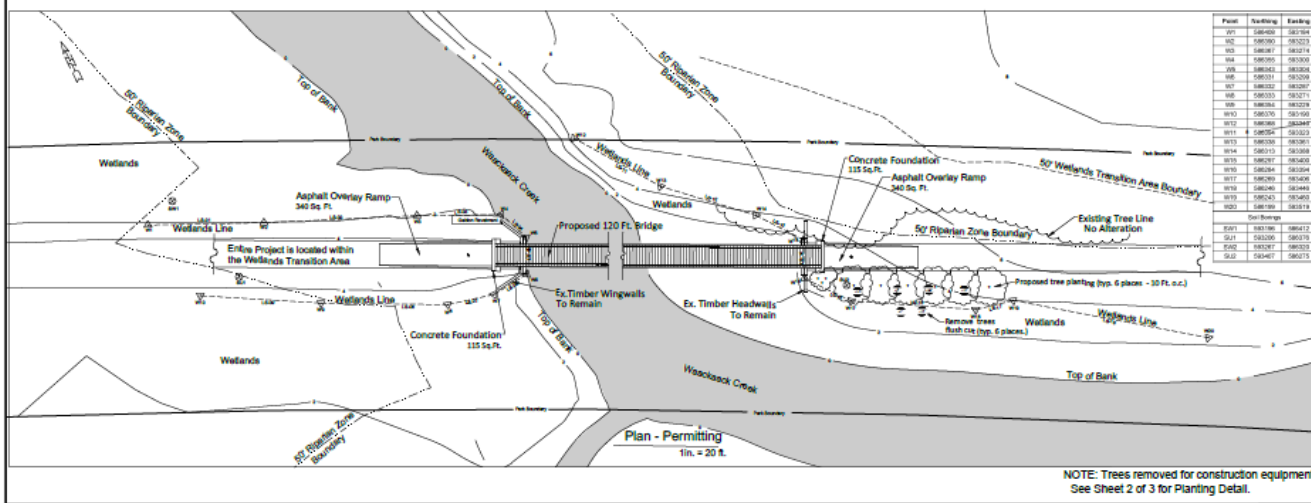
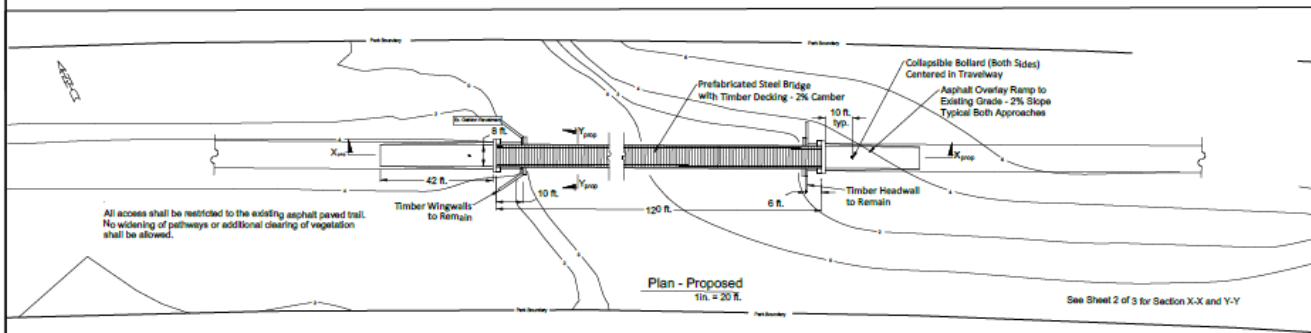
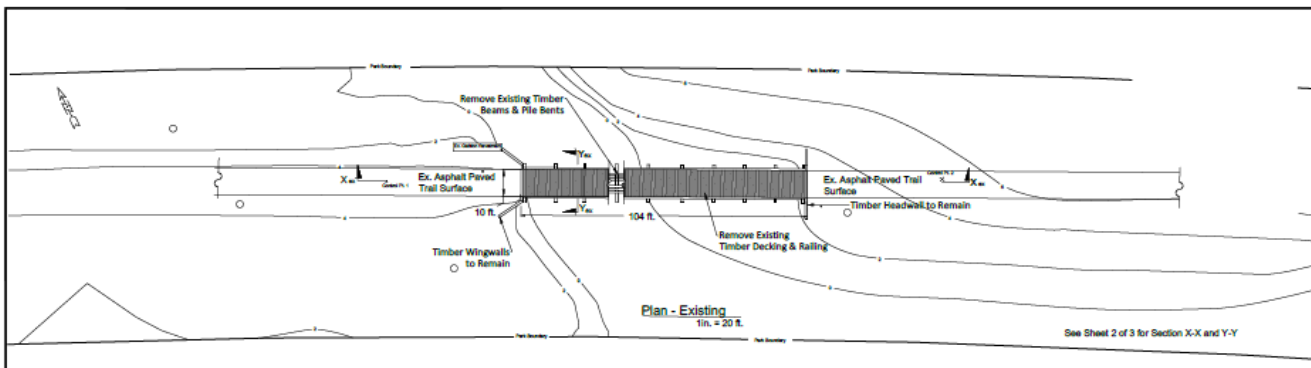


PLANS & DETAILS



NOTE: Trees removed for construction equipment access
See Sheet 2 of 3 for Planting Detail.




The elevations shown were developed from a field survey based upon a benchmark designated U 70 located near the Intersection of the Henry Hudson Trail and Laural Avenue, Hazlet, NJ.

The approximate Mean High Water elevation (2.08 feet N.A.V.D.) was based upon elevation of the feet above benchmark U 70 as published in the Tidal Datums and Benchmark Elevation Sheet 853-1592 Waackaack Creek, Raritan Bay, NJ

Topographic contours shown on plan were supplied by Monmouth County G.I.S.

Wetlands Delineation was developed from a 11-17-22 field survey by M.C.P.S. Environmental Specialists. See the Compliance Statement for Wetland Determination Data Forms.

REV	DATE	BY
1	03-01-23	AM
Revised per NJDEP		
02-03-23 email		
2	03-17-23	AM
Revised per NJDEP		
03-15-23 email		
3	04-09-23	AM
Revised per NJDEP		
03-30-23 email		
4	04-25-23	AM
Revised per NJDEP		
04-19-23 email		



MONMOUTH COUNTY PARK SYSTEM
BOARD OF PARK AND RECREATION COMMISSIONERS



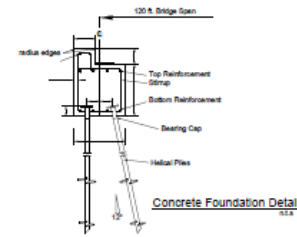
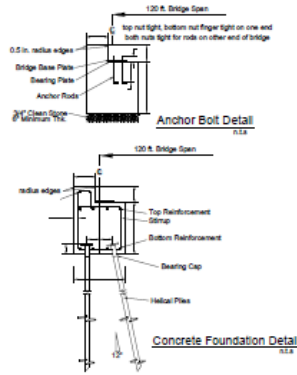
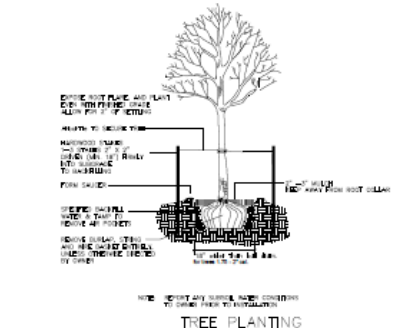
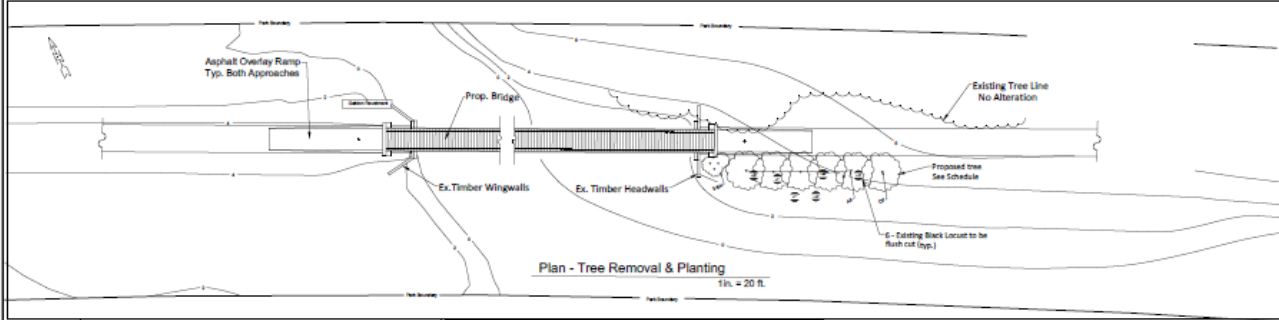
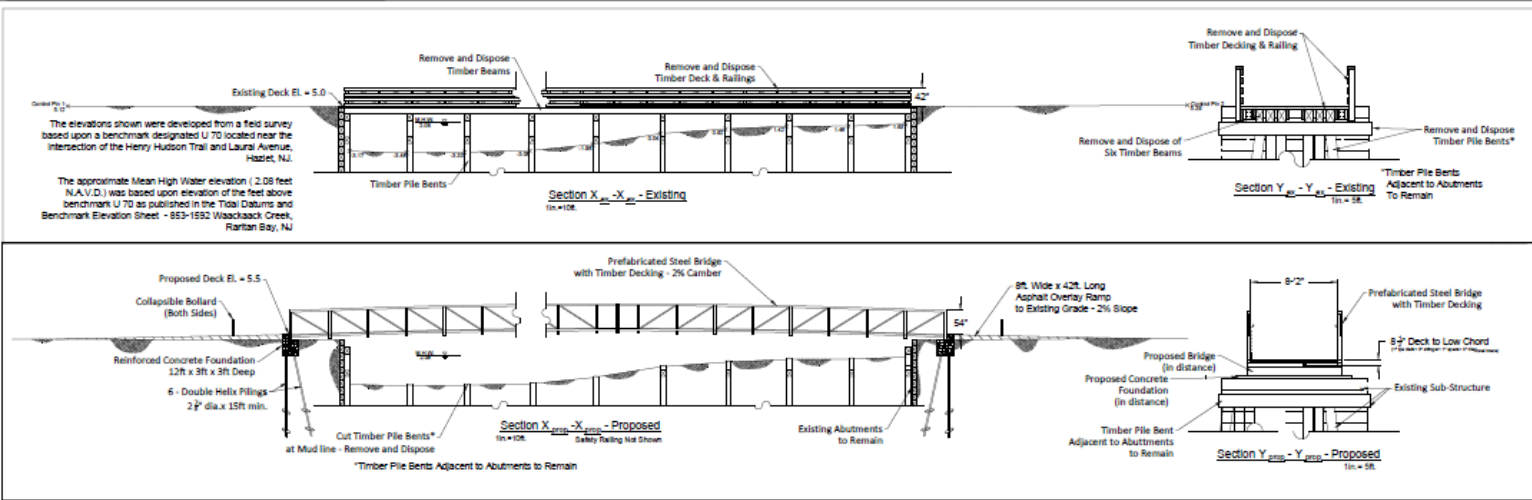
Replacement of Pedestrian Trail Bridge Henry Hudson Trail over Waackaack Creek Existing, Proposed and Permitting Plans

SHEET NO.,

1 OF 3

The elevations shown were developed from a field survey based upon a benchmark designated U 70 located near the intersection of the Henry Hudson Trail and Laurel Avenue, Hazlet, NJ.

The approximate Mean High Water elevation (2.08 feet N.A.V.D.) was based upon elevation of the feet above benchmark U 70 as published in the Tide Datum and Benchmark Elevation Sheet - 853-1552 Waackack Creek, Raritan Bay, NJ.



- GENERAL NOTES**
- BRIDGE DESIGN LOADING
 - 90 PSF UNIFORM LIVE LOADING ON THE FULL DECK AREA OR ONE 10,000 LB. VEHICLE LOAD. THE LOAD SHALL BE EQUALLY DISTRIBUTED AS A FOUR-WHEEL VEHICLE. THE WHEEL TRACK WIDTH OF THE VEHICLE SHALL BE 6'-0\"
 - 33 PSF WIND LOAD ON THE FULL HEIGHT OF THE BRIDGE, AS IF ENCLOSED.
 - 25 PSF UPWARD FORCE APPLIED AT THE WINDWARD QUARTER POINT OF THE TRANSVERSE BRIDGE WIDTH.
 - BRIDGE MEMBERS ARE FABRICATED FROM HIGH STRENGTH, LOW ALLOY, ENHANCED ATMOSPHERIC CORROSION RESISTANT ASTM A572 COLD-FORMED WELDED SQUARE AND RECTANGULAR TUBING, AND ASTM A572, ASTM A572, OR ASTM A709-50W PLATE AND STRUCTURAL SHAPES (7\"/>

PLANTING NOTES

- CONTACT MCP'S LANDSCAPE ARCHITECT PRIOR TO PLANTING. PLANT LOCATIONS ARE APPROXIMATE AND AREA TO BE STAKED OR FIELD LOCATED BY THE LANDSCAPE ARCHITECT.
- ALL TREES ARE TO BE PLANTED 10' APART ON CENTER.
- BACKFILL WITH A MIX OF ON SITE SOIL, EXCAVATED AND PART COMPOST.
- STOCKPILE ANY ALL REMAINING SOIL FROM THE PLANTING SOIL EXCAVATIONS AT THE PARK STOCKPILING AREA.
- STAKE ALL TREES.
- DEEP WATER (ONE GALLON WATER PER SQUARE FOOT) EVERY 5 DAYS FOR ONE SEASON.
- LOCATE ALL UTILITY LINES BEFORE PLANTING.
- ALL LANDSCAPING SHALL BE GUARANTEED FOR A PERIOD OF THREE YEARS FROM DATE OF ACCEPTANCE BY THE OWNER. PLANT MATERIAL THAT DOES NOT SURVIVE, OR IN THE OPINION OF THE RESIDENT ENGINEER IS NOT TRYING, SHALL BE REPLACED WITH THE SAME SPECIES OR APPROVED EQUAL AT NO ADDITIONAL COST.
- ALL PLANT MATERIAL SHALL MEET THE MINIMUM REQUIREMENTS FOR NURSERY STOCK AS DEFINED IN "AMERICAN STANDARD FOR NURSERY STOCK" AS PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN LATEST EDITION.
- COLLECTED PLANT MATERIAL WILL NOT BE ACCEPTED AND THE SOURCE OF PLANT MATERIAL SHALL BE CONFIRMED WITH MCP'S LANDSCAPE ARCHITECT.

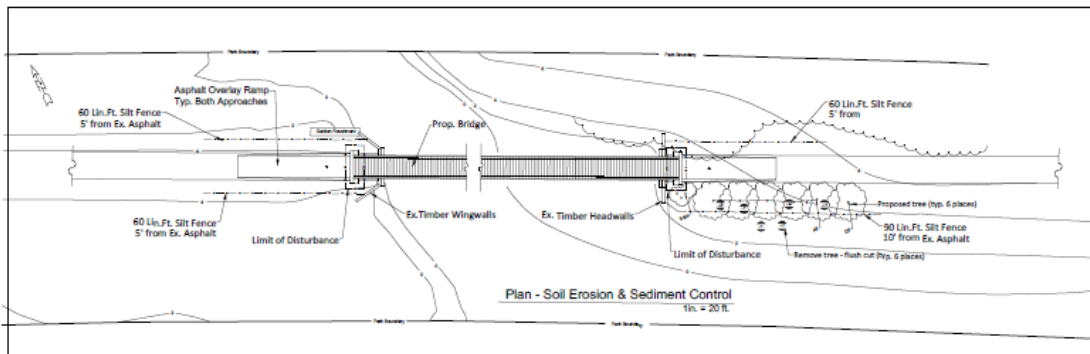
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3	1	05-15-23	JM	JM	ISSUED FOR PERMIT
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MONMOUTH COUNTY PARK SYSTEM
BOARD OF PARK AND RECREATION COMMISSIONERS
 800 E. GARDEN STREET, 2ND FLOOR
 FREEHOLD, NJ 07728
 TEL: (732) 431-5000 FAX: (732) 431-5000

Replacement of Pedestrian Trail Bridge
Henry Hudson Trail over Waackack Creek
 Sections, Plan & Details

SHEET NO. **2** OF **3**

DATE: 05-15-23
 BY: J.M.
 CHECKED: J.M.
 DESIGNED: J.M.
 DRAWN: J.M.
 IN CHARGE: J.M.



SOIL EROSION AND SEDIMENT CONTROL

- The Predefined Soil Erosion Control Plan shall be installed prior to any land disturbing activity.
- All Soil Erosion and Sediment Control practices shall be installed prior to any major soil disturbance, or in time prior to any excavation, and maintained until permanent protection is established.
- Any change to the Certified Soil Erosion and Sediment Control Plan will require the submission of a revised Soil Erosion and Sediment Control Plan to the District for re-certification. The revised plan must meet all required Soil Erosion and Sediment Control Standards.
- 11.2.1.A.28.30.40.45. Any project that is a Certificate of Occupancy for the District determines that a project or project located in a full compliance with the District Plan and Standards for Soil Erosion and Sediment Control in New Jersey and a Report of Compliance has been issued. Upon written request from the applicant the District may issue a Report of Compliance with conditions as to the following or conditions for written basis, provided that the project or project located in a satisfactory compliance with the requirements of the District and any necessary conditions for soil erosion and sediment control have been implemented, including provisions for stabilization and site work.
- Any disturbed area that will be left exposed more than sixty (60) days, and not subject to construction activity, will immediately require a temporary seeding. If the owner proposes the establishment of temporary cover, the disturbed area will be seeded with straw, or equivalent material, at a rate of 2 to 3 lbs. per acre, according to these standards for stabilization with biodegradable mulch.
- Immediately following initial disturbance or rough grading, all critical areas subject to erosion (i.e. soil disintegration, steep slopes and existing embankments) will require temporary seeding in accordance with a straw mulch or a suitable equivalent, and a suitable mulch, in accordance with these standards.
- A sub-area erosion will be applied immediately following rough grading and installation of improvements to stabilize erosion, roads, ditches, and parking areas. In areas where no soil loss is present, the sub-area shall be installed within (100) days of the preliminary grading.
- The Standard for Stabilized Construction Areas requires the installation of a pad of clean washed stone at points where traffic will be crossing the construction site. If the interior conditions are present, stabilized the require a stabilized construction surface consisting of one inch thick (1" - 2") stone for a minimum length of ten feet (10') upon the lot address width. All other areas provide shall be treated as well.
- All soil erosion, erosion, applied, or treated outside the limit of disturbance or site plan right of way will be removed immediately.
- Permanent vegetation is to be seeded or added on all exposed areas within six (6) days after final grading.
- At the time that site preparation for permanent vegetation stabilization is going to be accomplished, any soil that will not provide a suitable environment to support adequate vegetative ground cover shall be removed or treated in such a way that it will permanently retain the soil conditions and make it suitable for vegetative ground cover. If the removal or treatment of the soil will not provide suitable conditions, then vegetative means of permanent ground stabilization will have to be employed.
- In accordance with the Standard for Management of High Acid Producing Soils, any soil having a pH of 4 or less or containing free sulfates shall be permanently placed or treated with limestone applied at the rate of 10 tons per acre (400 lbs./100 sq. ft.) surface area) and covered with a minimum of 12" of washed soil with a pH of 5 or more, or 12" where lime and straw are to be applied.
- Curbcut Erosion Protection must be installed at all required outlets prior to the drainage system becoming operational.
- Undisturbed denaturing is not permitted. Temporary provisions must be taken during all denaturing operations to minimize sediment transfer. Any denaturing methods used must be in accordance with the Standard for Denaturing.
- Should the control of dust at the site be necessary, the site will be equipped until the surface is wet; temporary vegetation cover shall be established or mulch shall be applied as required by the Standard for Dust Control.
- Stumps and stumps located within the field shall be placed within the limit of disturbance according to the certified plan. Stumps and stumps not located within the limit of disturbance will require certification of a revised Soil Erosion and Sediment Control Plan. Certification of a revised Soil Erosion and Sediment Control Plan must be required for those situations if it is more than 100 feet from the site.
- All soil erosion plan are to be immediately stabilized in accordance with Soil Erosion and Sediment Control standards.
- The property owner shall be responsible for any erosion or sedimentation that may occur before construction activity or effects as a result of construction of the project.

CONSTRUCTION SEQUENCE	
PHASE	TIME SEQUENCE
1. Initial soil erosion and sediment control measures	1 week
2. Disturbance and site preparation	4 weeks
3. Construct Concrete Foundation	2 weeks
4. Construct Prefabricated Steel & Timber Bridge	1 week
5. Construct Asphalt Overlay Ramps	1 week
6. Restore permanent stabilization and de-mobilization	1 week
Total 11 weeks	

SEEDING SPECIFICATIONS - PERMANENT

Permanent seed cover shall be the following:

Perennial vegetation (Grass/legume) 1:1:1000.

Application Rate 12 lbs. per acre at a normal depth of 2" - 4" applied. Seeding Rate 2:1:1000.

Optimal Seeding Time 2:1:1000.

Standard for Permanent Vegetative Cover for Soil Stabilization

Establishment of permanent vegetative cover on exposed soils where permanent vegetation is needed for long-term protection.

Methods and Materials

1. Site Preparation

A. Grade or level and smooth to permit the use of mechanical equipment for seedbed preparation, seeding, mulch application, and mulch covering. All grading should be done in accordance with Standard for Land Grading.

B. Immediately prior to seeding and mulch application, the seedbed shall be evaluated for compaction in accordance with the Standard for Land Grading.

C. Topsoil should be handled only when it is in dry enough to work without damaging the soil structure. A minimum application to a depth of 2 inches (minimum) is required for all sites. Topsoil shall be applied with a minimum of 100 lbs. per acre, in accordance with the Standard for Topsoiling.

D. Install mulch under control conditions or facilities such as drainage, grade stabilization structures, channel stabilization measures, sediment basins, and structures.

2. Preparation of Seed Mixtures

A. Mixtures in a given condition and mixture as specified in the Department for review and approval prior to seeding. In the presence of MPTD staff, conduct the mixture with a series of sites, seed at a volume of 12 lbs. per acre for 1 per willow seed mixture.

3. Seed Application

A. Strictly spread the prepared blend of seed and mulch using a hand spreader, hand held, broadcast spreader. Lightly spread seed over the soil and the soil surface. The seed should be fairly dry for good seed contact.

4. Mulching

A. Mulch seed area within 7 days of willow seed spreading. Uniformly spread straw mulch in a layer 1 to 1 1/2 inches thick, loose measurement.

5. Seeding Rate

A. Seeding rate shall be 12 lbs. per acre at a normal depth of 2" - 4" applied. Seeding Rate 2:1:1000.

6. Seeding Time

A. Seeding time shall be 2:1:1000.

7. Seeding Method

A. Seeding method shall be 2:1:1000.

8. Seeding Equipment

A. Seeding equipment shall be 2:1:1000.

9. Seeding Results

A. Seeding results shall be 2:1:1000.

10. Seeding Costs

A. Seeding costs shall be 2:1:1000.

11. Seeding Schedule

A. Seeding schedule shall be 2:1:1000.

12. Seeding Quality

A. Seeding quality shall be 2:1:1000.

13. Seeding Quantity

A. Seeding quantity shall be 2:1:1000.

14. Seeding Location

A. Seeding location shall be 2:1:1000.

15. Seeding Duration

A. Seeding duration shall be 2:1:1000.

16. Seeding Frequency

A. Seeding frequency shall be 2:1:1000.

17. Seeding Intensity

A. Seeding intensity shall be 2:1:1000.

18. Seeding Effectiveness

A. Seeding effectiveness shall be 2:1:1000.

19. Seeding Reliability

A. Seeding reliability shall be 2:1:1000.

20. Seeding Consistency

A. Seeding consistency shall be 2:1:1000.

21. Seeding Uniformity

A. Seeding uniformity shall be 2:1:1000.

22. Seeding Accuracy

A. Seeding accuracy shall be 2:1:1000.

23. Seeding Precision

A. Seeding precision shall be 2:1:1000.

24. Seeding Detail

A. Seeding detail shall be 2:1:1000.

25. Seeding Completion

A. Seeding completion shall be 2:1:1000.

26. Seeding Finality

A. Seeding finality shall be 2:1:1000.

REV	DATE	BY
1	03-17-23	JM
	Revised per NJDEP	
	03-13-23 email	
2	04-08-23	JM
	Revised per NJDEP	
	03-30-23 email	



STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATERSHED & LAND MANAGEMENT
Mail Code 501-02A, P.O. Box 420, Trenton, New Jersey 08625-0420
Telephone: (609) 777-0454 or Fax: (609) 777-3656
www.nj.gov/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 terms, conditions, and limitations 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 8, 2023

Expiration Date

May 7, 2023

Permit Number:

1300-07-0001.2 LUP220001

Type of Approvals:

Freshwater Wetlands General Permit 17A
Flood Hazard Area General Permit 12
Water Quality Certificate

Governing Rules:

N.J.A.C. 7:13-1.1(b)
N.J.A.C. 7:7A-1.1(a)

Permittee:

Monmouth County Park System
Andrew Spears
805 Newman Springs Road
Lincroft, NJ 07738

Site Location:

Block & Lot: [97, 22]
Municipality: Keansburg Borough
County: Monmouth

Description of Authorized Activities:

This permit authorizes the construction of a footbridge, over Waackaack Creek, on the parcel(s) referenced above. This authorization to conduct activities in wetlands and/or waters includes the issuance of a Water Quality Certificate.

The Department has determined that the herein approved activities meet the requirements of the FHACA rules. This approval does not obviate the local Floodplain Administrator's responsibility to ensure all development occurring within their community's Special Flood Hazard Area is compliant with the local Flood Damage Prevention Ordinance, and minimum NFIP standards, regardless of any state-issued permits. FEMA requires communities to review and permit all proposed construction or other development within their SFHA in order to participate in the NFIP.

Prepared by:

Chingwah Liang

**Received and/or Recorded by
County Clerk:**

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

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

STATEMENT OF AUTHORIZED IMPACTS:

The authorized activities allow for the permittee to undertake impacts to regulated areas as described below. Additional impacts to regulated areas without prior Department approval shall constitute a violation of the rules under which this document is issued and may subject the permittee and/or property owner to enforcement action, pursuant to N.J.A.C. 7:13-2.18; N.J.A.C. 7:7A-22.

FWW GP17A Multiple-use Paths	Permanent Disturbance (Acres)	Temporary Disturbance (Acres)
Freshwater wetlands	0.0003	-
Transition areas	0.021	0.002
State open waters	-	-

Riparian Zone Vegetation	Area of riparian zone (Acres)
Permanent Disturbed	0.021
Temporary Disturbed	0.002

PRECONSTRUCTION CONDITIONS:

1. Prior to the commencement of site clearing, grading, or construction onsite, the permittee shall install a sediment barrier at the limits of disturbance authorized herein which is sufficient to prevent the sedimentation of the regulated waters and regulated areas onsite and shall serve as a physical barrier protecting all regulated areas from encroachment by construction vehicles or other soil-disturbing activities. All sediment barriers and soil erosion control measures shall be kept in place and maintained throughout the duration of construction, until such time that the site is stabilized.
2. Prior to the commencement of site clearing, grading, or construction onsite, all existing trees near the project area which are not to be removed shall be marked and a protective construction fence shall be placed around each tree for the duration of construction until the site is stabilized.

FLOOD HAZARD AREA CONDITIONS:

1. The permittee is responsible for restoring **120 square feet (0.003 acres)** of riparian zone with native, non-invasive trees and shrub vegetation, as shown on the approved plans. Planting shall commence simultaneously with site preparation, or during the next available growing season after site preparation begins. The permittee shall ensure the establishment and survival of the planted vegetation by monitoring the plantings and providing adequate water and care through the first growing season. Any loss of trees or shrubs shall be replaced during the next appropriate growing season. The restoration area shall be allowed to revert to a natural state and not be maintained as a lawn or landscaped area.
2. To ensure full compliance with the Coastal Zone Management Rules at N.J.A.C 7:7, and the Waterfront Development Law at N.J.S.A. 12:5-3, the permittee shall follow all requirements under

permit-by-rule No. 6 at N.J.A.C. 7:7-4.6 for the reconstruction of the bridge within the same footprint and in which no in-water work is to occur.

3. In order to preserve the stream channel and any low-flow characteristics, the pilings of the footbridge shall not be placed within the stream channel.
4. The permittee shall ensure that access to the construction activities is conducted from the banks of the channel and/or the existing asphalt paved trail only, as shown on the approved plans.
5. In order to protect general game fish within the Waackaack Creek from sediment generating activities, *special caution* shall be taken for any grading, excavation, or construction activities near the banks of the channel between **May 1st to Jul 31st** of each year throughout the validity of this permit. In addition, any activity within the flood hazard area or riparian zone of this watercourse which does not minimize the introduction of sediment into said stream or which could cause more than a minimum increase in the natural level of turbidity, is also prohibited anytime but especially during this period. The Department reserves the right to require additional soil conservation measures if it becomes evident that additional measures are required to protect State regulated resources, or the right to suspend all regulated activities onsite should it be determined that the permittee has not taken proper precautions to ensure continuous compliance with this condition.
6. The permittee shall prevent unset or raw concrete from encountering the waters of the channel(s) during all construction activities onsite; raw concrete is toxic to aquatic biota.
7. Construction equipment shall not be stored, staged, or driven within any regulated areas onsite, unless expressly approved by this permit or described on the approved plans.
8. The Department has determined that the riparian zone onsite along the Waackaack Creek is 50 feet. Therefore, vegetation within 50 feet of the top of the bank shall only be disturbed in the areas specifically shown on the approved drawings. Upon completion of the project, all temporary disturbed areas shall be replanted with indigenous, non-invasive vegetation in accordance with N.J.A.C. 7:13-11.2(z).
9. All excavated material shall be disposed of in a lawful manner. For example, it should be placed outside of any flood hazard area, riparian zone, regulated water, freshwater wetland and adjacent transition area, and in such a way as to not interfere with the positive drainage of the receiving area.
10. For the purposes of this permit, the Department has determined that this project is not a Major Development as defined in the Stormwater Management rules at N.J.A.C. 7:8-1.2. Therefore, the Department did not review the proposed project for compliance with these rules.

FRESHWATER WETLANDS CONDITIONS:

1. To avoid impacts to Northern Long-eared Bat, Tricolored Bat (proposed federal listing), as well as nesting migratory bird species, the Permittee shall adhere to a seasonal restriction on the clearing of all woody vegetation from ***April 1 through September 30*** of each calendar year throughout the validity of this permit.

2. The permittee is responsible for restoring **120 square feet (0.003 acres)** of transition area with native, non-invasive trees and shrub vegetation as shown on the approved plans. Planting shall commence simultaneously with site preparation, or during the next available growing season after site preparation begins. The permittee shall ensure the establishment and survival of the planted vegetation by monitoring the plantings and providing adequate water and care through the first growing season. Any loss of trees or shrubs shall be replaced during the next appropriate growing season. The restoration area shall be allowed to revert to a natural state and not be maintained as a lawn or landscaped area.
3. The permittee shall be responsible for preserving and minimizing vegetation disturbances within the freshwater wetlands and/or transition areas onsite. All temporary disturbances shall be restored to pre-existing elevations and replanted with native, non-invasive vegetation appropriate for the hydrologic conditions of the area.
4. The Department has determined that the freshwater wetlands affected by this permit authorization are of intermediate resource value and the standard transition area or buffer required adjacent to these wetlands is 50 feet. Please refer to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and implementing Rules (N.J.A.C. 7:7A) for additional information.
5. The authorized activities shall comply with the applicable conditions set forth under N.J.A.C. 7:7A-5.7, 7.17A, and 20.2. Failure to comply with these conditions shall constitute a violation of the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et. seq.). Any additional un-permitted disturbance of freshwater wetlands, State open waters, or transition areas besides that shown on the approved plans shall be considered a violation of the Freshwater Wetlands Protection Act Rules unless the activity is exempt or a permit is obtained from the Department prior to the start of the disturbance.
6. This authorization is valid for a term not to exceed five years from the date of this permit. If the permittee wishes to continue an activity covered by the permit after the expiration date of the permit, the permittee must apply for and obtain a permit extension or a new permit, prior to the permit's expiration. If the term of the authorization exceeds the expiration date of the general permit issued by rule, and the permit upon which the authorization is based is modified by rule to include more stringent standards or conditions, or is not reissued, the applicant must comply with the requirements of the new regulations by applying for a new applicable permit authorization.

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 or designee 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 of any unanticipated adverse effects on the environment not described in the application or in the conditions of the permit. The Department may, upon discovery of such unanticipated adverse effects, and upon the failure of the permittee to submit a report thereon, notify the permittee of its intent to suspend the permit.
7. The permittee shall immediately inform the Department by telephone at (877) 927-6337 (WARN DEP hotline) of any noncompliance that may endanger public health, safety, and welfare, or the environment. The permittee shall inform the Watershed & Land Management 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:
 - i. A description of the noncompliance and its cause;
 - ii. The period of noncompliance, including exact dates and times;
 - iii. If the noncompliance has not been corrected, the anticipated length of time it is expected to continue; and
 - iv. The steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
8. Any noncompliance with a permit constitutes a violation of this chapter and is grounds for enforcement action, as well as, in the appropriate case, suspension and/or termination of the permit.
9. 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.
10. 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.
11. 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.
12. The issuance of a permit does not relinquish public rights to access and use tidal waterways and their shores.
13. The permittee shall allow an authorized representative of the Department, upon the presentation of credentials, to:

- i. Enter upon the permittee's premises where a regulated activity, project, or development is located or conducted, or where records must be kept under the conditions of the permit;
 - ii. Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;
 - iii. 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; and
 - iv. Sample or monitor at reasonable times, for the purposes of assuring compliance or as otherwise authorized by the Federal Act, by the Freshwater Wetlands Protection Act, or by any rule or order issued pursuant thereto, any substances or parameters at any location.
13. 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, project, or development is being undertaken. Upon completion of the regulated activity, project, or development, 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.
15. The permittee and its contractors and subcontractors shall comply with all conditions, site plans, and supporting documents approved by the permit.
16. All conditions, site plans, and supporting documents approved by a permit shall remain in full force and effect, so long as the regulated activity, project, or development, or any portion thereof, is in existence, unless the permit is modified pursuant to the rules governing the herein approved permits.
17. The permittee shall perform any mitigation required under the permit in accordance with the rules governing the herein approved permits.
18. 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.
19. Any permit condition that does not establish a specific timeframe within which the condition must be satisfied (for example, prior to commencement of construction) shall be satisfied within six months of the effective date of the permit.
20. 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.
21. The permittee shall provide monitoring results to the Department at the intervals specified in the permit.
22. A permit shall be transferred to another person only in accordance with the rules governing the herein approved permits.

23. A permit can be modified, suspended, or terminated by the Department for cause.
24. 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.
25. 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.
26. The permittee shall submit email notification to the Bureau of Coastal & Land Use Compliance & Enforcement at CLU_tomsriver@dep.nj.gov at least 3 days prior to commencement of site preparation and/or regulated activities, whichever comes first. The notification shall include proof of completion of all pre-construction conditions, including proof of recording of permits, approved plans and/or conservation easements, if required. The permittee shall allow an authorized Bureau representative on the site to inspect to ensure compliance with this permit.
27. 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 Watershed & Land Management at the address listed on page one of this permit.

APPROVED PLANS:

The drawings hereby approved consist of three (3) sheets prepared by Monmouth County Park System, and entitled:

“REPLACEMENT OF PEDESTRIAN TRAIL BRIDGE HENRY HUDSON TRAIL OVER WAACKAACK CREEK”:

- Sheet 1 of 3: “EXISTING, PROPOSED AND PERMITTING PLANS” dated November 29, 2022, last revised April 6, 2023
- Sheet 2 of 3: “SECTIONS, PLANTING PLAN & DETAILS” dated November 29, 2022, last revised April 6, 2023
- Sheet 3 of 3: “SOIL EROSION CONTROL PLAN, DETAILS & NOTES” dated March 1, 2023, last revised April 6, 2023

APPEAL OF DECISION:

Any person who is aggrieved by this decision may submit an adjudicatory hearing request within 30 calendar days after public notice of the decision is published in the DEP Bulletin (available at www.nj.gov/dep/bulletin). If a person submits the hearing request after this time, the Department shall

deny the request. The hearing request must include a completed copy of the Administrative Hearing Request Checklist (available at www.nj.gov/dep/landuse/forms.html). A person requesting an adjudicatory hearing shall submit the original hearing request to: NJDEP Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, Mail Code 401-04L, P.O. Box 402, 401 East State Street, 7th Floor, Trenton, NJ 08625-0402. Additionally, a copy of the hearing request shall be submitted to the Director of Watershed & Land Management at the address listed on page one of this permit. In addition to your hearing request, you may file a request with the Office of Dispute Resolution to engage in alternative dispute resolution. Please see www.nj.gov/dep/odr for more information on this process.

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

Approved By:

Dennis Contois
Supervisor
Bureau of Flood Hazard & Stormwater Engineering
Watershed & Land Management

c: Municipal Clerk, Keansburg Borough
Municipal Construction Official, Keansburg Borough
Agent (original) – James Mowczan

Report of Subsurface Exploration & Geotechnical Engineering Assessment

Foundation Design of a Bridge Replacement On The Henry Hudson Trail Over Waackaack Creek Keansburg, Monmouth County, New Jersey



Jennifer Kaczala, QPA Purchasing Agent
Monmouth County Park System Headquarters
805 Newman Springs Road
Lincroft, New Jersey 07738



1800 Route 34, Suite 101
Wall Township, New Jersey 07719
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December 14, 2023

Jennifer Kaczala, QPA Purchasing Agent
Monmouth County Park System Headquarters
805 Newman Springs Road
Lincroft, New Jersey 07738

Re: Report of Subsurface Exploration & Geotechnical Engineering Assessment
Foundation Design of a Bridge Replacement On
The Henry Hudson Trail Over Waackaack Creek
Keansburg, Monmouth County, New Jersey
PS#60-23
FPA No. 20994.001

Dear Jennifer Kaczala:

INTRODUCTION & PROJECT UNDERSTANDING

This report presents the results of our Subsurface Exploration and Geotechnical Engineering Assessment performed in connection with the replacement of the bridge that spans Waackaack Creek in Keansburg, Monmouth County, New Jersey (Block 12, Lot 25). The regional location of the project site is presented in Drawing No. 1, "Regional Location Plan."

The subject project is part of the 24-mile paved trail, known as the Henry Hudson Trail, that was opened by the Monmouth County Park System in 1994. A portion of the trail runs along the entire north coast of Monmouth County, New Jersey and is one of Monmouth County Park System's greatest accomplishments that is enjoyed by many throughout the region year-round. The trail was constructed in stages over the former Central Railroad of New Jersey in which several pedestrian bridges traversing streams were constructed through the rehabilitation of former railroad trestles. The paved trail accommodates pedestrian, cycling, and equestrian traffic only.

During routine inspection by the Park System, advanced deterioration of the substructure supporting the bridge that crosses the Waackaack Creek in Keansburg, New Jersey was evident. The bridge replacement, designated as PS#60-23, will include the demolition of the existing timber bridge beams, deck, and pile bents. The existing timber piles will be cut flush with the mudline of Waackaack Creek. The existing timber abutments will be left in place. The demolished bridge will be replaced with a new single span prefabricated steel and timber bridge. The new bridge abutments will be constructed landward of the existing timber abutments.

Based on the horizontal and elevation alignment for the bridge replacement, we anticipate the existing site grades will not be substantially altered during the reconstruction of the bridge. For the purpose of this report, we have assumed that the Operational Classification of the new bridge is "non-essential" in accordance with the 9th Edition of the 2020 AASHTO LRFD Bridge Design Specifications (AASHTO).



The purpose of our involvement on the project at this time was to perform a Subsurface Exploration and Geotechnical Engineering Assessment to facilitate the planning, design, and construction of the proposed bridge foundations. Our scope of work included the technical observation of test borings, engineering evaluation of the acquired data, and the preparation of this geotechnical report.

SUBSURFACE EXPLORATION

A subsurface exploration program consisting of two test borings was performed on December 6, 2023 to characterize the subsurface soil and groundwater conditions in the vicinity of the bridge replacement. The field work was performed by a drilling subcontractor while under the full-time technical observation by a representative of French and Parrello Associates (FPA). The test borings were field located based on correlation with the existing site features. The approximate as-drilled test boring locations are presented in Drawing No. 2, "Test Boring Location Plan."

The two test borings, designated as B-1 and B-2, were advanced to depths of approximately 62 feet and 52 feet below the existing ground surface using mud rotary drilling procedures, respectively. Soil samples were taken continuously from below the existing ground surface to a depth of approximately 12 feet and at maximum 5-foot intervals thereafter.

Soil samples were obtained from within the boreholes by advancing a standard 2-inch diameter split-spoon sampler in general accordance with ASTM Test Method D-1586, The Standard Penetration Test (SPT). The standard penetration, or N-value, is determined as the number of blows required to advance the sampler 12-inches after the initial 6-inches of penetration. All soil samples were classified in the field using the Burmister Soil Classification System and were returned to our in-house soils laboratory for further review and will be stored for a period of 60 days following the completion of this report. The depth to groundwater was estimated based on the visually observed moisture content of the retrieved soil samples. Details of the drilling procedures, soil classifications, groundwater depths, and SPT results are presented on the test boring logs in Appendix A.

SITE CONDITIONS

Regional Geology

Based on our review of the published geologic literature, the native subsurface conditions at the project site consist of unconsolidated, stratified alluvial material deposited during the Quaternary period underlain by marine stratified deposits. The surficial soils, referred to as the "Lower Terrace Deposits (Qtl)" on the Surficial Geology Map of New Jersey, are generally less than 10 feet thick and consist primarily of yellowish-brown to yellowish-red sand and silty sand with some pebbles and cobbles. Within and west of the Waackaack Creek, the soils consist of tidal marsh, referred to as "Estuarine Deposits (Qmm)" on the Surficial Geology Map of New Jersey, that are peats and organic silts and clays with sand and minor pebble gravel. It should be anticipated that these soils may overlie the alluvial Qtl soils. The underlying marine formation, referred to as the "Woodbury Formation (Kwb)" on the Bedrock Geology Map of New Jersey, is relatively close to the ground surface and consist of laminated, micaceous, black or blue-gray clay. The depth to bedrock is generally greater than 100 feet.

Subsurface Conditions

The soils encountered within the test borings were consistent with those in published geologic literature to their terminating depths and generally consisted of the following:



Stratum 1 – Loose Sand

This stratum generally consisted of orange brown medium to fine sand with varying amounts of silt, gravel, and clay. Based upon the results of the SPT, the N-values ranged from approximately 4 to 11 blows per foot (bpf) with an average of 7 bpf, indicative of a loose relative density. This stratum extended to depths of approximately 6 and 8 feet from the existing ground surface.

Stratum 2 – Very Soft Organic Silt

This stratum generally consisted of dark gray organic silt with varying amounts of peat. Based upon the results of the SPT, the N-values ranged from approximately weight of hammer (WOH) to 3 bpf, indicative of a very soft consistency. This stratum was encountered at a depth of approximately 7 feet and is approximately 9 feet thick west of the Waackaack Creek and appears to thin to approximately 2 feet east of the Waackaack Creek.

Stratum 3 – Medium Dense Sand

This stratum generally consisted of green to brown fine sand with varying amounts of silt and gravel. Based upon the results of the SPT, the N-values typically ranged from approximately 11 to 19 bpf, indicative of a medium dense relative density. West of the Waackaack Creek, this stratum was encountered at a depth of approximately 18 feet and is approximately 7 feet thick and east of the Waackaack Creek, this stratum was encountered at a depth of approximately 9 feet and is approximately 15 feet thick.

Stratum 4 – Stiff to Very Stiff Clay

This stratum generally consisted of gray clay with varying amounts of silt. Based upon the results of the SPT, the N-values ranged from approximately 7 to 23 bpf with an average of 15 bpf, indicative of a stiff to very stiff consistency. This stratum was encountered at a depth of approximately 25 feet. All borings were terminated within this stratum to depths of at least 52 feet and 62 feet.

Groundwater Observations

The soil samples were observed to be dry to depths ranging between approximately 4 feet and 9 feet. Seasonal and storm related fluctuations in the groundwater level, as well as the potential presence of perched groundwater, should be anticipated.

For a more detailed description of the subsurface conditions encountered, please refer to the boring logs in Appendix A.

Seismicity

In accordance with the AASHTO guidelines and based upon subsurface data and that the new bridge Operational Classification is “non-essential” with a 1,000 year return period, we offer the following site characterization parameters:

Site Class.....	E
Spectral Acceleration @ Short Period (S_s)	0.167g
Spectral Acceleration @ 1 Second (S_1).....	0.036g
Peak Ground Acceleration (PGA)	0.089g



DISCUSSIONS & RECOMMENDATIONS

Based upon the results of our subsurface exploration program and our geotechnical engineering evaluation, it is our opinion that if the new bridge abutments were supported on conventional shallow foundations, the total and differential settlements from Strata 1 (loose sand) and 2 (very soft organic silt) would be unacceptable. Additionally, it is anticipated that the foundation bearing level will be close or below the groundwater and preparing a suitable subgrade will be difficult. We have not been provided with the structural foundation loads; however, we have assumed that there will be compression, tension, and lateral loads. We have also assumed that pile foundations may be required due to scour concerns.

Considering the above, we recommend that the new bridge abutments be supported on pile foundations provided the recommendations herein are followed.

Groundwater Considerations

Groundwater was encountered at depths ranging from approximately 4 feet to 9 feet below the existing grade. Seasonal and storm-related fluctuations in the groundwater level, as well as the potential presence of perched groundwater, should be anticipated. We anticipate that perched water encountered within the surficial fills may be addressed using sump pumps placed within crushed stone. For excavations that extend to or below the observed groundwater levels, alternate means of dewatering such as temporary well points may be required. We recommend that such dewatering efforts be specified on a performance basis and that the means and methods for such be left to the discretion of the Contractor. We recommend that the designer consider lateral hydrostatic forces and hydrostatic uplift forces in the design of all improvements including utilities which may be located below the groundwater level.

Pile Foundations

FPA anticipates that factored pile compression capacities in the range of 10 tons to 20 tons will be suitable for support of the new bridge abutments. We recommend that the pile foundations consist of either helical piles or Class B timber piles that bear within the very stiff clay (Stratum 4) encountered at a depth of approximately 25 feet below the existing ground surface.

Assuming that the existing site grades will not be substantially altered during the reconstruction of the bridge, ground settlements of the soft soils are not anticipated and therefore, drag load on the piles were not considered in the pile design.

We note that the test boring performed east of Waackaack Creek encountered wood within the drill cuttings between depths of approximately 15 feet and 30 feet, which may impact the installation of pile foundations. Considering this, we recommend that the need for pre-augering or pre-drilling pilot holes be considered during the planning of the improvements. Detailed recommendations for each pile foundation option are provided below.

Helical Piles

Helical Piles are typically installed by screwing auger flights into the ground using a track-hoe equipped with a hydraulic powered drive head. The piles may be installed in 5 feet or 10 feet long sections with a mechanical joint that is suitable for low overhead clearance applications. The drive head installs the piles to a



predetermined minimum torque that corresponds to the factored pile compression capacity and produces very little vibrations which may be desirable in a residential area.

We estimate that helical piles utilizing a standard 10"-12"-14" diameter auger lead section as manufactured by the AB Chance Corporation or similar helical pile vendor will achieve an allowable compressive capacity of 10 tons at depths of approximately 40 feet to 45 feet below the existing ground surface. It is recommended that the helical pile shaft consist of the 3.5 inches outside diameter AB Chance Round Shaft (RS3500.003) with a wall thickness of 0.3 inches. We note that the final pile depths and factored pile compression capacities will be determined through monitoring of the installation torque.

Due to the small shaft diameter of the helical piles, we recommend that no lateral capacity be considered for vertical helical piles. Battered helical piles may be utilized to provide lateral capacity if needed. Additionally, the passive resistance of the embedded pile caps may also be considered for lateral resistance.

Prior to the installation of any helical piles, the contractor should submit the proposed pile and installation equipment to confirm that the minimum torque to achieve the necessary pile capacity may be achieved.

Timber Piles

The factored pile compression and lateral capacities were estimated using the APILE 2015 (EnSoft, Inc.) and L-PILE v2018 (EnSoft, Inc.) computer software programs, respectively, and the Federal Highway Administration (FHWA) Method of analysis. A summary of the factored pile compression and lateral capacities are presented below:

Pile Type & Size	Estimated Pile Length (ft)	Factored Compression Pile Capacity (tons)	Factored Lateral Pile Capacity (tons)			
			Service		Strength	
			Free Head	Fixed Head	Free Head	Fixed Head
Class B Timber Pile	35 to 40	20	2.5	6.0	3.5	6.5

1. The timber piles should consist of treated, Southern Yellow Pine conforming to the requirements of ASTM Test Method D-25, Class B.
2. The evaluations assume that the top of the pile will be situated 5 feet below the existing ground surface.
3. The estimated pile lengths are relative to the top of the existing ground surface.
4. The factored compression capacity was estimated using a resistance factor of 0.65 as indicated on AASHTO Table 10.5.5.2.3-1 in consideration that Pile Driving Analyzer testing (high strain dynamic testing) will be performed.
5. The factored lateral pile capacities were estimated assuming a pile layout with a minimum pile spacing of 3B or greater for an applied reduction factor of 0.5 to the P-Y curves.
6. The service and strength limit state factored lateral pile capacities assume a lateral load that produces 0.5 inch and 1 inch of deflection at the pile head, respectively and that the moments do not exceed the pile allowable moment capacity.



7. Our evaluation indicates that the pile head fixity will affect computed deflections, and therefore the factored lateral pile capacities.
8. The minimum pile tip elevation should be established at a depth of approximately 25 feet below the existing ground surface. We note that the minimum tip elevation corresponds to the depth at which pile fixity is achieved for lateral resistance and should not be misinterpreted as the estimated pile lengths.
9. Prior to driving any piles, the contractor should submit Wave Equation Analysis (WEAP) results of the proposed pile and hammer configuration to confirm that the proposed pile driving system will obtain the necessary pile capacity without overstressing the pile.

Timber Pile Installation Criteria

The ultimate pile capacities should be verified through the use of Pile Driving Analyzer (PDA) testing. AASHTO recommends a resistance factor of 0.65 when dynamic measurements are taken with a PDA of at least one production pile per pier or abutment and this data is used in conjunction with driving criteria obtained through Wave Equation Analyses. The PDA testing should be included in the contractors' scope and be performed by a company with sufficient PDA testing experience.

The piles will be driven through saturated silty and clayey soils, which will produce excess pore water pressures that will decrease the pile capacity during pile driving. After pile driving, the excess pore pressures dissipate and the pile capacity typically increases with time. This process is known as pile setup. Therefore, the pile capacities, as obtained with a PDA, during initial drive and at the estimated pile lengths, may be lower than the required capacity. When this occurs, it will be necessary to stop the pile driving and allow pile setup (i.e., strength gain) to occur so that the necessary pile capacity can be achieved. The excess pore pressure dissipation rate depends on the soil type and the degree of soil disturbance. Considering the subsurface conditions at the site, it is estimated that it could take several days for excess pore pressure dissipation to occur. The pile capacity increase is evaluated in the field by restriking the test piles with a PDA, at various times after the initial drive.

Construction Vibrations from Pile Driving

We anticipate that the installation of the proposed piling will be accomplished using a pneumatic impact hammer. The installation of the proposed foundation piling will induce vibrations within the subsoils that may cause damage to existing structures and underground utilities. Therefore, we have evaluated the potential for such occurring on this project. The generally accepted safe limit for particle velocities on new structures is 2.0 in/sec. This value is reduced for old structures in poor and very poor conditions to 1.0 in/sec and 0.5 in/sec, respectively. The generally accepted safe limit on underground utility pipelines is 5.0 in/sec. Particle velocity is a function of the square root of the hammer energy (E) divided by the distance (D) from the vibration source to the point of interest, and may be estimated as follows:

$$V = 0.15 \{E^{1/2}/D\}^{1.5} \text{ (in/sec)}$$

Where; E is in foot-pounds and D is in feet

We anticipate that hammers utilized on the project will have energy ratings of approximately 19,500 foot-pounds. Based on our evaluation of potential particle velocities generated by such hammers, the areas of greatest concern for existing structures and utilities are those areas located within about 25 feet to 40 feet of the vibration source. Beyond a distance of approximately 60 feet, our evaluation indicates that particle



velocities would be on the order of 0.5 in/sec or less, which indicates that structural damage should not be an issue.

We recommend that a pre-construction survey of existing structures and sensitive utilities be considered in order to delineate structures and utilities that may be susceptible to damage from ground vibrations. Additionally, we recommend that vibration monitoring be performed during the installation of the piles.

Construction Inspection

We recommend that a representative of FPA provide technical observation and monitoring of the preproduction (i.e., installation torque and PDA testing) and production pile operations to verify all piles are all installed with the minimum installation criteria to achieve the minimum pile design capacity. Our representative would document the installation/driving of each pile and record the installation lengths, which may be used for verification of pay quantities. We will also verify that the piles are installed in accordance with the design drawings and specifications.

The production piles should be installed with the same equipment that was used to determine the minimum installation criteria. If the equipment is changed or modified prior to or during installation of production piles, the contractor should submit details of the proposed equipment. With this, it may be necessary to make modifications to the pile installation criteria and additional tests (i.e., PDA testing) may be required.

Foundation Excavation, Subgrade Preparation, and Backfill

We anticipate that the Contractor may utilize conventional earth excavating equipment for performing excavations within the in-situ soil deposits. We recommend that all excavations for foundations (i.e., pile caps) be hand trimmed, in a workmanlike manner, and that the subgrade soils be compacted with a smooth drum vibratory roller or large plate compactor to further densify the subsoils and identify soft areas.

We recommend that the design documents include provisions for the over-excavation of the foundation subgrade and the placement of NJDOT No. 57 coarse graded aggregate, if and where required, to facilitate construction such as any areas exhibiting excessive yielding or if the foundation excavation is left open overnight or performed during inclement weather. The NJDOT No. 57 coarse graded aggregate may be utilized as a workmat to minimize disturbance of the foundation subgrade due to construction and inclement weather and facilitate in-trench dewatering, if necessary.

We recommend that structural backfill consist of approved on-site granular soils or imported structural-grade, granular fill meeting the gradational criteria of NJDOT I-9 fill. The structural backfill shall be free of organic material, garbage, metal, debris, construction debris, lumps of clay, cobbles, boulders, and other deleterious matter. Each horizontal lift of new fill placed should not exceed a loose lift thickness of 12 inches. Fill placement should be compacted to a minimum of 95 percent of their maximum dry density as determined by ASTM Test Method D-1557, The Modified Proctor Compaction Test. The gradational requirements for NJDOT I-9 fill and NJDOT No. 57 Stone are presented in Appendix B.

Backfilling within five feet of the abutment walls should be accomplished using walk behind self-propelled trench rollers with a compaction force of approximately 16 kips or less. The use of heavy compaction equipment within five feet of any walls should be prohibited.



The on-site soils of Stratum 1 (upper sand) contain moderate to significant amounts of silt, which make them especially moisture sensitive and difficult to properly compact when wet. It should be expected that these soils may require careful moisture conditioning, including reworking to aerate and dry these materials, to obtain the optimal moisture content for proper compaction to the specified density. This is particularly true for the soils removed from below the groundwater level. Any deleterious materials should be removed from soils prior to re-use as structural fill. We do not recommend using the on-site soils of Stratum 2 (clayey silt) as structural fill. Alternatively, imported structural-grade, granular fill meeting the gradational criteria of NJDOT I-9 fill may be used for compacted structural fill and general grading fill placement and earthwork.

Excavation Considerations

It may be necessary to perform excavations below the existing ground surface to construct the new bridge abutments. Therefore, it should be anticipated that temporary support will be required to maintain a stable excavation. At the time of our investigation, the groundwater level was estimated to be encountered between depths of 4 feet and 9 feet. Considering this and if excavations may be at, close, or below these depths, we anticipate that a feasible support system could consist of interlocking steel sheet piling with lateral restraint (e.g., tiebacks, rakers, bracing, etc.), as required to facilitate water cutoff within these excavations.

The dewatering system should maintain the groundwater level at least two feet below the bottom of the subgrade elevation and until the foundations are poured, and the excavation is backfilled above the static groundwater level. Additionally, stockpiling of excavated soils should be carefully planned since stockpiling near the excavation will increase soil pressures on the bracing systems.

Responsibility for the adequacy of any sheeting and bracing systems and dewatering systems should be stipulated to be with the Contractor. All designs should be performed by an engineer licensed to practice in the State of New Jersey and should conform to all appropriate state, local, and OSHA regulations. The design should also consider the protection of surrounding subsurface utilities and other adjacent improvements. We recommend that all sheeting and bracing designs be submitted for review by the Professional Engineer of Record.

Lateral Earth Pressures

We offer the following design parameters assuming either the approved on-site granular soils or imported structural-grade granular fill (NJDOT I-9) are used as compacted backfill:

<u>Approved On-Site Granular Soils</u>	
Total Unit Weight (γ_t)	110 pcf
Submerged Unit Weight (γ_{sub})	50 pcf
Angle of Internal Friction (ϕ)	30 degrees
Coefficient of At-Rest Earth Pressure (K_o)	
Level Backfill050
2H to 1V slope072
Coefficient of Active Earth Pressure (K_a)	
Level Backfill033
2H to 1V slope054



Coefficient of Passive Earth Pressure (K_p) 3.00

NJDOT I-9 Granular Soils

Total Unit Weight (γ_t) 135 pcf

Submerged Unit Weight (γ_{sub}) 75 pcf

Angle of Internal Friction (ϕ) 34 degrees

Coefficient of At-Rest Earth Pressure (K_o)

Level Backfill 0.44

2H to 1V slope 0.55

Coefficient of Active Earth Pressure (K_a)

Level Backfill 0.28

2H to 1V slope 0.42

Coefficient of Passive Earth Pressure (K_p) 3.54

CLOSING & LIMITATIONS

The recommendations contained herein are contingent upon subsurface conditions remaining consistent with those encountered during our subsurface exploration. They are also contingent upon the basis that all foundation related aspects of construction, including pile load testing, production pile installation and controlled fill/backfill operations, be observed by a representative of FPA. This is to observe compliance with the design concepts and specifications and to allow design changes in the event that subsurface conditions differ from those anticipated prior to construction.

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

Services performed by FPA during this project have been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty, guarantee, or fiduciary responsibility is included or intended in the services provided.

Should you have any questions, please feel free to contact us.

Sincerely,

FRENCH & PARRELLO ASSOCIATES

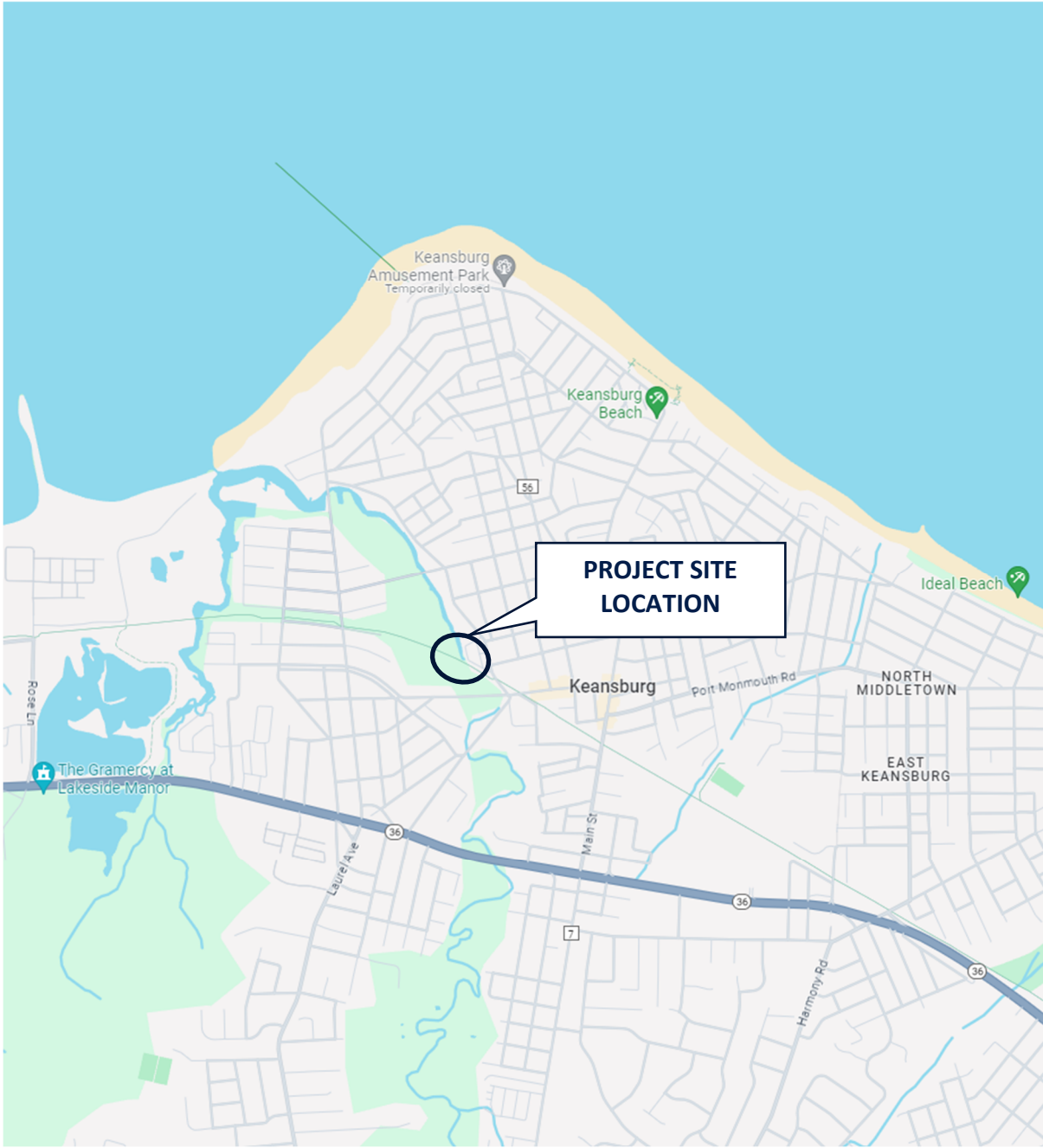
A handwritten signature in blue ink, appearing to read 'R. Knotz', is written over a horizontal line.

Robert D. Knotz, PE
Project Consultant



Drawings





REGIONAL LOCATION PLAN

Copyright Google Maps, 2023

THE HENRY HUDSON TRAIL OVER THE WAACKAACK CREEK PS#60-23
KEANSBURG, MONMOUTH COUNTY, NEW JERSEY

SCALE: NTS	DATE: DECEMBER 2023	JOB NO.: 20994.001	DRAWING NO.: 1
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O:\20K\20900\20994 - Henry Hudson Trail - Hazlet\20994.001 Foundation Design\DWGs\BLP\AsDrilledBLP.dwg BLP_11x17



- NOTES:
- 1. BASE PLAN DEVELOPED FROM NEARMAP IMAGERY DATED MARCH 8, 2022.
 - 2. BORING OPERATIONS WERE OBSERVED BY FPA PERSONNEL.
 - 3. THE LOCATIONS WERE FIELD LOCATED BASED ON CORRELATION WITH EXISTING SITE FEATURES.



LEGEND

B-1
BORING NUMBER & LOCATION



Corporate Office:
1800 Rt 34, Suite 101
Wall, New Jersey 07719
732.312.8000

FPAengineers.com

New Jersey ▲ New York ▲ Pennsylvania ▲ Georgia

TEST BORING LOCATION PLAN
FOR
**THE HENRY HUDSON TRAIL OVER
THE WAACKAACK CREEK PS#60-23**
KEANSBURG, MONMOUTH COUNTY, NEW JERSEY

DATE: 12/11/2023	SCALE: AS INDICATED	PROJECT NUMBER: 20994.001
DRAWN BY: ESM	CHECKED BY: RDK	DRAWING NO.: 2



Appendix A **Test Boring Logs**

BURMISTER SOIL CLASSIFICATION SYSTEM

A. Cohesionless Soils: Particle Size Definitions

Soil	Fraction	U.S. Standard Sieve	Actual Sizes
Gravel	coarse	3 in. to 1 in.	76 mm to 25 mm
	medium	1 in. to 3/8 in.	25 mm to 9.5 mm
	fine	3/8 in. to No. 10	9.5 mm to 2.0 mm
Sand	coarse	No. 10 to No. 30	2.0 mm to 0.6 mm
	medium	No. 30 to No. 60	0.6 mm to 0.25 mm
	fine	No. 60 to No. 200	0.25 mm to 0.075 mm
Silt		< No. 200	< 0.075 mm

B. Terms Describing Gradation of Cohesionless Soils

Written Description	Symbol/Designation	Defining Proportions
coarse, medium to fine	cmf	all fractions > 10%
coarse to medium	cm	< 10% fine
medium to fine	mf	< 10% coarse
coarse	c	< 10% medium and fine
medium	m	< 10% coarse and fine
fine	f	< 10% coarse and medium

Note: Use (+) for upper limit and (-) for lower limit.

C. Cohesive Soils: Terms Describing Plasticity

Soil	Plasticity Index	Workability	Plasticity Description
Clayey SILT	1 to 5	1/4 in. thread	Slightly Plastic
SILT & CLAY	5 to 10	1/8 in. thread	Low Plasticity
CLAY & SILT	10 to 20	1/16 in. thread	Medium Plasticity
Silty CLAY	20 to 40	1/32 in. thread	High Plasticity
CLAY	>40	1/64 in. thread	Very High Plasticity

D. Terms Describing Overall Composition of Soil

Written Proportion	Proportion Symbol	Proportion Percent by Weight
and	a	35 to 50
some	s	20 to 35
little	l	10 to 20
trace	t	1 to 10

Note: Use (+) for upper limit and (-) for lower limit.



TEST BORING LOG

THE HENRY HUDSON TRAIL OVER THE WAACKAACK CREEK
COUNTY OF MONMOUTH COUNTY, NEW JERSEY
FPA NO. 20994.001

BORING NO.: B-1
SHEET 1 OF 2

DATE STARTED: 12/6/2023
DATE FINISHED: 12/6/2023

DEPTH OF WATER: 4'±
LOCATION: See Plan

GROUND ELEVATION: N/A
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
--- 5' ---	S-1 0-2'	3 - 3 - 4 - 3		S-1 Dark Grey cmf SAND , little f Gravel, trace Silt. (fill)
	S-2 2-4'	4 - 3 - 3 - 3		S-2 TOP 18": Same as S-1 . BOT 6": Orange-Brown mf SAND , little Silt.
	S-3 4-6'	4 - 4 - 5 - 5		S-3 Orange-Brown f SAND , little Silt. (wet)
	S-4 6-8'	3 - 3 - 4 - 7		S-4 TOP 18": Orange Brown f SAND , little Silt. BOT 6": Grey f SAND , little Silt. (wet)
	S-5 8-10'	WOH - WOH - WOH - WOH		S-5 Dark Grey Organic SILT , trace Peat with fibers
	S-6 10-12'	WOH - WOH - WOH - WOH		S-6 Same as S-5 .
--- 15' ---	S-7 15-17'	WOH - WOH - WOH - WOH		S-7 Same as S-5 .
--- 20' ---	S-8 20-22'	4 - 4 - 7 - 9		S-8 Light Green f SAND , little Silt. (wet)
--- 25' ---	S-9 25-27'	4 - 3 - 4 - 5		S-9 TOP 6": Same as S-8 . BOT 18": Grey CLAY .
--- 30' ---	S-10 30-32'	1 - 4 - 5 - 6		S-10 Same as S-9 , BOT 18" .
--- 35' ---	S-11 35-37'	2 - 4 - 6 - 9		S-11 Same as S-9 , BOT 18" .

SOILS ENGINEER: R. KNOTZ, PE
DRILLING INSPECTOR: E. HAMILTON, PG

CONTRACTOR: CRAIG TEST BORING
DRILLER: M. KIER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

THE HENRY HUDSON TRAIL OVER THE WAACKAACK CREEK
COUNTY OF MONMOUTH COUNTY, NEW JERSEY
FPA NO. 20994.001

BORING NO.: B-1
SHEET 2 OF 2

DATE STARTED: 12/6/2023
DATE FINISHED: 12/6/2023

DEPTH OF WATER: 4'±
LOCATION: See Plan

GROUND ELEVATION: N/A
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPT H FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
---40'---	S-12 40-42'	7 – 10 – 13 – 14		S-12 Grey CLAY with ¼" vertical Silt lenses & embedded fine gravel. ½" thick fine Gravel layer at 41'.
---45'---	S-13 45-47'	5 – 8 – 8 – 10		S-13 Grey Clayey SILT . (micaceous)
---50'---	S-14 50-52'	4 – 6 – 11 – 16		S-14 Same as S-13 .
---55'---	S-15 55-57'	6 – 9 – 11 – 13		S-15 Same as S-14 .
---60'---	S-16 60-62'	5 – 6 – 9 – 11		S-16 Same as S-14 .
---65'---				END OF BORING @ 62'
---70'---				
---75'---				
SOILS ENGINEER: R. KNOTZ, PE DRILLING INSPECTOR: E. HAMILTON, PG				CONTRACTOR: CRAIG TEST BORING DRILLER: M. KIER
The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.				



TEST BORING LOG

THE HENRY HUDSON TRAIL OVER THE WAACKAACK CREEK
COUNTY OF MONMOUTH COUNTY, NEW JERSEY
FPA NO. 20994.001

BORING NO.: B-2
SHEET 1 OF 2

DATE STARTED: 12/6/2023
DATE FINISHED: 12/6/2023

DEPTH OF WATER: 9'±
LOCATION: See Plan

GROUND ELEVATION: N/A
GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary
HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
---5'---	S-1 0-2'	7 - 6 - 5 - 3		S-1 Dark Grey cmf SAND , little f Gravel, trace Silt. (fill)
	S-2 2-4'	3 - 2 - 2 - 2		S-2 TOP 12": Same as S-1 . BOT 12": Orange-Brown f SAND , little Clayey Silt.
	S-3 4-6'	2 - 2 - 3 - 2		S-3 Grey f SAND , little Clayey Silt.
	S-4 6-8'	2 - 2 - 1 - 2		S-4 Grey Organic SILT , little Peat.
	S-5 8-10'	WOH - WOH - 3 - 4		S-5 TOP 6": Same as S-4 . MID 6": Grey cmf SAND , trace f Gravel, trace Clayey Silt. (wet)
---10'---	S-6 10-12'	2 - 1 - 2 - 2		BOT 12": Grey f SAND , little Silt. (wet)
				S-6 Grey f SAND , some Silt. (wet)
---15'---	S-7 15-17'	8 - 9 - 10 - 12		S-7 Green f SAND , little Silt with wood pieces.
---20'---	S-8 20-22'	9 - 10 - 5 - 5		S-8 Orange-Brown f SAND , little Silt, trace f Gravel.
---25'---	S-9 25-27'	1 - 3 - 5 - 8		S-9 Grey CLAY (soft), trace f Gravel with wood fibers.
---30'---	S-10 30-32'	2 - 4 - 6 - 8		S-10 Grey CLAY .
---35'---	S-11 35-37'	3 - 6 - 13 - 20		S-11 Same as S-10 .

SOILS ENGINEER: R. KNOTZ, PE

DRILLING INSPECTOR: E. HAMILTON, PG

CONTRACTOR: CRAIG TEST BORING

DRILLER: M. KIER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



TEST BORING LOG

THE HENRY HUDSON TRAIL OVER THE WAACKAACK CREEK
COUNTY OF MONMOUTH COUNTY, NEW JERSEY
FPA NO. 20994.001

BORING NO.: B-2
SHEET 2 OF 2

DATE STARTED: 12/6/2023

DEPTH OF WATER: 9'±

GROUND ELEVATION: N/A

DATE FINISHED: 12/6/2023

LOCATION: See Plan

GROUND WATER ELEV.: N/A

DRILLING TECHNIQUE: Mud Rotary

HAMMER TYPE: 140 lb. Automatic Trip Hammer, 30 Inch Drop

DEPTH FEET	SAMPLE DEPTH	SPT BLOW COUNTS (PER 6")	STRATA	DESCRIPTION OF SOIL
---40'---	S-12 40-42'	7 – 9 – 12 – 15		S-12 Grey & Brown CLAY .
---45'---	S-13 45-47'	6 – 8 – 8 – 14		S-13 Dark Grey Clayey SILT . (micaceous)
---50'---	S-14 50-52'	4 – 6 – 9 – 14		S-14 Same as S-14 .
---55'---				END OF BORING @ 52'
---60'---				<i>Note: observed wood pieces in mud cuttings during advancement after 15' to approximately 30'</i>
---65'---				
---70'---				
---75'---				


SOILS ENGINEER: R. KNOTZ, PE

DRILLING INSPECTOR: E. HAMILTON, PG

CONTRACTOR: CRAIG TEST BORING

DRILLER: M. KIER

The information shown hereon indicates the subsurface conditions encountered at the specific boring location on the date(s) of drilling. Subsurface conditions are likely to vary across the project site. Interpretation of the subsurface data shall be at the discretion of the user.



Appendix B **Gradational Requirements**

Allowable Gradational Envelope

AASHTO M43

Standard Sizes of Coarse Aggregate Size No. 57

U.S. Standard Sieve Size

Percent Finer by Weight

1 ½"

100

1"

95 - 100

½"

25 - 60

No. 4

0 - 10

No. 8

0 - 5

Allowable Gradational Envelope

NJDOT I-9 Fill

<u>U.S. Standard Sieve Size</u>	<u>Percent Finer by Weight</u>
4"	100
2"	80 - 100
$\frac{3}{4}$ "	60 - 100
No. 4	40 - 100
No. 16	20 - 70
No. 50	5 - 35
No. 100	0 - 20
No. 200	0 - 8