40	94.1		
#60	90.7		
#140	85.2		
#200	81.8		

* (no specification provided)

Soil Description

Lean clay with sand

Atterberg Limits

PL= 10 LL= 22 PI= 12

Coefficients

D_{85}= 0.104 D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

W_n = 12.6%

Sample No.: S-6 **Source of Sample:** B-3 **Date:** 05/13/2015
Location: **Elev./Depth:** 13.0' - 15.0'

WHITESTONE ASSOCIATES, INC.

Client: Bohler Engineering NJ, LLC
Project: Proposed Hangar Development
Fred Wehran Drive, Borough of Teterboro, Bergen County, NJ
Project No: GJ1513346.000 **Plate**

APPENDIX C
Supplemental Information (USCS, Terms and Symbols)

WHITESTONE ASSOCIATES, INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERS & CONSULTANTS

35 TECHNOLOGY DRIVE
WARREN, NJ 07059
908.668.7777
FAX 908.754.5936
www.whitestoneassoc.com

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

j:\whitestn\geoforms\uscs.geo

Other Office Locations:

■ CHALFONT, PA
215.712.2700

■ STERLING, VA
703.464.5858

■ EVERGREEN, CO
303.670.6905

WHITESTONE ASSOCIATES, INC.
ENVIRONMENTAL & GEOTECHNICAL ENGINEERS & CONSULTANTS

35 TECHNOLOGY DRIVE
WARREN, NJ 07059
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FAX 908.754.5936
www.whitestoneassoc.com

GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Pentration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

Other Office Locations:

■ CHALFONT, PA 215.712.2700
■ STERLING, VA 703.464.5858
■ EVERGREEN, CO 303.670.6905

NOAA Atlas 14, Volume 2, Version 3
Location name: Teterboro, New Jersey, USA*
Latitude: 40.853°, Longitude: -74.056°
Elevation: 7 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.337 (0.307-0.370)	0.403 (0.367-0.442)	0.478 (0.435-0.525)	0.535 (0.485-0.587)	0.607 (0.548-0.666)	0.657 (0.591-0.722)	0.711 (0.635-0.782)	0.758 (0.672-0.836)	0.822 (0.719-0.911)	0.871 (0.755-0.969)
10-min	0.532 (0.485-0.584)	0.638 (0.581-0.700)	0.757 (0.689-0.832)	0.845 (0.767-0.927)	0.952 (0.860-1.04)	1.03 (0.926-1.13)	1.11 (0.988-1.22)	1.18 (1.04-1.30)	1.27 (1.11-1.40)	1.33 (1.15-1.48)
15-min	0.661 (0.603-0.725)	0.794 (0.724-0.873)	0.949 (0.863-1.04)	1.06 (0.960-1.16)	1.20 (1.08-1.31)	1.29 (1.16-1.42)	1.39 (1.24-1.53)	1.48 (1.31-1.63)	1.59 (1.39-1.76)	1.66 (1.44-1.86)
30-min	0.896 (0.817-0.983)	1.08 (0.988-1.19)	1.33 (1.21-1.46)	1.51 (1.37-1.66)	1.74 (1.57-1.91)	1.91 (1.72-2.10)	2.08 (1.86-2.29)	2.25 (1.99-2.48)	2.47 (2.16-2.74)	2.63 (2.28-2.92)
60-min	1.11 (1.01-1.22)	1.35 (1.23-1.48)	1.69 (1.54-1.86)	1.95 (1.77-2.14)	2.30 (2.08-2.52)	2.57 (2.31-2.82)	2.84 (2.54-3.13)	3.12 (2.77-3.44)	3.50 (3.06-3.88)	3.78 (3.28-4.22)
2-hr	1.37 (1.24-1.51)	1.66 (1.51-1.83)	2.10 (1.91-2.32)	2.44 (2.21-2.69)	2.91 (2.62-3.20)	3.29 (2.95-3.63)	3.69 (3.28-4.07)	4.10 (3.61-4.53)	4.67 (4.06-5.18)	5.12 (4.40-5.70)
3-hr	1.53 (1.39-1.68)	1.85 (1.69-2.04)	2.34 (2.13-2.58)	2.72 (2.48-3.00)	3.26 (2.94-3.59)	3.70 (3.32-4.07)	4.15 (3.69-4.57)	4.63 (4.08-5.10)	5.29 (4.60-5.85)	5.82 (5.00-6.47)
6-hr	1.98 (1.81-2.16)	2.39 (2.19-2.63)	3.00 (2.75-3.30)	3.50 (3.19-3.83)	4.20 (3.80-4.60)	4.78 (4.30-5.23)	5.38 (4.79-5.89)	6.02 (5.32-6.61)	6.93 (6.03-7.64)	7.68 (6.59-8.49)
12-hr	2.43 (2.21-2.69)	2.95 (2.68-3.25)	3.72 (3.38-4.10)	4.36 (3.94-4.80)	5.27 (4.73-5.79)	6.05 (5.39-6.64)	6.88 (6.06-7.55)	7.77 (6.78-8.56)	9.08 (7.77-10.0)	10.2 (8.58-11.2)
24-hr	2.74 (2.53-2.98)	3.31 (3.06-3.62)	4.23 (3.90-4.61)	5.01 (4.60-5.45)	6.17 (5.63-6.70)	7.18 (6.49-7.79)	8.28 (7.42-8.99)	9.50 (8.43-10.3)	11.3 (9.88-12.4)	12.9 (11.1-14.1)
2-day	3.20 (2.94-3.52)	3.87 (3.55-4.27)	4.94 (4.52-5.44)	5.85 (5.33-6.42)	7.18 (6.50-7.87)	8.32 (7.48-9.12)	9.57 (8.53-10.5)	10.9 (9.66-12.1)	13.0 (11.2-14.4)	14.7 (12.5-16.4)
3-day	3.37 (3.10-3.69)	4.08 (3.76-4.46)	5.19 (4.77-5.67)	6.12 (5.61-6.68)	7.48 (6.81-8.16)	8.64 (7.81-9.42)	9.90 (8.87-10.8)	11.3 (10.0-12.4)	13.3 (11.6-14.6)	15.0 (12.9-16.6)
4-day	3.54 (3.27-3.85)	4.28 (3.96-4.66)	5.44 (5.02-5.91)	6.39 (5.88-6.94)	7.79 (7.12-8.44)	8.96 (8.14-9.72)	10.2 (9.22-11.1)	11.6 (10.4-12.6)	13.6 (12.0-14.9)	15.3 (13.3-16.8)
7-day	4.16 (3.87-4.50)	5.01 (4.65-5.41)	6.24 (5.79-6.74)	7.26 (6.72-7.83)	8.73 (8.03-9.41)	9.96 (9.11-10.7)	11.3 (10.2-12.2)	12.7 (11.4-13.7)	14.7 (13.0-16.0)	16.4 (14.3-17.9)
10-day	4.76 (4.44-5.12)	5.68 (5.31-6.12)	6.98 (6.50-7.51)	8.05 (7.48-8.65)	9.58 (8.85-10.3)	10.8 (9.96-11.6)	12.2 (11.1-13.1)	13.6 (12.3-14.7)	15.6 (13.9-16.9)	17.2 (15.2-18.8)
20-day	6.42 (6.02-6.85)	7.62 (7.15-8.13)	9.11 (8.54-9.72)	10.3 (9.62-11.0)	11.9 (11.1-12.7)	13.1 (12.2-14.0)	14.4 (13.3-15.3)	15.6 (14.4-16.7)	17.3 (15.8-18.6)	18.7 (16.9-20.2)
30-day	8.03 (7.56-8.51)	9.48 (8.93-10.1)	11.1 (10.5-11.8)	12.3 (11.6-13.1)	14.0 (13.1-14.8)	15.2 (14.2-16.2)	16.4 (15.3-17.5)	17.6 (16.3-18.7)	19.1 (17.6-20.5)	20.3 (18.6-21.7)
45-day	10.2 (9.65-10.8)	12.0 (11.3-12.7)	13.9 (13.1-14.7)	15.3 (14.4-16.2)	17.1 (16.1-18.1)	18.5 (17.4-19.6)	19.8 (18.6-21.0)	21.1 (19.7-22.4)	22.7 (21.1-24.1)	23.9 (22.1-25.5)
60-day	12.3 (11.6-12.9)	14.4 (13.6-15.1)	16.4 (15.6-17.3)	18.0 (17.0-18.9)	19.9 (18.8-21.0)	21.3 (20.1-22.5)	22.7 (21.3-23.9)	23.9 (22.4-25.3)	25.5 (23.8-27.0)	26.5 (24.7-28.2)

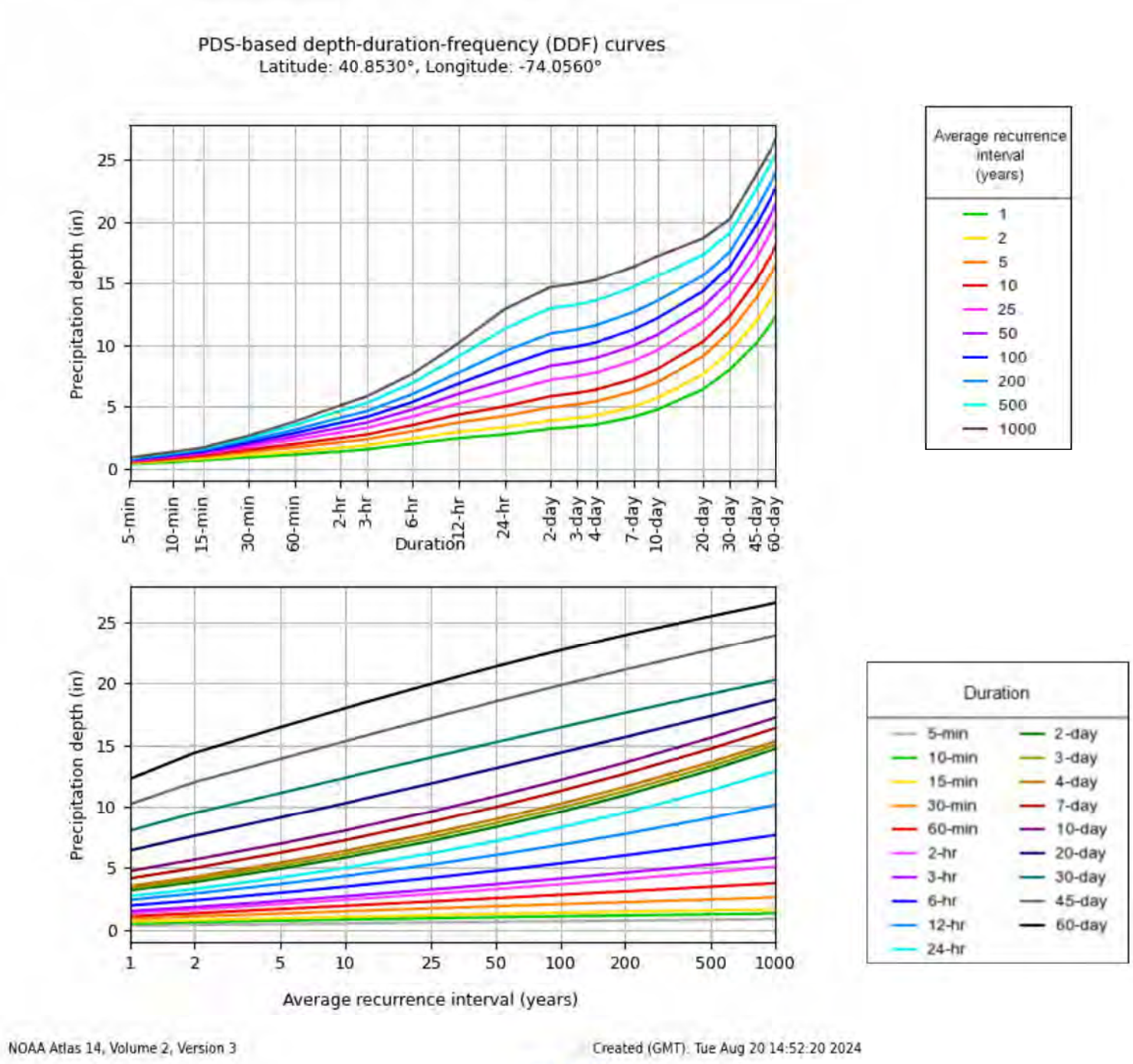
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



NOAA Atlas 14, Volume 2, Version 3 Created (GMT): Tue Aug 20 14:52:20 2024

Back to Top

Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

20
11-133 MS

Bergen County Recording Data Page
Honorable John S. Hogan
Bergen County Clerk

Official Use Only - Barcode

17-047415 NON ABSTRACTED DEED
V Bk: 02645 Pg: 1825-1836 Rec. Fee $273.00
John S. Hogan, Bergen County Clerk
Recorded 06/21/2017 02:54:10 PM
Map #: 007084

Official Use Only – Realty Transfer Fee

Date of Document:	Type of Document:
06/06/2017	NJDEP Land Use Permit: Flood Hazard Area Individual Permit; Verification and HMC Water Quality Certificate
First Party Name:	**Second Party Name:**
Neil Terwilliger/Signature Flight Support, Corp	
Additional Parties:	

THE FOLLOWING SECTION IS REQUIRED FOR DEEDS ONLY

Block:	Lot:
203	1
Municipality:	
Teterboro Borough	
Consideration:	
Mailing Address of Grantee:	
Signature Flight Support Corp./201 South Orange Ave., Suite 1100; Orlando, FL 32801	

THE FOLLOWING SECTION IS FOR ORIGINAL MORTGAGE BOOKING & PAGE INFORMATION FOR ASSIGNMENTS, RELEASES, SATISFACTIONS, DISCHARGES & OTHER ORIGINAL MORTGAGE AGREEMENTS ONLY

Original Book:	Original Page:

BERGEN COUNTY RECORDING DATA PAGE

Please do not detach this page from the original document as it contains important recording information and is part of the permanent record.

MAP FILED IN REQUISITION ROOM

RR
Bohler Engineering NJ LLC
35-Technology Drive
Warren NJ
07059

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF LAND USE REGULATION
Mail Code 501-02A, P.O. Box 420, Trenton, New Jersey 08625-0420
Telephone: (609) 777-0454 or Fax: (609) 777-3656
www.state.nj.us/dep/landuse

PERMIT

In accordance with the laws and regulations of the State of New Jersey, the Department of Environmental Protection hereby grants this permit to perform the activities described below. This permit is revocable with due cause and is subject to the limitations, terms and conditions listed below and on the attached pages. For the purpose of this document, "permit" means "approval, certification, registration, authorization, waiver, etc." Violation of any term, condition or limitation of this permit is a violation of the implementing rules and may subject the permittee to enforcement action.

Approval Date
MAY 15 2017

Expiration Date
MAY 14 2022

Permit Number(s):

0262-02-0002.1 FHA160007
0262-02-0002.1 FHA160008
0262-02-0002.1 CDT160003

Type of Approval(s):

Flood Hazard Area Individual Permit
Flood Hazard Area Verification
HMC Water Quality Certificate

Enabling Statute(s):
NJSA 58:16A et seq. FHACA
NJSA 13:20-1 et seq. HWPPA
NJSA 58:10A et seq. WPCA
NJSA 58:11A-1 et seq. WQPA
NJSA 13:1D-29 et seq. 90-D CPL
NJSA 13:1D-1 et seq. RDCD

Permittee:

Neil Terwilliger/Signature Flight Support Corp.
201 South Orange Ave., Suite 1100
Orlando, FL 32801

Site Location:
Block(s) & Lot(s): [203, 1]
Municipality: Teterboro Boro
County: Bergen

Description of Authorized Activities:

This permit verifies the flood hazard area flood elevation and authorizes the construction of a new hangar, office space, associated asphalt apron, associated parking and stormwater management facilities on the easterly side of the Teterboro Airport located in the flood plain of the Hackensack River and its tributaries, within Lot No. 1 of Block No. 203, in the Borough of Teterboro, Bergen County, New Jersey, as shown on the plans referenced on the last page of this permit.

Prepared by:
Nabil Andrews
Nabil M. Andrews

If the permittee undertakes any regulated activity authorized under a permit, such action shall constitute the permitee's acceptance of the permit in its entirety as well as the permitee's agreement to abide by the permit and all conditions therein.

Received and/or Recorded by County Clerk:

This permit is not valid unless authorizing signature appears on the last page.

FLOOD HAZARD SPECIAL CONDITIONS:

1. Any new, reconstructed, enlarged, or elevated structure within a flood hazard area shall be secured to resist flotation, collapse, and displacement due to hydrostatic and hydrodynamic forces from floodwaters.

2. The regulated activity shall not adversely affect low-flow aquatic passage in any regulated water.

3. The regulated activity shall not expose unset or raw cement to flowing water within any channel or regulated water during construction.

4. All riparian zone vegetation that is temporarily cleared, cut, and/or removed to conduct a regulated activity, access an area where regulated activities will be conducted, or otherwise accommodate a regulated activity shall be replanted immediately after completion of the regulated activity, unless prevented by seasonal weather, in which case the vegetation shall be replanted as soon as conditions permit. The vegetation to be replanted shall:
    a. Consist of vegetation of equal or greater ecological function and value as the vegetation that was cleared, cut, or removed. For example, herbaceous vegetation may be replaced with the same type of vegetation or with trees, but the trees in forested areas must be replaced with trees of equal or greater density and ecological function and value;
    b. Consist of native, non-invasive vegetation, except in an actively disturbed area. In an actively disturbed area, the vegetation may be replaced with the same type of vegetation that was cleared, cut, or removed, or with another kind of vegetation typical of an actively disturbed area. For example, lawn grass may be replaced with garden plants or agricultural crops; and
    c. In cases where replanting would interfere with continued access to or maintenance of a structure that is required by Federal, State, or local law, the vegetation replanted shall meet the requirements to the extent feasible.
5. The applicant shall adhere to the maintenance plan for the stormwater management measures incorporated into the design of the major development in accordance with N.J.A.C. 7:8-5.8 and the guidelines of the New Jersey Stormwater Best Management Practices Manual. .

6. The Department has determined that this project meets the requirements of the Stormwater Management rules at N.J.A.C. 7:8. Any future expansion or alteration of the approved stormwater management system, which would affect water quality, increase the rate or volume of stormwater leaving the site, affect the infiltration capacity on the site, or alter the approved low impact site design, shall be reviewed and approved by the Department prior to construction. This includes any proposed changes to the discharge characteristics of any basin, the construction of new inlets or pipes that tie into the storm sewer network and/or the replacement of existing inlets or pipes with structures of different capacity.

7. The floor elevation labeled "F.F. ELEV. = 9.00" on the approved drawing(s) is the elevation of the lowest finished floor of the proposed building(s). The construction of any habitable area below this elevation, such as a basement, is prohibited.

8. All excavated material shall be disposed in a lawful manner and outside any regulated flood plain, open water, freshwater wetlands or adjacent transition areas, and in such a way as to not interfere with the positive drainage of the receiving area.

9. Prior to the start of any activities authorized under this permit, the permittee shall obtain approval from the U.S. Army Corp of Engineers for the permanent disturbance to 4.49 acres of wetlands for the construction of a new hangar, new office space, new apron space, and new parking spaces.

10. Provision of the Hackensack Meadowlands Water Quality Certificate

This permit authorizes the permanent disturbance to **4.49 acres of wetlands** for the construction of a new hangar, new office space, new apron space, and new parking spaces. No additional impacts to wetlands or open water is permitted.

MITIGATION CONDITIONS:

1. The permittee shall mitigate for the permanent disturbance of 3.09 acres of forested and 1.40 acres of emergent wetlands through an on-site or off-site creation, restoration or enhancement project or with the purchase of credits from a mitigation bank serving the appropriate watershed management area in accordance with the mitigation hierarchy. (N.J.A.C. 7:7A-15 et seq).

   The permittee proposes to satisfy the mitigation requirement for the entire 4.49 acres of impacts through the use of a stand-alone project to be undertaken at the Oradell Reservoir site. Recent applications the Department has reviewed indicate that several potential mitigation projects much closer to the impact site exist; however, the application contains no information regarding any of these potential sites that are located within the Hackensack Meadowlands District. The application did not contain an evaluation of the off-site projects considered, nor did it contain a justification as to why those sites were rejected, nor did it contain an ecological justification as to how the Oradell Reservoir site will replace the wetlands proposed to be filled at Teterboro Airport. In the absence of such justification, the Department is not approving the use of the Oradell reservoir site at this time. The Department may reconsider this decision, if the applicant provides thorough documentation of the sites more proximate to the impact site and the reasons, if any, that these sites are being rejected.

2. **All mitigation shall be conducted prior to or concurrent with the construction of the approved project** (N.J.A.C. 7:7A-15.3(a)1). Concurrent means that at any given time, the mitigation must track at the same or greater percentage of completion as the project as a whole.

3. If the permittee fails to perform mitigation within the applicable time period the acreage of mitigation required shall be increased by 20 percent each year after the date mitigation was to begin (N.J.A.C. 7:7A-15.3(b)).

4. **At least 90 days prior to the initiation of regulated activities authorized by this permit**, the permittee shall address the issues described above regarding the mitigation proposal to the Division of Land Use Regulation (Division) for review and approval. Activities authorized by this permit shall not begin until the permittee has obtained written approval of a mitigation plan from the Department (N.J.A.C. 7:7A-15.11(a)1).

5. If the applicant is considering obtaining land to satisfy a mitigation requirement, the Department strongly recommends that the permittee obtain the Division's conceptual review and approval of any land being considered as a potential mitigation area.

6. If the permittee is purchasing credits from a mitigation bank to satisfy a mitigation requirement, prior to the initiation of regulated activities authorized by this permit, the permittee shall submit proof of the purchase of 1.4 acres of mitigation credits from an approved wetland mitigation bank to the attention of the Mitigation Unit Supervisor, NJDEP, Division of Land Use Regulation at Mail Code 501-02A, P.O. Box 420, Trenton, NJ 08625-0420.

   At this time, the following bank(s) are approved to serve the project area; additional banks may be approved at any time, so please contact the Mitigation Unit for the most up to date service area information if you would like additional options.

   MRI – 3 Wetland Mitigation Bank (for emergent and scrub shrub impacts only)
   The contact for this bank is Mark Renna and he can be reached at (973) 305-0643 or (973) 356-7164 or by email at mrenna@evergreenenv.com

7. If the permittee is considering conducting a creation, restoration or enhancement project, the following conditions shall apply:

   a. **Prior to the initiation of regulated activities** authorized by this permit, the permittee shall submit a final design of the mitigation project for approval and include all of the items listed on the checklist entitled Checklist for Completeness: Creation, Restoration or Enhancement for a Freshwater Wetland Mitigation Proposal located at http://www.nj.gov/dep/landuse/forms/index.html.

   b. The permittee shall obtain a secured bond or other financial surety acceptable to the Division from a firm licensed to provide such services in New Jersey. (N.J.A.C. 7:7A-15.13)

   c. **Prior to the completion of the mitigation project**, the permittee shall complete, sign and file with the County Clerk (the Registrar of Deeds and Mortgages in some counties), a conservation restriction that meets the requirements of N.J.A.C. 7:7A-

15.14. The conservation restriction shall include the wetland and required transition area and conform to the format and content of the Wetlands Mitigation Area model conservation restriction that is available at: http://www.nj.gov/dep/landuse/forms/index.html. The applicant is required to include a metes and bounds description shown on a map. Within 10 days of filing the conservation restriction, the permittee must send a copy of the conservation restriction to the Mitigation Unit, NJDEP Division of Land Use Regulation for verification. (N.J.A.C. 7:7A-15.14(a))

d. The permittee shall notify the Mitigation Unit at the Division of Land Use Regulation in writing **at least 30 days prior to the start of construction of the wetland mitigation project** to arrange an on-site pre-construction meeting among the permittee, the contractor, the consultant and the Division.

e. To ensure the intent of the mitigation design and its predicted wetland hydrology is realized in the landscape, the mitigation designer shall be present on-site during all critical stages of mitigation construction and during the restoration of any temporarily impacted areas. Critical stages of construction include but are not limited to herbicide applications, earthmoving activities, planting, and inspections.

f. The permittee shall be responsible for ensuring that best management practices are used throughout construction to control the spread and colonization of highly invasive plants. Specifically, all equipment, especially tracks and tires, must be thoroughly cleaned every time equipment or vehicles move from an area containing invasive plants or from off-site to the mitigation area. In addition, soil containing root fragments and above-ground vegetative material from invasive plants shall be carefully managed during earthmoving activities and disposed of at a suitable off site location rather than mulched and reused or stockpiled elsewhere on the site. For information on the specific species that are considered to be invasive, please refer to the Invasive Plant Atlas at http://www.invasiveplantatlas.org/index.html.

g. In the event that changes to the mitigation design are necessary to ensure success of the project as a result of on-site conditions, the mitigation designer shall immediately notify the Division in writing and submit an alternative plan which achieves the proposed wetland conditions. The Division shall review the plan in accordance with N.J.A.C. 7:7A-15.15. Any modifications to the plan that are reviewed and approved by the Division must be shown on a signed and sealed revised plan. The As-Built plans required as a part of the Construction Completion Report may serve as the signed and sealed revised plan required to be submitted as part of the construction modification process described above if time constraints warrant such action and have been approved by the Division in writing.

h. **Within 30 days of final grading of the mitigation site and prior to planting**, the permittee shall notify the Mitigation Unit at the Division of Land Use Regulation in

writing to arrange a post-grading construction meeting among the permittee, contractor, consultant and the Division.

i. **Within 30 days following the final planting of the mitigation project**, the permittee shall submit a Construction Completion Report to the Division detailing as-built conditions (see below) and any changes to the approved mitigation plan that were made during construction (N.J.A.C. 7:7A-15.16). The Construction Completion Report shall contain, at a minimum, the following information:

   i. A completed Wetland Mitigation Project Completion of Construction Form. This form is located at http://www.nj.gov/dep/landuse/forms/index.html and certifies that the mitigation project has been constructed as designed and that the proposed area of wetland creation, restoration or enhancement has been accomplished;

   ii. As-Built plans which depict final grade elevations at one foot contours and include a table of the species and quantities of vegetation that were planted including any grasses that may have been used for soil stabilization purposes; and

   iii. Photos of the constructed wetland mitigation project with a photo location map as well as the GPS waypoints in NJ state plane coordinates NAD 1983.

j. **Within 30 days following final planting of the mitigation project**, the permittee shall post the mitigation area with permanent signs which identify the site as a wetland mitigation project and that all-terrain vehicle use, motorbike use, mowing, dumping, draining, cutting and/or removal of plant materials is prohibited and that violators shall be prosecuted and fined to the fullest extent under the law. The signs must also state the name of the permittee, a contact name and phone number, and the Department's permit number.

k. The permittee shall monitor the wetland mitigation project for 5 full growing seasons beginning the year after the mitigation project has been completed. The permittee shall submit monitoring reports to the Division of Land Use Regulation no later than December 31st of each full monitoring year (N.J.A.C. 7:7A-15.16(c)). All monitoring reports must include the standard items identified in the checklist entitled, "Wetland Mitigation Monitoring Project Checklist", which can be found at http://www.nj.gov/dep/landuse/forms/index.html.

l. Once the required monitoring period has expired and the permittee has submitted the final monitoring report, the Division will make the finding that the mitigation project is either a success or a failure. This mitigation project will be considered successful if the permittee demonstrates all of the following:

i. That the goals of the wetland mitigation project, including acreage and the required transition area, as stated in the approved wetland mitigation proposal and the permit have been satisfied. The permittee shall submit a field wetland delineation of the wetland mitigation project based on the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1989) which shows the exactacreage of State open waters, emergent, scrub/shrub and/or forested wetlands in the mitigation area;

ii. The site has an 85 percent survival and 85 percent area coverage of the mitigation plantings or target hydrophytes, which are species native to the area and similar to ones identified on the mitigation planting plan. All plant species in the mitigation area must be healthy and thriving and all trees must be at least five feet in height;

iii. The site has less than 10 percent coverage by invasive or noxious species.

iv. The site contains hydric soils or there is evidence of reduction occurring in the soil; and,

v. The proposed hydrologic regime as specified in the mitigation proposal has been satisfied.

m. The permittee is responsible for assuming all liability for any corrective work necessary to meet the success criteria established above (N.J.A.C. 7:7A-15.16(f)). The Division will notify the permittee in writing if the mitigation project is considered to be a failure. Within 30 days of notification, the permittee shall submit a revised mitigation plan to meet the success criteria identified above for Division review and approval. The financial surety, if required, will not be released by the Division until such time that the permittee satisfies the success criteria as stipulated above.

STANDARD CONDITIONS:

1. The issuance of a permit shall in no way expose the State of New Jersey or the Department to liability for the sufficiency or correctness of the design of any construction or structure(s). Neither the State nor the Department shall, in any way, be liable for any loss of life or property that may occur by virtue of the activity or project conducted as authorized under a permit.

2. The issuance of a permit does not convey any property rights or any exclusive privilege.

3. The permittee shall obtain all applicable Federal, State, and local approvals prior to commencement of regulated activities authorized under a permit.

4. A permittee conducting an activity involving soil disturbance, the creation of drainage structures, or changes in natural contours shall obtain any required approvals from the Soil Conservation District having jurisdiction over the site.

5. The permittee shall take all reasonable steps to prevent, minimize, or correct any adverse impact on the environment resulting from activities conducted pursuant to the permit, or from noncompliance with the permit.

6. The permittee shall immediately inform the Department by telephone at (877) 927-6337 (Warn DEP Hotline) of any noncompliance that may endanger the public health, safety, and welfare, or the environment. In addition, the permittee shall inform the Division of Land Use Regulation by telephone at (609) 777-0454 of any other noncompliance within two working days of the time the permittee becomes aware of the noncompliance, and in writing within five working days of the time the permittee becomes aware of the noncompliance. Such notice shall not, however, serve as a defense to enforcement action if the project is found to be in violation of this chapter. The written notice shall include:
    a. A description of the noncompliance and its cause;
    b. The period of noncompliance, including exact dates and times;
    c. If the noncompliance has not been corrected, the anticipated length of time it is expected to continue; and
    d. The steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

7. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the authorized activity in order to maintain compliance with the conditions of the permit.

8. The permittee shall employ appropriate measures to minimize noise where necessary during construction, as specified in N.J.S.A. 13:1G-1 et seq. and N.J.A.C. 7:29.

9. The issuance of a permit does not relinquish the State's tidelands ownership or claim to any portion of the subject property or adjacent properties.

10. The issuance of a permit does not relinquish public rights to access and use tidal waterways and their shores.

11. The permittee shall allow an authorized representative of the Department, upon the presentation of credentials, to:
    a. Enter upon the permittee's premises where a regulated activity is located or conducted, or where records must be kept under the conditions of the permit;
    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit; and
    c. Inspect at reasonable times any facilities, equipment, practices, or operations regulated or required under the permit. Failure to allow reasonable access under this paragraph shall be considered a violation of this chapter and subject the permittee to enforcement action under.

12. The permittee and its contractors and subcontractors shall comply with all conditions, site plans, and supporting documents approved by the permit. Any noncompliance with a permit constitutes a violation of this chapter and is grounds for enforcement action under, as well as, in the appropriate case, suspension and/or termination of the permit.

13. All conditions, site plans, and supporting documents approved by a permit shall remain in full force and effect so long as the regulated activity or project, or any portion thereof, is in existence, unless the permit is modified.

14. For Coastal Permits, Flood Hazard Permits and Flood Hazard Verifications, the permittee shall record the permit, including all conditions listed therein, with the Office of the County Clerk (the Registrar of Deeds and Mortgages, if applicable) of each county in which the site is located. The permit shall be recorded within 30 calendar days of receipt by the permittee, unless the permit authorizes activities within two or more counties, in which case the permit shall be recorded within 90 calendar days of receipt. Upon completion of all recording, a copy of the recorded permit shall be forwarded to the Division of Land Use Regulation at the address set forth in the rules.

15. If any condition or permit is determined to be legally unenforceable, modifications and additional conditions may be imposed by the Department as necessary to protect public health, safety, and welfare, or the environment.

16. A copy of the permit and all approved site plans and supporting documents shall be maintained at the site at all times and made available to Department representatives or their designated agents immediately upon request.

17. A permit shall be transferred to another person only in accordance with the regulations.

18. A permit can be suspended or terminated by the Department for cause.

19. The submittal of a request to modify a permit by the permittee, or a notification of planned changes or anticipated noncompliance, does not stay any condition of a permit.

20. Where the permittee becomes aware that it failed to submit any relevant facts in an application, or submitted incorrect information in an application or in any report to the Department, it shall promptly submit such facts or information.

21. The permittee shall submit written notification to the Bureau of Coastal and Land Use Compliance and Enforcement, 401 East State Street, 4th Floor, P.O. Box 420, Mail Code 401-04C, Trenton, NJ 08625, at least three working days prior to the commencement of regulated activities.

22. The permittee shall not cause or allow any unreasonable interference with the free flow of a regulated water by placing or dumping any materials, equipment, debris, or structures within or adjacent to the channel while the regulated activity(ies) is being undertaken. Upon completion of the regulated activity(ies), the permittee shall remove and dispose of in a lawful manner, all excess materials, debris, equipment, and silt fences and other temporary soil erosion and sediment control devices from all regulated areas.

23. The regulated activity shall not destroy, jeopardize, or adversely modify a present or documented habitat for threatened or endangered species, and shall not jeopardize the continued existence of any local population of a threatened or endangered species.

APPROVED PLANS:

The drawings hereby approved are eleven (11) sheets prepared by Bohler Engineering, dated January 29, 2016, last revised February 14, 2017, unless otherwise noted, entitled:

"SITE DEVELOPMENT PLANS FOR SIGNATURE FLIGHT SUPPORT BBA AVIATION PROPOSEDEAST SIDE RAMP EXPANSION & HANGER TETERBORO AIRPORT FRED WEHRAN DRIVE BOROUGH OF TETERBORO BERGEN COUNTY, NEW JERSEY",

"DEMOLITION PLAN", sheet no. 2 of 14,

"SITE PLAN", sheet no. 3 of 14,

"GRADING PLAN", sheet no. 4 of 14,

"DRAINAGE & UTILITIES PLAN", sheet no. 5 of 14,

"CROSS-SECTION KEY MAP", sheet no. 7 of 14,

"PROP. CROSS SECTIONS (A)", sheet no. 8 f 14,

"PROP. CROSS SECTIONS (B)", sheet no. 9 of 14,

"DETAIL SHEET", sheet nos. 11, 12, 13 and 14 of 14.

In accordance with the applicable regulations, any person who is aggrieved by this decision or any of the conditions of this permit may request an adjudicatory hearing within 30 calendar days after public notice of the decision is published in the DEP Bulletin. This request must include a completed copy of the Adjudicatory Hearing Request form. The DEP Bulletin is available through the Department's website at http://www.nj.gov/dep/bulletin and the form is available through the Division's website at http://www.nj.gov/dep/landuse/download/lur_024.pdf. In addition to requesting a hearing, a request may be filed with the Department's Office of Dispute Resolution to determine whether the matter is suitable for mediation. Information concerning the dispute resolution process is available at www.nj.gov/dep/odr.

If you need clarification on any section of this permit or conditions, please contact the Division of Land Use Regulation's Technical Support Call Center at (609) 777-0454.

Approved By:

Richard C. Reilly

Richard C. Reilly, Manager
Division of Land Use Regulation

5/15/17
Date

Original sent to Agent to record
c: Permittee
Construction Official