

**STORMWATER MANAGEMENT REPORT**

**FOR**

**GALILEEE EGLISE ADVENTISTE INCORPORATED  
PROPOSED CHURCH**

**BLOCK 3301, LOT 4  
NEPTUNE TOWNSHIP**

**MONMOUTH COUNTY, NEW JERSEY**

**PREPARED BY:**

**B&G ENGINEERING LLC.  
30 BERNARD DRIVE  
EWING, NEW JERSEY 08628**

**November 29, 2022**



**BESRICK G. PLUMMER, P.E.  
NEW JERSEY PROFESSIONAL ENGINEER  
LICENSE NO. 39534**

***B&G PROJECT NO. 1943A***

## TABLE OF CONTENTS

<u>Title</u>	<u>Page</u>
INTRODUCTION.....	1
PROJECT DESCRIPTION.....	1
SITE DESCRIPTION .....	2
SOIL CHARACTERISTICS.....	3
PRE-DEVELOPMENT DRAINAGE CONDITIONS.....	3
POST-DEVELOPMENT DRAINAGE CONDITIONS .....	4
PROPOSED STORWATER MANAGEMENT DESIGN.....	5
STORMWATER COMPLIANCE .....	5
PRIMARY SPILLWAY ROUTING.....	6
SOIL EROSION & SEDIMENT CONTROL.....	6
ON SITE STORM SEWER COMPUTATIONS .....	6
CONCLUSIONS.....	6
APPENDIX A	
FIGURE 1 – PROJECT LOCATION MAP	
APPENDIX B	
FIGURE 2 – SOILS MAP	
SOILS DESCRIPTION	
SOIL INVESTIGATION REPORT	
APPENDIX C	
PRE DEVELOPMENT RUNOFF CALCULATIONS	
APPENDIX D	
POST DEVELOPMENT RUNOFF CALCULATIONS/ BASIN ROUTING CALCULATIONS	
APPENDIX E	
PRIMARY SPILLWAY ROUTING CALCULATIONS	
APPENDIX F	
NJDEP IDF CURVES	
ON-SITE STORM SEWER CALCULATIONS	
CONDUIT OUTLET PROTECTION CALCULATIONS	
PRE-FORMED SCOUR HOLE CALCULATIONS	
HYDROLOGIC MODELING DATABASE DATA ENTRY FORM	
APPENDIX G	
STORM SEWER DRAINAGE AREA MAP	
PRE & POST DEVELOPMENT DRAINAGE AREA MAPS	

## **INTRODUCTION**

The scope of this report is to discuss the storm-water management measures proposed for the planned improvements at the subject site located in Neptune Township, Monmouth County, New Jersey, (see Figure 1- Project Location Map). The proposed storm-water management system has been designed in accordance with the New Jersey Department of Environmental Protection and Neptune Township Stormwater Management Standards, per New Jersey Administrative Code Section 7:8-5.5. Storm-water routing calculations in this report are in accordance with USDA Soil Conservation Service Technical Release No. 55 (TR-55), "Urban Hydrology for Small Watersheds".

Storm	24-hour depth (inches)
2-year	3.49
10-year	5.40
100-year	9.24

## **PROJECT DESCRIPTION**

The proposed project involves the construction of a one (1)-story house of worship with basement at the project site. The proposed building footprint will be 80 ft x 50 ft and it will be constructed on the west side of the existing one (1) story single-family residence currently on site. The church sanctuary will be physically connected to the existing house (garage section), and the existing house will be converted to religious office spaces and ancillary uses.

To facilitate the proposed improvements some existing onsite infrastructure will be demolished including existing asphalt driveways, concrete walkways and other miscellaneous site features. In addition, several trees and shrubs will be removed to allow for construction of proposed site features required to serve the needs of the church.

Site improvements include the construction of a 64-space parking lot including three (3) handicap accessible parking spaces, installation of concrete curb and sidewalk, and construction of a 14' x 14' trash enclosure. An infiltration basin has been proposed to meet the storm-water management requirements of the NJDEP, Freehold Soil Conservation District and Neptune Township. This basin will be located north of the proposed sanctuary and behind the existing dwelling. A pre-formed scour hole is proposed downstream of the infiltration basin to account for emergency overflow from the infiltration basin. The proposed storm system discharging to the infiltration basin will consist primarily of reinforced concrete culvert pipes (15"-24") and associated drainage inlets. Roof leaders from the church building will connect to HDPE and PVC pipes. These pipes will tie into the main storm sewer system.

Onsite open space areas will consist of parking lot and site landscaping per Neptune Township landscaping requirements. Several shade trees, shrubs, along with ground cover and perennial

grass are proposed throughout the site. Since the site is heavily wooded, the on-site landscaping will be supplemented by existing trees and shrubs that will remain.

Existing onsite utilities that will remain and serve the proposed church include a 4-inch sanitary lateral that connects to an existing sanitary main on State Highway 33, and a domestic water well to provide potable water use.

### **SITE DESCRIPTION**

The site is located on the northern side of New Jersey State Highway Route No. 33 between West Bangs Ave to the west and Fairview Ave in the east, in Neptune Township, Monmouth County, New Jersey, (See Figure 1, Appendix "A"). A review of the official tax map of the Township identifies the site as Lot 4, Block 3301. Its postal address is 3313 NJ 33, Neptune, NJ 07753.

Presently the site is occupied by a one (1) story single-family residence with an attached one-car garage, and a wooden deck. In addition to the residence, other onsite structures include a one-story frame building, a wooden shed and a wooden gazebo. Vehicular access to the site is via an existing paved driveway from NJ Route 33.

The site is almost rectangular in shape and is heavily wooded along all property lines. To the north the site is bordered by Shark River Brook, aka Jumping Brook which flows southwards and is a tributary to Shark River. To the south the site is bordered by NJ Route 33 (Corlies Ave), and commercial buildings. West of the site is a single-family residence and wooded areas, while east of the site is a United Methodist Church and wooded areas.

On site utilities include a 4-inch sanitary lateral, a domestic water well, and electric and gas services. Open space includes several shade and flowering trees, shrubs and lawn areas.

A review of the existing topography within the area of proposed disturbance shows a relatively flat site with slopes of from 1.0% to 5% (area of major site and building improvements.). The exception to the mild slopes is in the area of the proposed infiltration basin and pre-formed scour hole, where the average slope is over 30%.

Pre-development stormwater runoff at the site generally flows from four (4) drainage areas in a sheet flow like pattern across and from the site, to adjacent properties to the west and to Route 33 to the south. To the north and east stormwater flows to Shark River Brook, a tributary of Shark River. There is no existing onsite storm sewer system to convey stormwater runoff, resulting in areas of standing water at low lying paved areas during heavy rainfalls. The existing onsite soil is sandy with a favorable infiltration rate allowing water from pervious areas to seep through the soil.

In the areas associated with the proposed sanctuary, and parking lot construction, the existing ground cover is mostly pervious, except for areas of existing onsite driveway and approximately 2,000 SF of parking area. Therefore, stormwater runoff is minimal due to the existing sandy soils. Rainfall infiltrates the soil after various storm events and there is little evidence of onsite erosion due to the porous soils.

## **SOIL CHARACTERISTICS**

A review of the United States Department of Agriculture/Soil Conservation Service Soil Survey of Monmouth County New Jersey, indicates that there are two (2) soils series at the project site. A closer review shows that within the proposed area of disturbance, the onsite soil is Lakehurst Sand (LakB), occurring on 0% to 5% slopes, (See Figure 2- Project Soils Map, Appendix "B"). In addition, at the rear of the site, outside of the proposed limit of disturbance, the other soil series is Humaquepts, (HumAt), occurring on 0 to 3 percent slopes.

The Lakewood soil series is described as having a depth to restrictive feature of more than 80 inches and is a moderately well drained soil. Onsite soil tests revealed an infiltration rate of 4.5 inches/hour in the area of the proposed infiltration basin.

Its typical soil profile is 0 to 2 inches of slightly decomposed material, and 2 to 80 inches of sand. Its hydrologic soil group is "A" based on its high infiltration rate. Appendix "B" of this report gives a detailed description of the soil series. The Onsite Soil Exploration Report is also included in Appendix "B".

The following sections detail the calculation methodologies and results of the storm-water management design.

## **PRE-DEVELOPMENT DRAINAGE CONDITIONS**

The proposed stormwater management for this project has been designed to meet NJDEP storm water management requirements for "major development". Presently there are no designed stormwater management structures at the subject site. However non-structural features such as lawn areas provide TSS removal for stormwater runoff. In addition, the existing onsite soil is sandy in nature which allows for stormwater recharge.

The existing drainage areas are shown on the Pre-development Drainage Area Map in Appendix "E. A review of this map shows four (4) distinct drainage areas all flowing offsite un-detained. The area consists of parking lot and driveway (CN = 98) and pervious areas (CN =39 for grass and CN = 30 for woods). The resulting storm-water rates and volumes generated for the pre-development conditions (see Appendix "C" & Pre-Development Drainage Area Map, Appendix "G"), is shown in the table on the next page.

	DA #1	DA #2	DA #3	DA #4
Area (SF)	7247	39472	37279	5931
Curve Number	39	47	44	47
Time of Concentration (min)	6.5	7.2	9.1	6.6
2 Year Rate (cfs)	0.00	0.02	0.01	0.00
25 Year Rate (cfs)	0.01	0.40	0.21	0.06
100 Year -Rate (cfs)	0.26	2.51	1.83	0.39

## POST-DEVELOPMENT DRAINAGE CONDITIONS

The proposed stormwater management for this project has been designed to meet NJDEP storm water management requirements for “major development”. The project involves the construction of a one (1)-story house of worship with basement at the project site. The proposed building footprint will be 80 ft x 50 ft and it will be constructed on the west side of the existing one (1) story single-family residence currently on site. The church sanctuary will be physically connected to the existing house (garage section), and the existing house will be converted to religious office spaces and ancillary uses.

Site improvements include the construction of a 64-space parking lot including three (3) handicap accessible parking spaces, installation of concrete curb and sidewalk, and construction of a 14’ x 14’ trash enclosure. An infiltration basin has been proposed to meet the storm-water management requirements of the NJDEP, Freehold Soil Conservation District and Neptune Township. This basin will be located north of the proposed sanctuary and behind the existing dwelling. A pre-formed scour hole is proposed downstream of the infiltration basin to account for emergency overflow from the infiltration basin. The proposed storm system discharging to the infiltration basin will consist primarily of reinforced concrete culvert pipes (15”-24”) and associated drainage inlets. Roof leaders from the church building will connect to HDPE and PVC pipes. These pipes will tie into the main storm sewer system.

The proposed drainage areas to the infiltration basin is shown on the Post -development Drainage Area Map in Appendix “G. This area is modeled as fourteen subcatchment areas, both detained and undetained, due to site topography and ground cover. The area consists of parking lot and driveway (CN = 98) and pervious areas (CN =39 for grass and CN = 30 for woods). The resulting storm-water rates and volumes generated for the post development conditions is included in Appendix “C” of this report and can be summarized as follows:

	DA #1	DA #2	DA #3	DA #4	DA #5	DA #6	DA #7
Area (SF)	5194	10842	3636	11746	5947	1843	5726
Curve Number	64	72	81	54	54	39	82
Time of Concentration (min)	6	6	6	6	6	6	6
2 Year Rate (cfs)	0.08	0.38	0.20	0.04	0.02	0.00	0.33
25 Year Rate (cfs)	0.25	0.89	0.40	0.35	0.18	0.00	0.65
100 Year -Rate (cfs)	0.67	2.06	0.81	1.33	0.68	0.08	1.29

	DA #8	DA #9	DA #10	DA #11	DA #12	DA #13	DA #4a
Area (SF)	4165	6623	4405	9263	3590	4473	4351
Curve Number	87	88	86	81	78	89	39
Time of Concentration (min)	6	6	6	6	6	6	6
2 Year Rate (cfs)	0.30	0.49	0.30	0.52	0.17	0.34	0.00
25 Year Rate (cfs)	0.53	0.86	0.55	1.02	0.36	0.59	0.01
100 Year -Rate (cfs)	0.99	1.59	1.04	2.05	0.76	1.08	0.16

**PROPOSED STORMWATER MANAGEMENT DESIGN**

The proposed storm-water management design consists of the construction of one (1) storm-water management infiltration basin providing 22,933 cf. of storage at elevation 43.73ft, and a preformed scour hole acting as a stable downstream discharge point.

The infiltration basin will control storm-water runoff generated by the reconstructed and new parking lot, driveways, and other site improvements. This storage is provided between elevations 38.0 and 45.00, with the 100- year water surface elevation at 43.73 ft. An emergency spillway is provided at elevation 45.00, to a preformed scour hole, located downstream of the basin.

All frequency storms up to and including the 100 yr storm will flow to the infiltration basin. A proposed onsite storm sewer system will convey storms including the 25 yr frequency storm to the infiltration basin, via open channel flow.

The resulting storm-water improvements will provide pre-treatment and reduce the rate and volume of storm-water runoff flowing from the project area.

**STORMWATER COMPLIANCE**

The proposed improvements will result in 1.86 acres of disturbance and a net increase of 0.81 acre of impervious coverage. This project falls under NJDEP’s definition of a “major development”. NJDEP requirements for groundwater recharge, water quality and low reductions are being achieved by the proposed infiltration basin. The infiltration basin will provide 80% TSS removal to the developed area, meeting the NJDEP water quality requirements.

The Flow and Volume reduction requirements are summarized below.

Flow Comp

POA	Exist	Target	Proposed	Delta
2	0.02	0.01	0.10	+0.09*
10	0.62	0.46	0.37	-0.11
100	4.92	3.93	1.30	-2.63

\*See below Volume Table

Volume Comp

POA	Exist	Prop	Delta
2	0.015	0.011	-0.004
10	0.101	0.034	-0.067
100	0.402	0.108	-0.294

### **Time for basin to drain**

For 100-year storm:

Peak Basin Elevation = 43.73 ft @ 17.80 hours

Basin at Invert Elevation 38.00 @ 53.10 hours

Basin drains in 35.3 hours

The basin infiltration rates are based on in-situ soils testing. The infiltration rate was measured at 4.5-inches per hour, See Appendix "C". A design rate of 2.25-inches per hour was used, in accordance with NJDEP Best Management Practices. This infiltration rate is in keeping with the USDA Soil designation of Lakehurst Sand, HSG A.

### **PRIMARY SPILLWAY ROUTING (ASSUMING FULL BASIN )**

The emergency spillway consists of an outlet structure with a grate at elevation 44.50. The structure discharges to an 18-inch pipe ending at a scour-hole at elevation 42.00. Assuming that the basin is in failure, with no exfiltration and the water surface at 44.50, a 100- year storm will reach a maximum elevation of 44.80, with a velocity into the scour hole of approximately 6.0 feet per second. The scour-hole as designed will attenuate this velocity and prevent downhill soil erosion.

### **SOIL EROSION & SEDIMENT CONTROL**

Soil Erosion and sediment control measures are proposed for this project based on Freehold Soil Conservation District Soil Erosion & sediment Control Standards. Silt fence and storm drain inlet protections are specified to be installed at designated locations as shown on sheet 9 of the Site Plan documents. A stabilized construction access (min length 50 ft) is shown at the proposed access point for construction activities. The Freehold Soil Conservation District Standard General Notes are included on Sheets 9 & 10 of the Site Plan documents, along with construction details and notes.

### **ON SITE STORM SEWER COMPUTATIONS**

Storm sewer capacity calculations were done using Manning's Equation for open channel flow. An "n" value of 0.013 was utilized for reinforced concrete pipe. A tabular layout of the storm sewer calculation is included in Appendix "E". The calculations in Appendix "E" show that the proposed on-site storm sewer system has the design capacity to convey the 25-year storm runoff for the proposed improvements.

### **CONCLUSIONS**

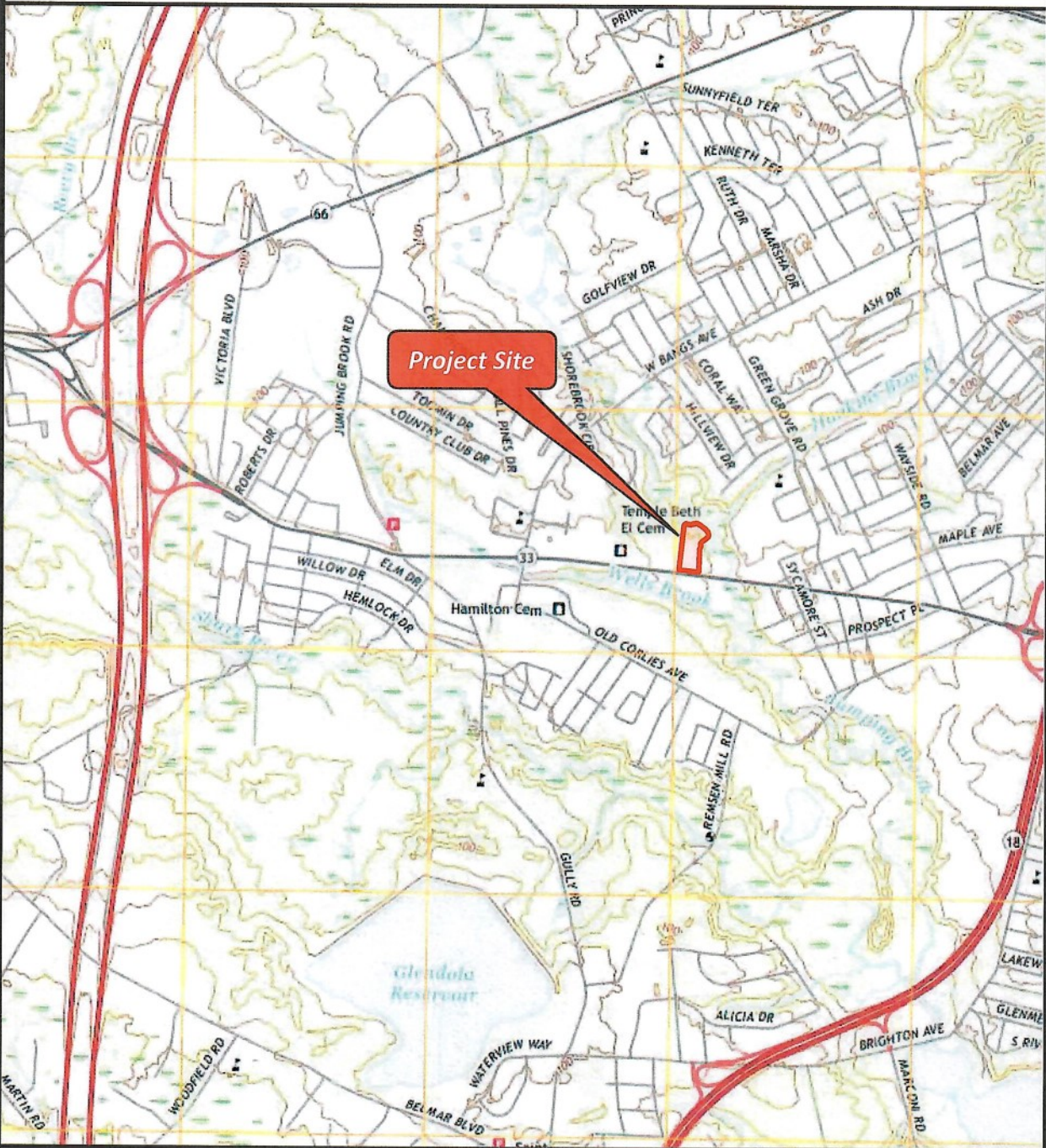
The proposed infiltration basin has been designed to address the NJDEP stormwater management requirements. All flow reductions requirements and TSS removal will be addressed with the planned improvements. The onsite storm sewer system is designed to convey the 25 yr frequency storm as discussed herein and as shown in the calculations included in appendix "E" of this report.



**APPENDIX A**

FIGURE 1 – PROJECT LOCATION MAP

### Project Location Map



**NJ State Plane Coordinates: 612,020 feet (E), 501,471 feet (N)**

**Map Source: USGS 7.5-Minute Series, Asbury Park, NJ Quadrangle (2019)**

**APPENDIX B**

**SOILS MAP, SOILS DESCRIPTION &  
SOIL INVESTIGATION REPORT**

## Soils Map



### Legend

HumAt – Humaquepts, 0 to 3 percent slopes, frequently flooded  
LakB – Lakehurst sand, 0 to 5 percent slopes

*Map Source: USDA NRCS Web Soil Survey (2020)*

## Monmouth County, New Jersey

### LakB—Lakehurst sand, 0 to 5 percent slopes

#### Map Unit Setting

*National map unit symbol:* 4j88  
*Elevation:* 20 to 150 feet  
*Mean annual precipitation:* 28 to 59 inches  
*Mean annual air temperature:* 46 to 79 degrees F  
*Frost-free period:* 161 to 231 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Lakehurst and similar soils:* 85 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Lakehurst

##### Setting

*Landform:* Dunes, flats  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Convex, linear  
*Parent material:* Sandy fluviomarine deposits

##### Typical profile

*O<sub>i</sub> - 0 to 2 inches:* slightly decomposed plant material  
*A - 2 to 4 inches:* sand  
*E - 4 to 18 inches:* sand  
*B<sub>h</sub> - 18 to 32 inches:* sand  
*BC - 32 to 45 inches:* sand  
*C - 45 to 54 inches:* sand  
*C<sub>g</sub> - 54 to 80 inches:* sand

##### Properties and qualities

*Slope:* 0 to 5 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Moderately well drained  
*Runoff class:* Very high  
*Capacity of the most limiting layer to transmit water (K<sub>sat</sub>):* High to very high (2.00 to 19.98 in/hr)  
*Depth to water table:* About 18 to 42 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water capacity:* Low (about 4.7 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 4w  
*Hydrologic Soil Group:* A  
*Hydric soil rating:* No

## Minor Components

### Quakerbridge

*Percent of map unit:* 5 percent  
*Landform:* Knolls, flats  
*Landform position (three-dimensional):* Interfluve  
*Down-slope shape:* Convex, linear  
*Across-slope shape:* Linear  
*Hydric soil rating:* No

### Atsion, rarely flooded

*Percent of map unit:* 5 percent  
*Landform:* Flats, depressions  
*Landform position (two-dimensional):* Toeslope, footslope  
*Landform position (three-dimensional):* Base slope, dip, talf  
*Down-slope shape:* Linear, concave  
*Across-slope shape:* Linear, concave  
*Hydric soil rating:* Yes

### Berryland, rarely flooded

*Percent of map unit:* 5 percent  
*Landform:* Flats, depressions, drainageways  
*Landform position (two-dimensional):* Toeslope  
*Landform position (three-dimensional):* Base slope  
*Down-slope shape:* Linear, concave  
*Across-slope shape:* Linear, concave  
*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: Monmouth County, New Jersey  
Survey Area Data: Version 14, Jun 1, 2020

## Monmouth County, New Jersey

### HumAt—Humaquepts, 0 to 3 percent slopes, frequently flooded

#### Map Unit Setting

*National map unit symbol:* 1j1jd  
*Elevation:* 0 to 300 feet  
*Mean annual precipitation:* 28 to 59 inches  
*Mean annual air temperature:* 46 to 79 degrees F  
*Frost-free period:* 161 to 231 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Humaquepts, frequently flooded, and similar soils:* 85 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Humaquepts, Frequently Flooded

##### Setting

*Landform:* Flood plains  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Loamy alluvium

##### Typical profile

*A - 0 to 18 inches:* loam  
*C - 18 to 60 inches:* sand

##### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Drainage class:* Poorly drained  
*Runoff class:* Negligible  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.20 to 6.00 in/hr)  
*Depth to water table:* About 0 to 12 inches  
*Frequency of flooding:* FrequentNone  
*Frequency of ponding:* Frequent  
*Available water supply, 0 to 60 inches:* Moderate (about 7.2 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 5w  
*Hydrologic Soil Group:* A/D  
*Hydric soil rating:* Yes

### Minor Components

#### **Manahawkin, frequently flooded**

*Percent of map unit:* 5 percent

*Landform:* Flood plains

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Hydric soil rating:* Yes

#### **Mullica, occasionally flooded**

*Percent of map unit:* 5 percent

*Landform:* Flood plains, depressions, drainageways

*Landform position (two-dimensional):* Toeslope

*Landform position (three-dimensional):* Base slope

*Down-slope shape:* Linear, concave

*Across-slope shape:* Linear, concave

*Hydric soil rating:* Yes

#### **Atsion**

*Percent of map unit:* 5 percent

*Landform:* Flats

*Landform position (two-dimensional):* Footslope

*Landform position (three-dimensional):* Dip, talf

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: Monmouth County, New Jersey

Survey Area Data: Version 16, Aug 30, 2022





**CONSULTANTS, INC.**  
 4405 South Clinton Avenue  
 South Plainfield, NJ 07080

**Tel: (800) 545-ATUL**  
**(908) 754-8383**  
**Fax: (908) 754-8633**

NJ EDA Approved Testing Laboratory • MBE/DBE Certified • NJ DEP Certified  
[www.ANSConsultants.net](http://www.ANSConsultants.net)

Soil, Concrete, Masonry, Rebar, Asphalt, Structural Steel, Precast, Piles, Caissons, Fire-proofing, Roofing, Soil Boring, Concrete/Rock Coring, UST Removal, Environmental Testing & Reports

March 08, 2021

B & G Engineering LLC  
 30 Bernard Dr  
 Ewing, NJ 08628

Attn: Mr. Besrick Plummer  
 President

Re: Subsurface Soil Investigation Report  
 Proposed Infiltration Basin  
 3313 Corlies Avenue  
 Township of Neptune  
 Monmouth County, NJ  
 Block # 3301, Lot # 4

Dear Mr. Plummer,

Enclosed, please find three (3) copies of the the Subsurface Soil Investigation and Foundation Recommendation report for two (2) soil borings and one (1) field percolation test performed on February 17, 2021 at the project referenced above.

Soil samples collected during the subsurface soil investigation program will be discarded after thirty (30) days from the date of this report, if not requested in advance to do otherwise. We thank you very much for providing us an opportunity to service you on this project.

Should you have any question or require additional information, please do not hesitate to contact the undersigned at (908)754-8383.

Sincerely,  
 ANS Consultants, Inc.

Atulkumar N. Shah, PE  
 President  
 New Jersey PE License # 24GE03443900  
 ANS / RM

Copy to: B & G Engineering LLC- (3), file- (1)

File: ANX-5349\_01.SB

## TABLE OF CONTENT

	<u>Page No.</u>
SCOPE OF SERVICES.....	01
PROPOSED CONSTRUCTION.....	01
SITE CONDITIONS.....	01
FIELD INVESTIGATION.....	02
SOIL BORING.....	02
FIELD PERCOLATION TEST.....	02
LABORATORY TESTING.....	03
SUBSURFACE CONDITIONS.....	03
SUMMARY OF FINDINGS.....	04
GROUNDWATER.....	05
SEASONAL HIGH-WATER TABLE.....	05
CONCLUSIONS & RECOMMENDATIONS.....	05
RECOMMENDED SERVICES.....	05
LIMITATIONS.....	05-06
APPENDIX - A.....	07
GOOGLE MAP.....	08
TOPO QUAD.....	09
SOIL BORING & PERCOLATION TEST LOCATION PLAN.....	10
SOIL BORING LOGS: B-1 & B-2.....	11-12
FIELD PERCOLATION TEST REPORT.....	13-14
SOIL CLASSIFICATION.....	15
APPENDIX - B.....	16
SIEVE ANALYSIS REPORT, SAMPLE # 1 & # 2.....	17-18
APPENDIX - C.....	19
PHOTOGRAPHS.....	20-24



**CONSULTANTS, INC.**  
 4405 South Clinton Avenue  
 South Plainfield, NJ 07080

**Tel: (800) 545-ATUL**  
**(908) 754-8383**  
**Fax: (908) 754-8633**

NJ EDA Approved Testing Laboratory • MBE/DBE Certified • NJ DEP Certified  
[www.ANSconsultants.net](http://www.ANSconsultants.net)

Soil, Concrete, Masonry, Rebar, Asphalt, Structural Steel, Precast, Piles, Caissons, Fire-proofing, Roofing, Soil Boring, Concrete/Rock Coring, UST Removal, Environmental Testing & Reports

March 08, 2021

B & G Engineering LLC  
 30 Bernard Dr  
 Ewing, NJ 08628

Attn: Mr. Besrick Plummer  
 President

Re: Subsurface Soil Investigation Report  
 Proposed Infiltration Basin  
 3313 Corlies Avenue  
 Township of Neptune  
 Monmouth County, NJ  
 Block # 3301, Lot # 4

Dear Mr. Plummer,

Enclosed, please find three (3) copies of the Subsurface Soil Investigation and Foundation Recommendation report for two (2) soil borings and one (1) field percolation test performed on February 17, 2021 at the project referenced above. The work was performed as per our signed proposal dated February 11, 2021.

Our **Scope of Services** included the following:

1. Drilling and full-time inspection of two (2) soil borings down to maximum 17'-0" depth or to refusal, whichever comes first, including recording of groundwater level and also seasonal high-water table if encountered.
2. Perform field percolation test in one of the soil boring location.
3. Preparation of a written report summarizing all findings and recommendations.

**PROPOSED CONSTRUCTION:**

The project site is located at 3313 Corlies Avenue, Township of Neptune, NJ in Monmouth County. At present, the subject site consists of a 1½ story dwelling. We understand that the borings and field percolation test were conducted for the proposed Infiltration storm drain system at the subject site. The soil borings and the field percolation test were performed towards rear of the subject property. Please see soil boring & percolation test location plan in Appendix-A and photographs in Appendix-C for more details.

**SITE CONDITIONS:**

The subject site is located towards north side of Corlies Avenue. Primarily the subject site is located in residential & commercial surroundings. At the time of soil boring work, the site was noted to be fairly leveled. The subject site is located at latitude of N 40° 12' 34.93" and Longitude of W 74° 04' 13.97". As per the DeLorme Topo Quad Map the subject site is at the elevation of 37 feet above mean sea level. Please, see site location plan in Appendix-A and Photographs in Appendix-C for more details.

**FIELD INVESTIGATIONS:**

**SOIL BORING:**

Soil Boring locations were marked by the ANS field representative as per the proposed location Plan provided by the client and based upon the equipment access. Sub-Surface utility mark-out was performed by New Jersey-One call System. Once, cleared the soil boring work began on February 17, 2021.

Two (2) soil borings, B-1 and B-2 were drilled during the geo-technical investigation at the site on February 17, 2021. Both the borings were performed at the location shown in Soil Boring & Field Percolation Location Plan included in Appendix-A. The soil boring work was performed under the direction and supervision of our field Engineer Mr. Syed Abbas. Drilling work was performed using an Acker Track-Rig XLS with hollow stem auger. As per the drawing provided by the client, the ground contour elevation was noted to be 44.50' which is the starting elevation for the borings. Soil samples were collected continuously down to 18 feet depth in boring B-1 and down to 20 feet depth in boring B-2. Soil samples were extracted using a 2" diameter split spoon sampler as the sampling procedure specified in ASTM 1586-99.

Samples were obtained by the Standard Penetration Test (SPT) Method (ASTM D 1586), which consists of driving a 2-inch outside-diameter split-spoon sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler was driven in four successive 6-inch increments, with the number of blows per increment being recorded. The number of blows required to advance the sampler the middle 12 inches is termed the Standard Penetration Resistance (N-value) and is presented on the Field Test Boring Logs in Appendix-A.

During drilling operations, extracted soil samples were visually examined and classified by our Field Engineer. The soil sample description, Standard Penetration Resistance Test (SPT) blow counts and locations, strata changes, groundwater depth and other pertinent information were recorded on a detailed field log. Soil samples obtained at the SPT locations were visually classified according to the Unified Soil Classification System (USCS). Samples were later returned to our laboratory for further review and testing.

**FIELD PERCOLATION TEST:**

One (1) field percolation test was performed on February 17, 2021 at a location shown on the attached location plan. Test was performed by drilling a hole at location using augurs to test depth and installing a 2" diameter PVC pipe. Bottom of pipe was secured at test depth and pipe was filled to top with water. Ground at test depth was saturated for 2 hours by refilling PVC pipe again and again whenever its level dropped down from top. After 2 hours of saturation, refilling of pipe was ceased and drop in water level was recorded for every 15 minutes interval.

1. Depth of test: 7'- 6" below existing ground elevation.
2. Water was filled to top of PVC pipe at 1:16p.
3. Two (2) hours saturation time ended at 3:16p.
4. Water was levelled off to top of pipe at 3:16p and drops in water level at 15 minutes interval were recorded.

Sr. No.	Time	Drop in Water Level	Remarks	Percolation Rate per Hour
1.	3:16 pm	Water was filled to top of PVC pipe.		

2.	3:31 pm	1 1/4"		5"
3.	3:31 pm		Refilled	
4.	3:46 pm	1 1/4"		5"
5.	3:46 pm		Refilled	
6.	4:01 pm	1 1/8"		4 1/2"
7.	4:01 pm		Refilled	
8.	4:16 pm	1 1/8"		4 1/2"
9.	4:16 pm		Refilled	
10.	4:31 pm	1 1/8"		4 1/2"
11.	4:31 pm		Refilled	
12.	4:46 pm	1 1/16"		4 1/4"
13.	4:46 pm		Refilled	
14.	5:01 pm	1 1/16"		4 1/4"
15.			Refilled	
16.	5:16 pm	1 1/16"		4 1/4"

$$\begin{aligned}
 \text{Average Percolation per Hour} &= \frac{2 \times 5'' + 3 \times 4 \frac{1}{2}'' + 3 \times 4 \frac{1}{4}''}{8} \\
 &= \frac{36 \frac{1}{4}''}{8} \\
 &= 4.53125''
 \end{aligned}$$

**LABORATORY TESTING:**

Two (2) soil samples, one each from borings B-1 and B-2 were laboratory tested to determine in-place moisture content and to classify the soil as per Unified Soil Classification System ASTM-D2487-93. The test results are summarized below and a complete Laboratory test results are included in Appendix-B.

Soil Boring No.	Soil Sample No.	Depth collected	Moisture Content (%)	Fines thru #200 Sieve	USCS Symbol
B-1	S-1	4' - 6'	10.2	18.2	SM
B-2	S-2	2' - 4'	7.6	8.3	SP-SM

SM: Silty Sands SP- SM: A mixture of Poorly Graded sands and Silty Sands

**SUBSURFACE CONDITIONS:**

A detailed description of the soil encountered during soil boring activities is documented in the summary table below. The following gives a general description of the subsurface conditions encountered. While the sampled area may indicate that the subsurface conditions appeared to be relatively uniform across the site, it should be recognized that the size of the sampled area was quite small compared to the size of the site, and that the existence of anomalies cannot be precluded.

According to NJ Geoweb website, the geological formation is upper stream terrace deposits and geologic age is middle to late Pleistocene. It consists of sand and pebble gravel, minor silt and cobble gravel; yellow, reddish yellow, yellowish brown. As much as 20 feet thick.

Based on the results of soil borings and our geo-technical laboratory testing, we estimate the general stratigraphy of the site to consist of the following major units, in an increasing order of depth.

**Stratum 1:** Fill material containing gray-black and grayish brown/black silt, trace fine gravel, trace fine roots & grayish brown silty fine sand, trace f/c gravel, some fragments of concrete, trace fragments of wood & dark gray-black/yellowish-orange f/c sand, trace silt, some f/c gravel, yellowish-orange clay/dark gray orange clayey silt was noted in top 8' in boring B-1 and down to 16' in boring B-2.

**Stratum 2:** Very dark gray-black silt, trace f/m sand, trace fine gravel was noted between 10' to 12' in only boring B-1.

**Stratum 3:** Gray-dark gray & orange clayey silt/dark gray clay trace fine sand, trace f/c gravel was noted between 12 feet to 18 feet in only boring B-1.

**Stratum 4:** Very dark gray sandy silt, trace coarse gravel and dark gray f/c sand and fine gravel, trace silt, trace fragments of clay was noted between 18' to 20' depth in only boring B-2.

**SUMMARY OF FINDINGS:**

Boring Number	Depth in (feet)	Penetration Resistance N-Value	Soil Type	In-Place Soil Bearing Capacity (PSF)	Recommended Safe Soil Bearing Capacity (PSF)
B-1	0-2	12	FILL	2400	1500
B-1	2-4	6	FILL	1200	1500
B-1	4-6	7	FILL	1400	1500
B-1	6-8	31	FILL	+5000	1500
B-1	8-10	11	FILL	2200	1500
B-1	10-12	2	SM-ML	400	1000
B-1	12-14	5	CL-ML	1000	1000
B-1	14-16	5	CL-ML	1000	1000
B-1	16-18	8	CL	1600	1500

Boring Number	Depth in (feet)	Penetration Resistance N-Value	Soil Type	In-Place Soil Bearing Capacity (PSF)	Recommended Safe Soil Bearing Capacity (PSF)
B-2	0-2	16	FILL	3200	2000
B-2	2-4	9	FILL	1800	2000
B-2	4-6	25	FILL	5000	2000
B-2	6-8	16	FILL	3200	2000
B-2	8-10	10	FILL	2000	2000
B-2	10-12	20	FILL	4000	2000
B-2	12-14	16	FILL	3200	2000
B-2	14-16	19	FILL	3800	2000
B-2	16-18	5	No	1000	1000
B-2	18-20	10	SP-SM	2000	2000

**GROUNDWATER:**

Groundwater was encountered at 9'-4" in boring B-1 (at elevation +34.00') and at 9'-9" in boring B-2 (at elevation +34.25') below existing grade surface. It should be noted that groundwater level will fluctuate due to variations in rainfall or other factors not evident at the time of our investigation.

**SEASONAL HIGH WATER TABLE:**

Due to fill material noted in both borings, mottling or Seasonal High water table was not noted in both borings.

**CONCLUSIONS & RECOMMENDATIONS:**

1. Groundwater was encountered at 9'-4" in boring B-1 and at 9'-9" in boring B-2 below existing grade surface. Consequently, we anticipate that groundwater management during construction will be critical if any excavation for utility will be placed below this level.
2. Fill was noted in top 8' in B-1 and down to 16' in B-2. The majority of on-site soil consisted of clayey-silt/clay with trace fine sand & f/c gravel in boring B-1 and sandy silt with trace coarse gravel in boring B-2. On site soil will be unsuitable as structural fill. Depending upon the time of the year when the actual construction takes place, drying of excavated soil and aeration may be required to reduce the moisture content. In-situ moisture content of soil varied in between 7.6 % to 10.2 % which is generally considered moist.
3. The safe soil bearing capacity in top 8 feet was noted between 1,500 PSF to 2,000 PSF in B-1 and B-2. We recommend utilizing 1,500 lbs/sq.ft in-place soil bearing capacity to design any footings for the structures.
4. Field percolation rate was noted to be 4.53125 inch/hr.
5. All fill material shall be placed in lifts on the order of twelve (12) inches in loose thickness and be uniformly compacted to at least 95% of its maximum dry density as determined by the modified proctor density values derived based upon ASTM D-1557-93 test procedure. In addition, we recommend that backfill soils placed in confined areas, such as foundation or utility excavations, to be spread in lifts on the order of six to eight inches in loose thickness and be compacted to the same degree using manually operated vibratory compaction equipment.

Soil Unit weight (total):	110 pcf
Angle of Internal Friction:	28 degrees
Coefficient of sliding friction:	0.4
Coefficient of active earth pressure:	0.28
Coefficient of passive earth pressure:	3.57

**RECOMMENDED SERVICES:**

It is recommended that we should be retained to provide continuous observation and Soil Engineering services during the excavation and foundation construction phases of the work. This is to observe compliance with the design concepts, specifications and recommendations, and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

**LIMITATIONS:**

The recommendations contained in this report are our best professional judgment as to be

followed in the design and construction of the proposed project based on the subsurface information, plans and criteria referred to in this report. There may be subsurface conditions not disclosed by the explorations adequately identify subsurface conditions for the purpose of this study. If changes in location or character of this project are subsequently amended or if, during construction any differences are found between the report of the explorations and the actual subsurface conditions, they should be brought to our attention immediately so that the effect on our recommendations can be evaluated.

This report has been prepared in accordance with generally accepted Geotechnical Engineering practices for the exclusive use of B & G Engineering LLC and their designated representative (s). No other warranty, express or implied is made. Contractor's wishes to use the soil boring information may do at their own risk. Unless specifically indicated to the contrary in this report, this report does not address environmental considerations, which may affect the site development. The conclusions and recommendations of this report are not intended to supersede or overlook any NJDEP and Federal Environmental rules and regulations, which should be reflected in the site planning.

Should you have any questions or require additional information, please, do not hesitate to contact the undersigned at (908)754-8383.

Sincerely,  
ANS Consultants, Inc.



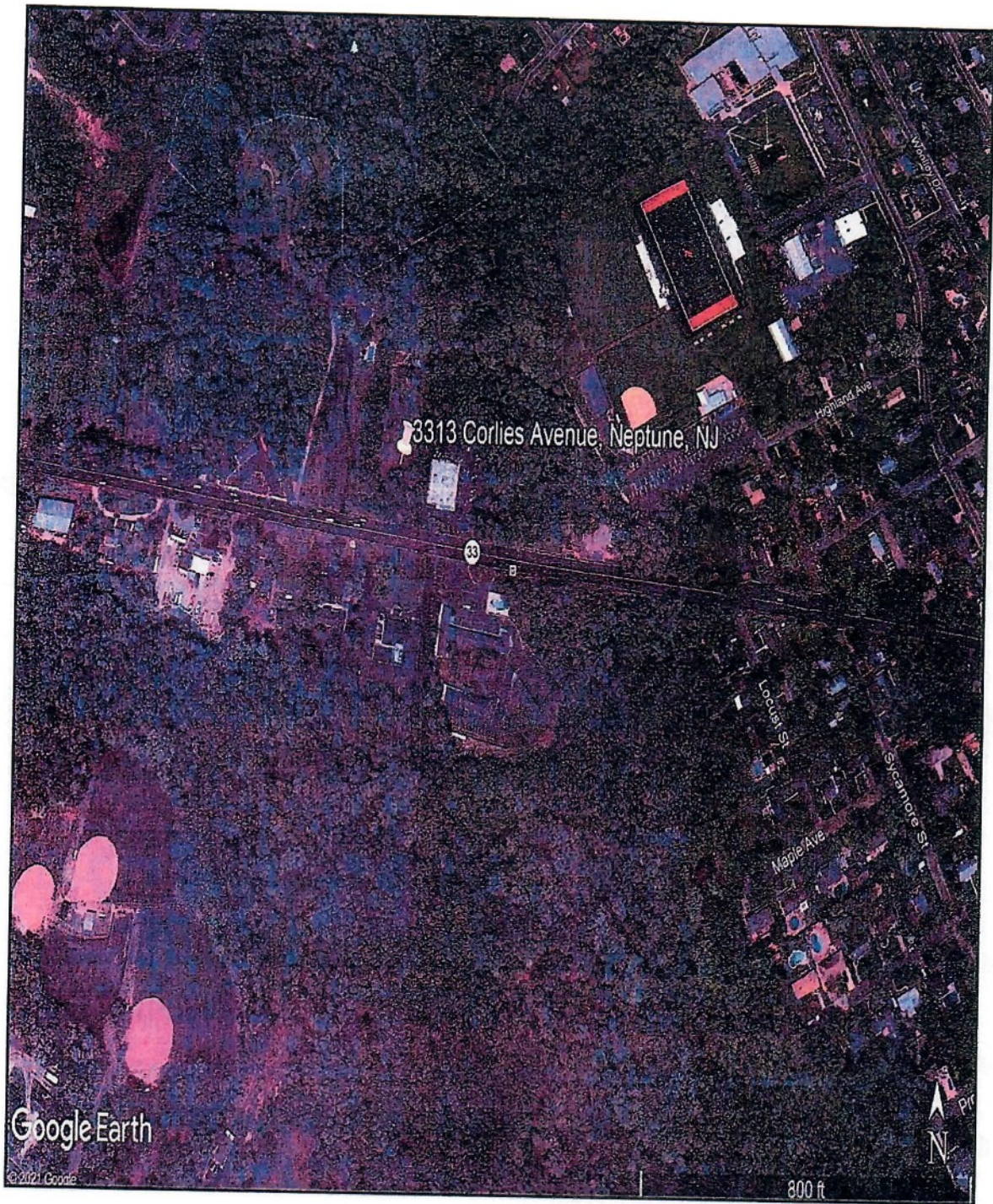
Atulkumar N. Shah, PE  
President  
New Jersey PE License # 24GE03443900  
ANS / RM

Copy to: B & G Engineering LLC- (3), file- (1)



# Appendix-A

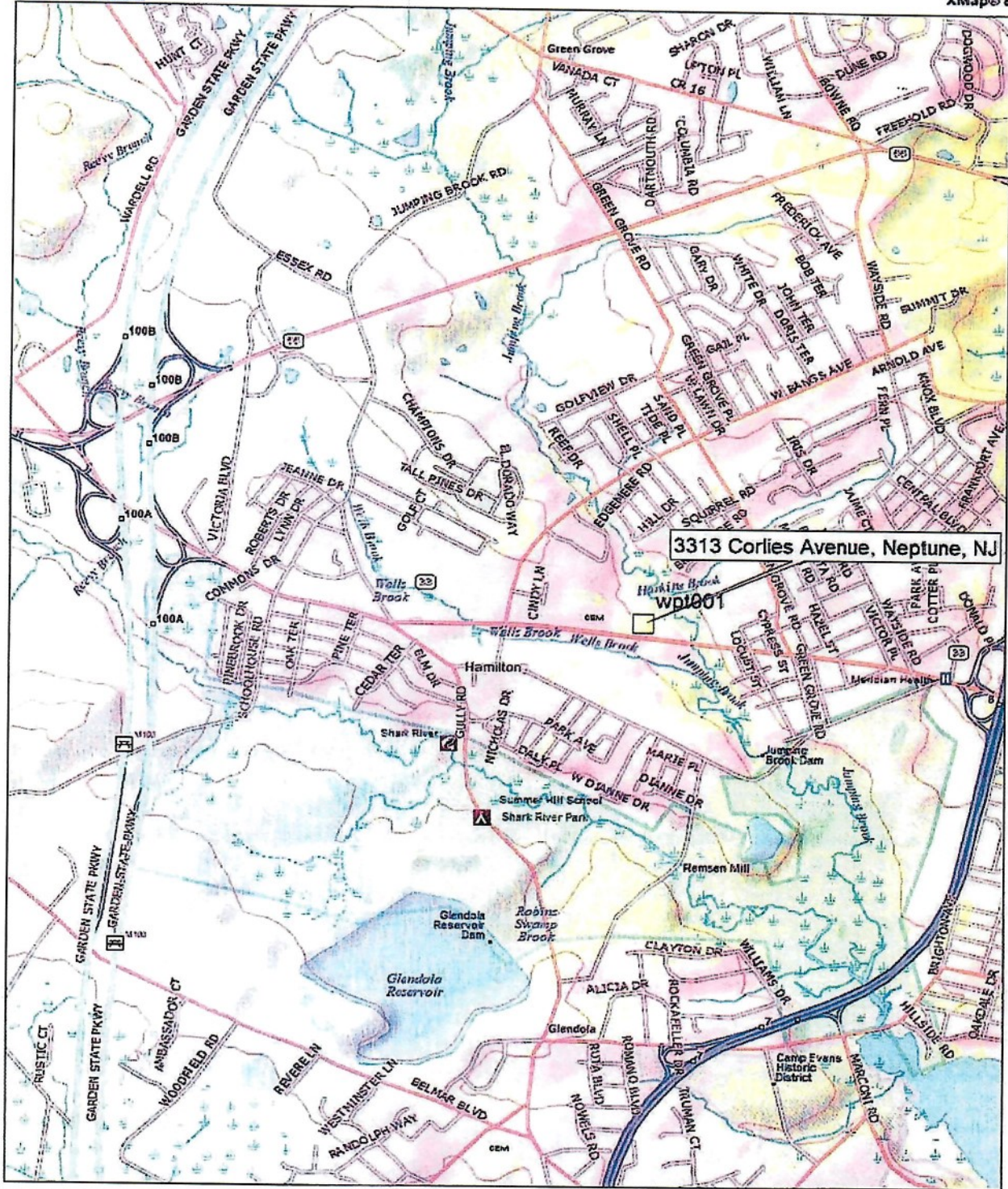
GOOGLE MAP



**Client:** B & G Engineering, LLC  
**Project:** 3313 Corlies Avenue  
Twp of Neptune, Monmouth County NJ



**CONSULTANTS, INC.**  
4405 South Clinton Avenue  
South Plainfield, NJ 07080

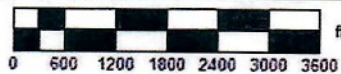


3313 Corlies Avenue, Neptune, NJ

Data use subject to license

© DeLorme XMap® 8

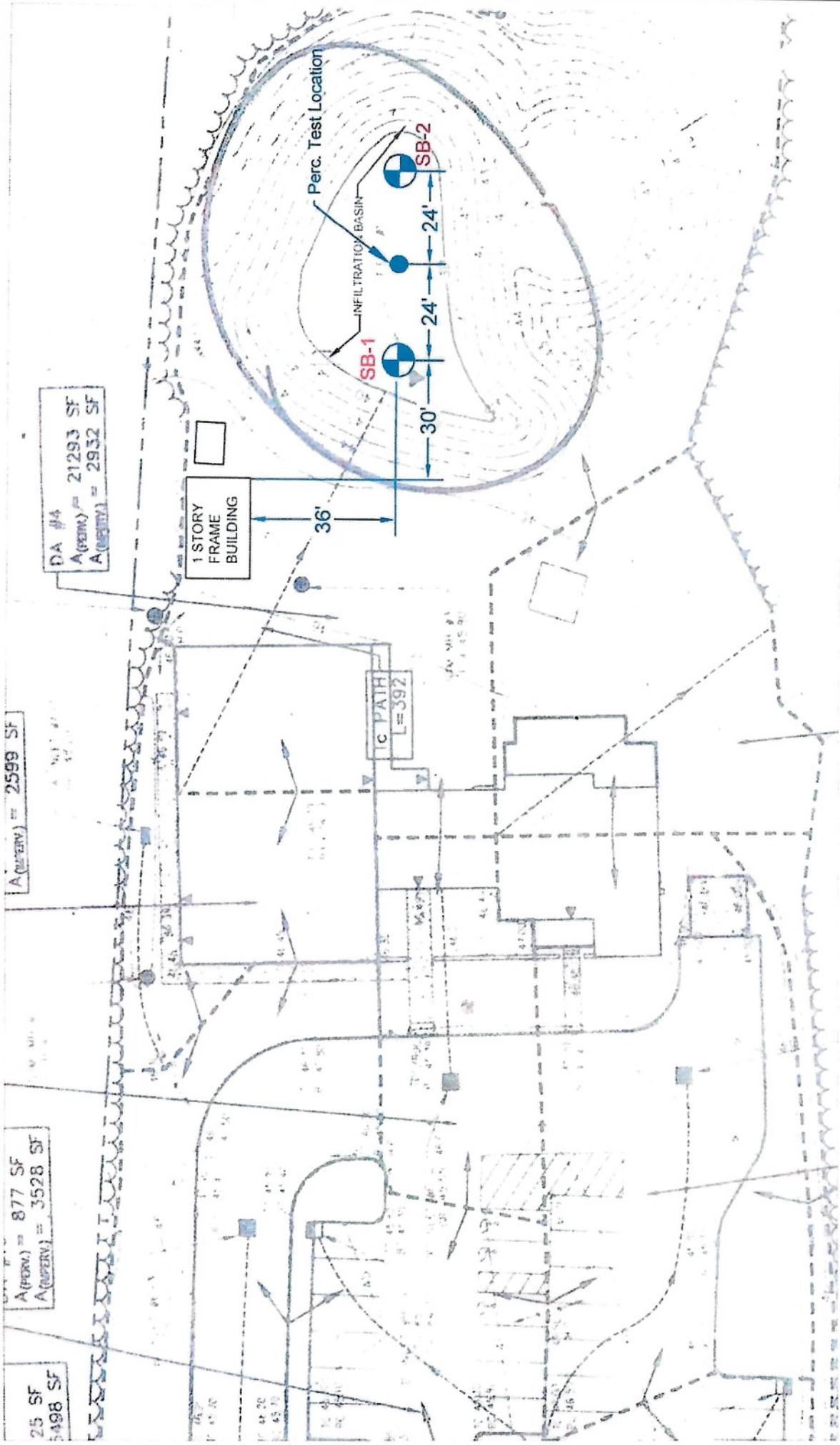
www.delorme.com



Data Zoom 13-0

**SITE LOCATION MAP**  
 3313 Corlies Ave, Twp of Neptune, NJ

**ANS** CONSULTANTS, INC.  
 4405 South Clinton Avenue  
 South Plainfield, NJ 07080



DA #4  
 A (PERM) = 21293 SF  
 A (REV) = 2932 SF

1 STORY  
 FRAME  
 BUILDING

Perc. Test Location

INFILTRATION BASIN

SB-1

SB-2

36'

30'

24'

24'

A (REV) = 2599 SF

A (PERM) = 877 SF  
 A (REV) = 3528 SF

25 SF  
 5498 SF

IC PATH  
 L=392

**SOIL BORING LOCATION PLAN**  
 SCALE: N.T.S.

**LEGEND:**  
 Soil boring location

CLIENT: B&G Engineering, LLC
PROJECT: 3313 Corlies Ave, Neptune Twp. NJ
ANS CONSULTANTS INC.
4405 SOUTH CLINTON AVE
SO. PLAINFIELD, NJ, 07080
PHONE: (908) 754 8383 FAX: (908) 754 8633
BY: Dharmin Parekh DATE: 3/2/2021
Project No: ANX-5349

Client: B & G Engineering, LLC

Project: 3313 Corlies Avenue, Neptune, NJ

**Report of Testpit / Soil Boring**

**TP -1 /B-1**

S. No.	Depth	N-Value	Recovery	Description of Soil
1.	0 - 2'	12	20"	Fill: 1. Top soil: 1" 2. Top 12": Gray black and grayish brown silt, trace fine gravel, trace fine roots, moist. 3. Bottom 7": Grayish brown silty fine sand, trace f/m gravel, moist.
2.	2' - 4'	6	5"	Fill: Dark gray silty fine sand, trace f/c gravel, moist.
3.	4' - 6'	7	10"	Fill: Dark gray and grayish brown silty fine sand, trace fine gravel, moist.
4.	6' - 8'	31	9"	Fill: Dark gray and grayish brown silty fine sand, trace fine gravel, some fragments of concrete, trace fragments of wood, moist.
5.	8' - 10'	11	11"	Fill: Dark gray silty fine sand and fragments of concrete, trace fine gravel, moist.
6.	10' - 12'	2	6"	Virgin Soil: Very dark gray-black silt, trace f/m sand, trace fine gravel, wet.
7.	12' - 14'	5	11"	Gray-dark gray and orange clayey silt, trace fine sand, trace fine gravel, wet.
8.	14' - 16'	5	24"	Gray-dark gray and yellowish orange clayey silt, trace f/c gravel, wet.
9.	16' - 18'	8	10"	Dark gray clay, moist.

Ground water @ 9'-4"

Client: B & G Engineering, LLC

Project: 3313 Corlies Avenue, Neptune, NJ

TP -2 /B-2

S. No.	Depth	N-Value	Recovery	Description of Soil
1.	0 - 2'	16	20"	Fill: Dark gray-black silt, trace fine sand, trace f/c gravel, trace roots, trace fragments of concrete (bottom of spoon), moist.
2.	2' - 4'	9	7"	Fill: Dark gray-black f/c sand, trace silt, some f/c gravel, moist.
3.	4' - 6'	25	10"	Fill: Yellowish-orange clay and fragments of concrete, some silt, some f/m gravel, moist.
4.	6' - 8'	16	13"	Fill: Dark gray-orange clayey silt, some fragments of concrete, some f/m gravel, s/wet.
5.	8' - 10'	10	10"	Fill: Gray f/c sand and fine gravel, trace silt, some fragments of concrete, s/moist.
6.	10' - 12'	20	12"	Fill: Gray-black and yellowish-orange f/c sand, trace silt, some fine gravel, some fragments of concrete, s/moist.
7.	12' - 14'	16	11"	Fill Top 8": Dark gray f/c sand, trace silt, some f/c gravel, trace fragments of concrete, wet. Fill Bottom 3": Grayish orange f/c sand and fine gravel, trace silt, wet.
8.	14' - 16'	19	17"	Fill: Top 11": Black and orange f/c sand, trace silt, some f/m gravel, trace fragments of concrete, wet. Fill Bottom 6": Black and brown fragments of wood, wet.
9.	16' - 18'	5	NR	
10.	18' - 20'	10	21"	Virgin Soil top 13": Very dark gray sandy silt, trace coarse gravel, wet. Bottom 8": Dark gray f/c sand and fine gravel, trace silt, trace fragments of clay, wet.

Ground water @ 9'-9"

Client: B & G Engineering, LLC

Project: 3313 Corlies Avenue, Neptune, NJ

## Report of Field Percolation Test

One field percolation test was performed at a location shown on attached location plan. Test was performed by drilling a hole at location using augurs to test depth and installing a 2" diameter PVC pipe. Bottom of pipe was secured at test depth and pipe was filled to top with water. Ground at test depth was saturated for 2 hours by refilling PVC pipe again and again whenever its level dropped down from top. After 2 hours of saturation, refilling of pipe was ceased and drop in water level was recorded for every 15 minutes interval.

1. Depth of perc test: 7"-6" below existing ground elevation.
2. Water was filled to top of PVC pipe at 1:16 pm.
3. Two (2) hours saturation time ended at 3:16 pm.
4. Water was levelled off top of pipe at 3:16 pm and drops in water level at 15 minutes interval were recorded.

S. No.	Time	Drop in Water Level	Remarks	Percolation Rate Per Hour
1.	3:16 pm	Water was filled to top of PVC pipe		
2.	3:31 pm	1 ¼"		5"
3.	3:31 pm		Refilled	
4.	3:46 pm	1 ¼"		5"
5.	3:46 pm		Refilled	
6.	4:01 pm	1 1/8"		4 ½"
7.	4:01 pm		Refilled	
8.	4:16 pm	1 1/8"		4 ½"
9.	4:16 pm		Refilled	
10.	4:31 pm	1 1/8"		4 ½"
11.	4:31 pm		Refilled	
12.	4:46 pm	1 1/16"		4 ¼"
13.	4:46 pm		Refilled	
14.	5:01 pm	1 1/16"		4 ¼"
15.			Refilled	

Client: B & G Engineering, LLC

Project: 3313 Corlies Avenue, Neptune, NJ

16.	5:16 pm	1 1/16"		4 1/4"
-----	---------	---------	--	--------

$$\text{Average Percolation Rate Per Hour} = \frac{2 \times 5'' + 3 \times 4\frac{1}{2}'' + 3 \times 4\frac{1}{4}''}{8}$$

$$= \frac{36\frac{1}{4}''}{8}$$

$$= 4.53125''$$



# FIELD SOIL CLASSIFICATION SYSTEM

## PARTICLE SIZE IDENTIFICATION

Boulders ..... 8 inch diameter or greater  
Cobbles ..... 3 to 8 inch diameter  
Gravel ..... Coarse -- 1 to 3 inch  
Medium -- 1/2 to 1 inch  
Fine -- 4.75 mm to 1/2 inch  
Sand ..... Coarse -- 2.0 mm to 4.75 mm  
(dia. of pencil lead)  
Medium -- 0.425 mm to 2.0 mm  
(dia. of broom straw)  
Fine -- 0.075 mm to 0.425 mm  
(dia. of human hair)  
Silt & Clay . . . Smaller than 0.075 mm

## RELATIVE PORTIONS

Descriptive Term	Percent
Trace - tr .....	1 - 10
Some - sm .....	11 - 20
Adjective - ly .....	21 - 35
And - & .....	36 - 50

## ABBREVIATIONS

Bn - Brown	
Gy - Gray	
Blk - Black	
Rd - Red	
Or - Orange	
Bl - Blue	
Lt - Light	Coarse grained - c
Dk - Dark	Medium grained - m
Multi - Multi colored	Fine grained - f

## COHESIONLESS SOIL

(Gravel, Sand, Silt and Combinations)

### DENSITY

Very Loose ..... 05 blows / ft or less  
Loose ..... 06 to 10 blows / ft  
Medium Dense ..... 11 to 30 blows / ft  
Dense ..... 31 to 50 blows / ft  
Very Dense ..... 51 blows / ft or more

### COHESIVE SOIL

(Clay Silt and Combinations)

### CONSISTENCY

Very Soft ..... 01 blow / ft or less  
Soft ..... 02 to 4 blows / ft  
Medium Stiff ..... 05 to 8 blows / ft  
Stiff ..... 09 to 15 blows / ft  
Very Stiff ..... 16 to 30 blows / ft  
Hard ..... 31 blows / ft or greater

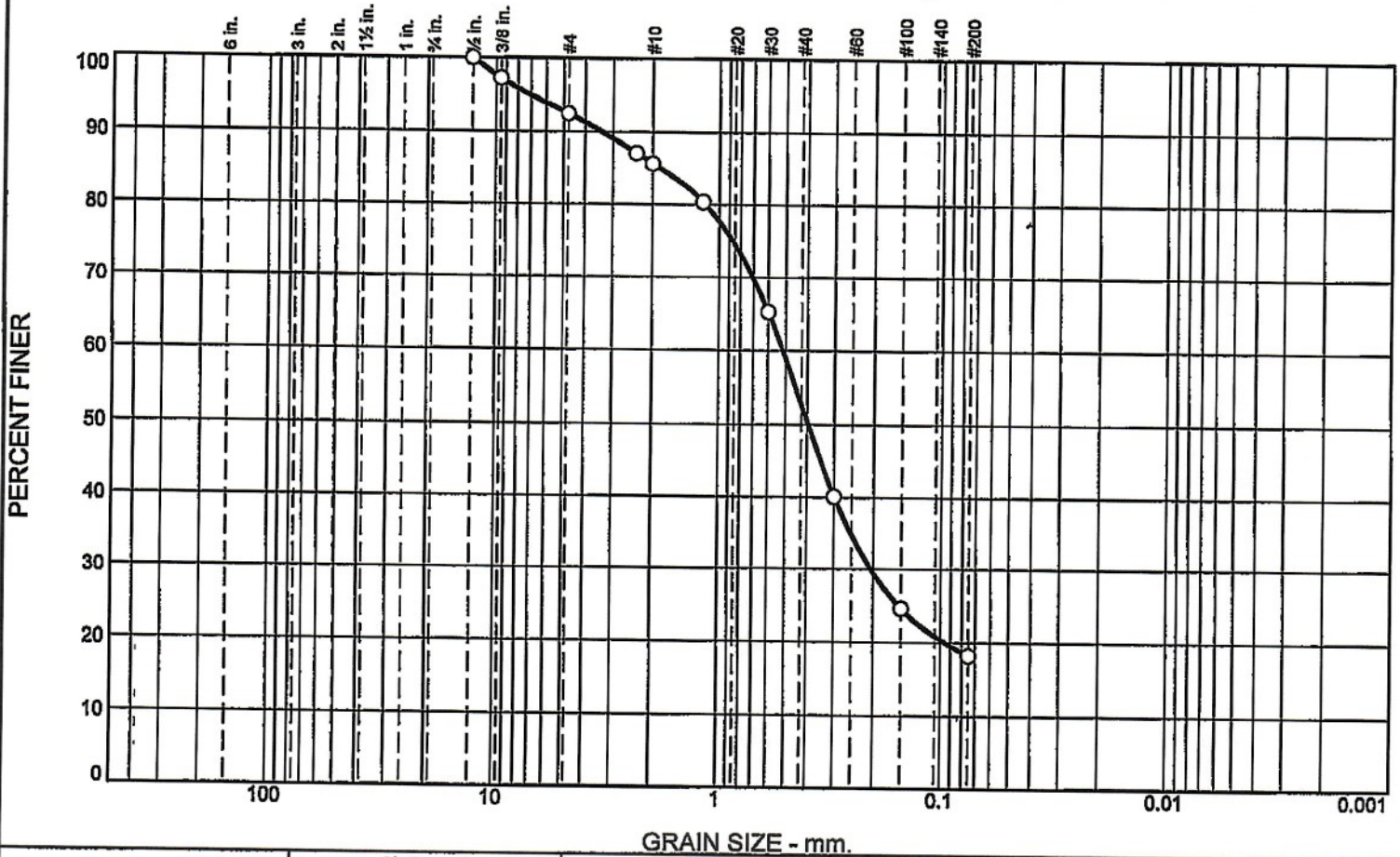
### ROCK

R.Q.D.	Rock Quality
00 - 25 .....	Very Poor
25 - 50% .....	Poor
50 - 75% .....	Fair
75 - 90% .....	Good
90 - 100% .....	Excellent

HSA - Hollow Stem Auger  
SS- Split Spoon Sampler  
WOR - Weight of Rods  
WOH - Weight of Hammer  
NR - No Recovery of Sample

# Appendix-B

# Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.6	6.7	32.9	34.6	18.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	97.3		
#4	92.4		
#8	87.1		
#10	85.7		
#16	80.4		
#30	65.2		
#50	40.1		
#100	24.6		
#200	18.2		

\* (no specification provided)

**Material Description**  
Brown in color. silty sand

**Atterberg Limits**  
PL= NP      LL= NV      PI= NP

**Coefficients**  
D<sub>90</sub>= 3.3740      D<sub>85</sub>= 1.8519      D<sub>60</sub>= 0.5156  
D<sub>50</sub>= 0.3953      D<sub>30</sub>= 0.2049      D<sub>15</sub>=  
D<sub>10</sub>=              C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
USCS= SM      AASHTO= A-2-4(0)

**Remarks**  
Sample was collected on 02/17/21 and tested on 02/25/21. In-Situ  
%MC=10.2  
F.M.=2.13

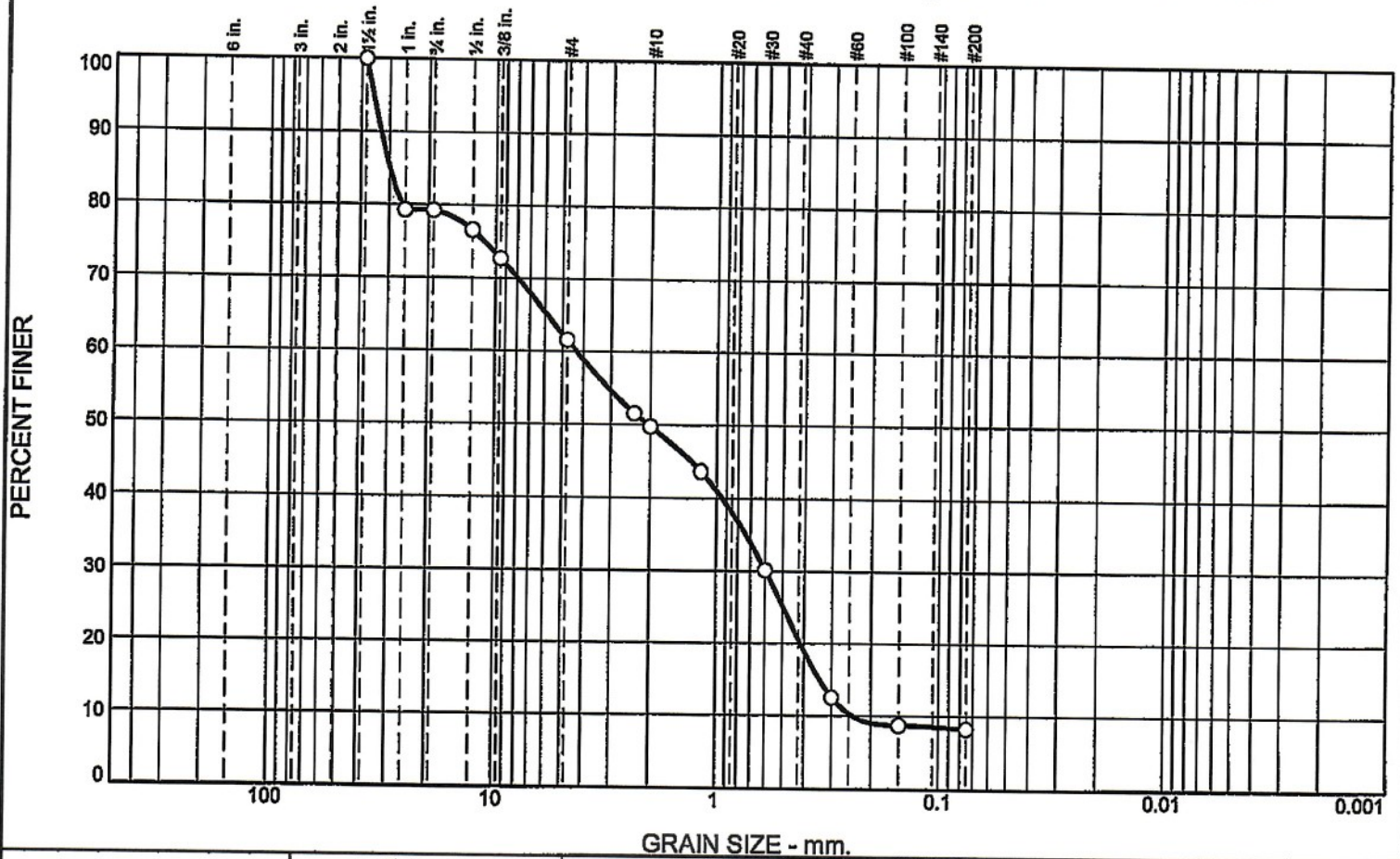
Location: B-1, 4'-6'  
Sample Number: S-1

Depth: 4'-6'

Date: 02/25/2021

<b>ANS CONSULTANTS, INC.</b> South Plainfield, New Jersey	Client: B&G Engineering LLC Project: 3313 Corlies Avenue, Township of Neptune, Block # 3301, Lot # 4
	Project No: ANX-5349      Figure 1 F 1

# Particle Size Distribution Report As per ASTM D-422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.7	17.7	11.9	29.1	12.3	8.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	79.3		
3/4	79.3		
1/2	76.6		
3/8	72.8		
#4	61.6		
#8	51.5		
#10	49.7		
#16	43.6		
#30	30.2		
#50	12.5		
#100	8.7		
#200	8.3		

**Material Description**  
Dark brown in color, poorly graded sand with silt and gravel

**Atterberg Limits**  
PL= NP      LL= NV      PI= NP

**Coefficients**  
D<sub>90</sub>= 32.6536      D<sub>85</sub>= 29.8317      D<sub>60</sub>= 4.2933  
D<sub>50</sub>= 2.0533      D<sub>30</sub>= 0.5964      D<sub>15</sub>= 0.3408  
D<sub>10</sub>= 0.2429      C<sub>u</sub>= 17.68      C<sub>c</sub>= 0.34

**Classification**  
USCS= SP-SM      AASHTO= A-1-a

**Remarks**  
Sample was collected on 02/17/21 and tested o 02/25/21. In-Situ  
%MC=7.6  
F.M.=4.40

\* (no specification provided)

Location: B-2, 2'-4'      Sample Number: S-2      Depth: 2'-4'      Date: 02/25/2021

<b>ANS CONSULTANTS, INC.</b> South Plainfield, New Jersey	Client: B&G Engineering LLC Project: 3313 Corlies Avenue, Township of Neptune, Block # 3301, Lot # 4
	Project No: ANX-5349      Figure 2 F 1

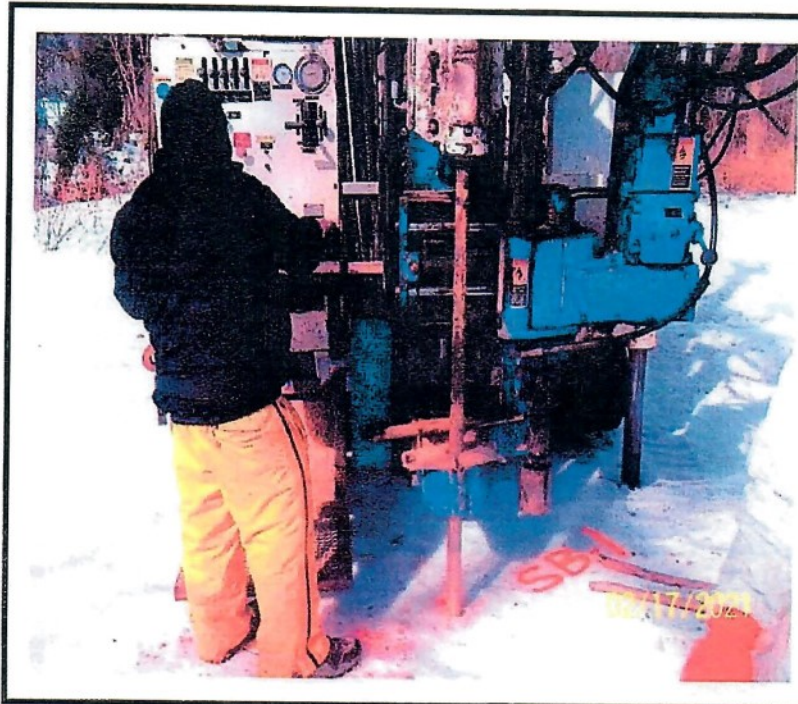
# Appendix-C



CONSULTANTS, INC.  
4405 South Clinton Avenue  
South Plainfield, NJ 07080

Client: B & G Engineering, LLC

Project: 3313 Corlies Ave, Twp of Neptune, NJ



Sample procurement using split spoon samplers and augurs



Sample recovery from split spoon samplers



CONSULTANTS, INC.  
4405 South Clinton Avenue  
South Plainfield, NJ 07080

Client: B & G Engineering, LLC

Project: 3313 Corlies Ave, Twp of Neptune, NJ



Sample recovery from split spoon samplers



Sample recovery from split spoon samplers



CONSULTANTS, INC.  
4405 South Clinton Avenue  
South Plainfield, NJ 07080

Client: B & G Engineering, LLC

Project: 3313 Corlies Ave, Twp of Neptune, NJ



Sample procurement using split spoon samplers and augurs



Sample procurement using split spoon samplers and augurs

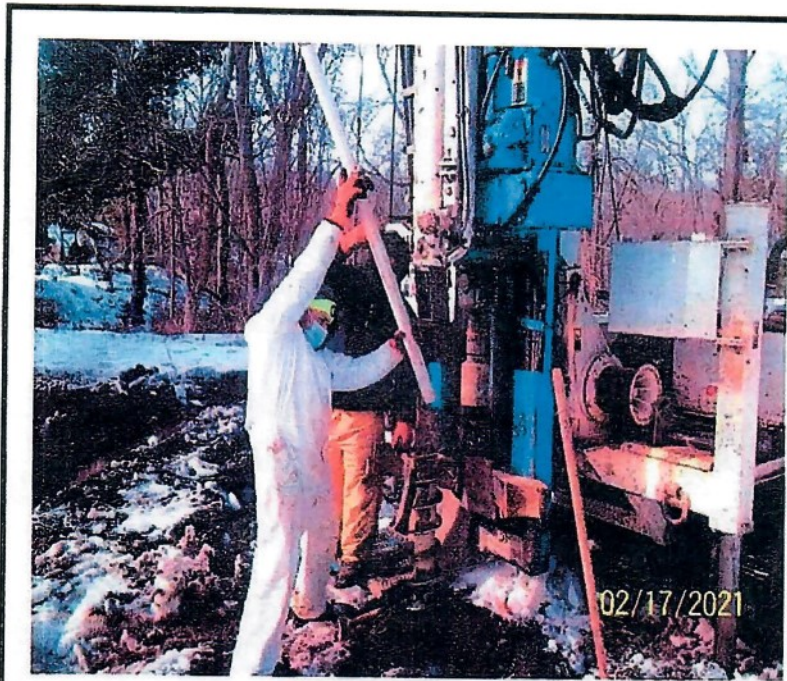




CONSULTANTS, INC.  
4405 South Clinton Avenue  
South Plainfield, NJ 07080

Client: B & G Engineering, LLC

Project: 3313 Corlies Ave, Twp of Neptune, NJ



Sample procurement using split  
spoon samplers and augurs



Field Percolation Test



CONSULTANTS, INC.  
4405 South Clinton Avenue  
South Plainfield, NJ 07080

Client: B & G Engineering, LLC

Project: 3313 Corlies Ave, Twp of Neptune, NJ



Sample procurement using split spoon samplers and augurs



Sample recovery from split spoon samplers

**APPENDIX E**

**PRIMARY SPILLWAY ROUTING  
CALCULATIONS  
(ASSUMING FULL BASIN)**

**1943A-Proposed 20221024 no exfiltration**

Prepared by {enter your company name here}

HydroCAD® 10.10-3a s/n 03590 © 2020 HydroCAD Software Solutions LLC

Emergency Overflow No Exfiltration  
Type III 24-hr 100-Year Rainfall=9.24"

Printed 12/14/2022

Page 1

**Summary for Pond 1P: INFILTRATION BASIN**

[80] Warning: Exceeded Pond 13P by 5.26' @ 17.44 hrs (23.47 cfs 8.734 af)

Inflow Area = 1.480 ac, 63.46% Impervious, Inflow Depth = 6.35" for 100-Year event  
Inflow = 12.86 cfs @ 12.00 hrs, Volume= 0.783 af  
Outflow = 10.56 cfs @ 12.04 hrs, Volume= 0.783 af, Atten= 18%, Lag= 2.1 min  
Primary = 10.56 cfs @ 12.04 hrs, Volume= 0.783 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Starting Elev= 44.50' Surf.Area= 4,001 sf Storage= 26,003 cf  
Peak Elev= 44.80' @ 12.04 hrs Surf.Area= 4,001 sf Storage= 27,206 cf (1,203 cf above start)

Plug-Flow detention time= 435.6 min calculated for 0.186 af (24% of inflow)  
Center-of-Mass det. time= 1.7 min ( 794.3 - 792.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	38.00'	28,004 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
38.00	4,000	0	0
45.00	4,001	28,004	28,004

Device	Routing	Invert	Outlet Devices
#1	Device 2	44.50'	2.0" x 2.0" Horiz. Orifice/Grate X 12.00 columns X 12 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	42.50'	18.0" Round Culvert L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.00' S= 0.0500 ' / Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Primary OutFlow Max=10.55 cfs @ 12.04 hrs HW=44.80' TW=0.00' (Dynamic Tailwater)

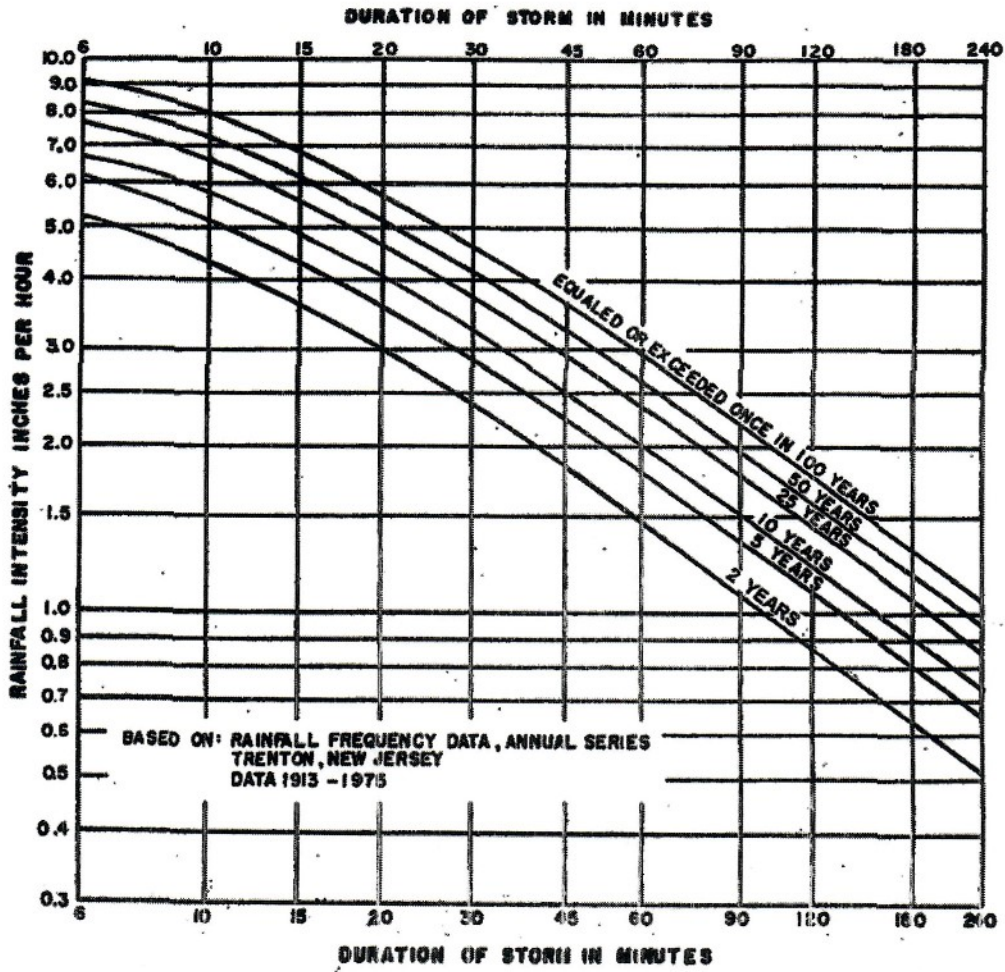
↑ 2=Culvert (Passes 10.55 cfs of 10.59 cfs potential flow)

↑ 1=Orifice/Grate (Orifice Controls 10.55 cfs @ 2.64 fps)

**APPENDIX F**

NJDEP IDF CURVES  
ON-SITE STORM SEWER COMPUTATIONS  
CONDUIT OUTLET PROTECTION  
CALCULATIONS  
PERFORMED SCOUR HOLE CALCULATIONS  
HYDROLOGIC MODELING DATABASE DATA  
ENTRY FORM

FIGURE 7.2 RAINFALL INTENSITY CURVES



Note: Adapted from Figure 2.1-2 in the NJDEP *Technical Manual for Stream Encroachment Permits*.

PROJECT NAME:		PRELIMINARY & FINAL SITE PLAN- GALILEE EGLISE ADVENTISTE PROPOSED CHURCH										COMPUTED BY: BP										
TOWNSHIP		NEPTUNE										CHECKED BY: BP										
		25 YR STORM SEWER SYSTEM COMPUTATIONS																				
		COUNTRY: MONMOUTH																				
		DATE: DEC 2022																				
		TIME OF CONCN. Q (CFS)										PROFILE										
		DESIGN																				
LOCATION FROM	TO	STRUCT TYPE	AREA (Ac.)	"C" FACTOR	CXA INCR	CXA ACCUM	TIME OF STORM CONC. (MIN)	FREQ. (YRS)	INTEN. (IN/HR)	"Q" INCREM. (GFS)	"Q" TOTAL (GFS)	PIPE SIZE (INCH)	PIPE SLOPE (FT/FT)	MANN. "n"	"Q" FULL (GFS)	"Q" VAR. (GFS)	VEL. FULL Q (FPS)	PIPE LENGTH (FEET)	UPPER INVERT (FEET)	LOWER INVERT (FEET)	TOP ELEV (FEET)	
# B-1		B	0.10	0.81	0.081		10	25	6.80	0.55			0.013						41.76			45.15
	# B-2				0.081						0.55	15	0.0050		4.58	4.03	3.73	40		41.56		45.10
# B-2		B	0.13	0.72	0.094		10	25	6.80	0.64			0.013						41.56			45.10
	# B-3				0.175						1.19	15	0.0050		4.58	3.39	3.73	146		40.83		45.10
# B-3		B	0.10	0.90	0.090		10	25	6.80	0.61			0.013						40.83			45.10
	# E-1				0.265						1.80	15	0.0050		4.58	2.78	3.73	78		40.44		
# E-1		E	0.20	0.72	0.144		10	25	6.80	0.98			0.013						40.19			44.80
	# E-2				0.409						2.78	18	0.0050		7.45	4.67	4.21	70		39.84		
# A-3		A	0.03	0.69	0.021		10	25	6.80	0.14			0.010						41.29			46.10
	# A-2				0.021						0.14	8	0.0100		1.58	1.43	4.51	19		41.10		
RD		PIPE	0.02	0.99	0.020		10	25	6.80	0.13			0.010						41.64			-
	# A-2				0.020						0.13	4	0.0200		0.35	0.22	4.02	10		41.44		
# A-2		A	0.004	0.11	0.0004		10	25	6.80	0.0030			0.010						41.10			46.10
	# E-2				0.0409						0.28	8	0.0100		1.58	1.30	4.51	41		40.69		
# E-2		E	0.06	0.84	0.050		10	25	6.80	0.34			0.013						39.84			45.55
	# B-5				0.500						3.40	18	0.0049		7.37	3.97	4.17	49		39.60		
# B-4		B	0.15	0.87	0.131		10	25	6.80	0.89			0.013						40.32			44.70
	# B-5				0.131						0.89	15	0.0050		4.58	3.69	3.73	94		39.85		
# B-5		B	0.10	0.81	0.081		10	25	6.80	0.55			0.013						39.60			44.70
	# E-3				0.711						4.84	18	0.0053		7.66	2.83	4.34	17		39.51		
# E-3		E	0.25	0.60	0.150		10	25	6.80	1.02			0.013						39.07			45.00
	MH# 1				0.861						5.86	24	0.0050		16.04	10.18	5.11	68		38.73		
RD		PIPE	0.02	0.99	0.020		10	25	6.80	0.13			0.010						40.52			-

PROJECT NAME: PRELIMINARY & FINAL SITE PLAN - GALILEE EGLISE ADVENTISTE PROPOSED CHURCH COUNTY: MONMOUTH DATE: DEC 2022 COMPUTED BY: BP

TOWNSHIP NEPTUNE 25 YR STORM SEWER SYSTEM COMPUTATIONS TIME OF CONCN. Q (CFS) DESIGN PROFILE CHECKED BY: BP

LOCATION FROM	TO	STRUCT TYPE	AREA (AC.)	RUNOFF "C" FACTOR	CXA INCR	CXA ACCUM	TIME OF STORM CONC. (MIN)	FREQ. (YRS)	INTEN. (IN/HR)	"Q" INCREM. (CFS)	"Q" TOTAL (CFS)	PIPE SIZE (INCH)	PIPE SLOPE (F/FT)	MANN. "n"	"Q" FULL (CFS)	"Q" VAR. (CFS)	VEL. FULL Q (FPS)	PIPE LENGTH (FEET)	UPPER INVERT (FEET)	LOWER INVERT (FEET)	TOP ELEV (FEET)
	MH # 1					0.020				0.13	0.13	4	0.0200	0.013	0.35	0.22	4.02	9	38.73	40.34	
MH# 1		MH	0.00	0.00	0.000		10	25	6.80	0.00				0.013							46.00
	# A-1					0.881					5.99	24	0.0050	0.013	16.04	10.05	5.11	36	38.55	38.55	
# A-1		A	0.03	0.40	0.012		10	25	6.80	0.08				0.013							45.20
	MH # 2					0.893					6.07	24	0.0051	0.010	16.19	10.11	5.15	55	38.55	38.27	
RD		PIPE	0.02	0.99	0.020		10	25	6.80	0.13				0.010					40.05		
	MH# 2					0.020					0.13	4	0.0200	0.013	0.35	0.22	4.02	8	39.89	39.89	
MH# 2		MH	0.00	0.00	0.000		10	25	6.80	0.00				0.013					38.27	38.08	46.30
	MH # 3					0.913					6.21	24	0.0050	0.010	16.04	9.83	5.11	38	38.27	38.08	
CO # 1		CO	0.02	0.99	0.020		10	25	6.80	0.13				0.010					40.08		45.90
	MH # 3					0.020					0.13	4	0.0200	0.013	0.35	0.22	4.02	19	39.70	39.70	
MH# 3		MH	0.00	0.00	0.000		10	25	6.80	0.00				0.013					38.08		45.80
	FES # 1	FES				0.933					6.34	24	0.0053		16.57	10.22	5.27	15	38.00	38.00	



PROJECT NAME:		PRELIMINARY & FINAL SITE PLAN- GALILEE EGLISE ADVENTISTE PROPOSED CHURCH										COMPUTED BY: BP										
TOWNSHIP		NEPTUNE										CHECKED BY: BP										
		100 YR STORM SEWER SYSTEM COMPUTATIONS																				
		COUNTY: MONMOUTH																				
		DATE: DEC 2022																				
		TIME OF CONCENT					Q (CFS)					DESIGN		PROFILE								
LOCATION FROM	TO	STRUCTURE TYPE	AREA (Ac.)	RUNOFF "C" FACTOR	CXA INGR	CXA ACCUM	TIME OF CONC. (MIN)	FREQ. (YRS)	INTEN. (IN/HR)	"Q" INCREM. (GFS)	"Q" TOTAL (GFS)	PIPE SIZE (INCH)	PIPE SLOPE (FT/FT)	MANN. "n"	"Q" FULL (GFS)	"Q" VAR (GFS)	VEL. FULL Q (FPS)	PIPE LENGTH (FEET)	UPPER INVERT (FEET)	LOWER INVERT (FEET)	TOP ELEV (FEET)	
#B-1		B	0.10	0.81	0.081		10	25	8.00	0.65			0.013						41.76			45.15
	#B-2				0.081						0.65	15	0.0050		4.58	3.93	3.73	40		41.56	41.56	
#B-2		B	0.13	0.72	0.094		10	25	8.00	0.75			0.013						41.56			45.10
	#B-3				0.175						1.40	15	0.0050		4.58	3.18	3.73	146		40.83	40.83	
#B-3		B	0.10	0.90	0.090		10	25	8.00	0.72			0.013						40.83			45.10
	#E-1				0.265						2.12	15	0.0050		4.58	2.46	3.73	78		40.44	40.44	
#E-1		E	0.20	0.72	0.144		10	25	8.00	1.15			0.013						40.19			44.80
	#E-2				0.409						3.27	18	0.0050		7.45	4.18	4.21	70		39.84	39.84	
#A-3		A	0.03	0.69	0.021		10	25	8.00	0.17			0.010						41.29			46.10
	#A-2				0.021						0.17	8	0.0100		1.58	1.41	4.51	19		41.10	41.10	
RD		PIPE	0.02	0.99	0.020		10	25	8.00	0.16			0.010						41.64			-
	#A-2				0.020						0.16	4	0.0200		0.35	0.19	4.02	10		41.44	41.44	
#A-2		A	0.004	0.11	0.0004		10	25	8.00	0.0035			0.010						41.10			46.10
	#E-2				0.0409						0.33	8	0.0100		1.58	1.25	4.51	41		40.69	40.69	
#E-2		E	0.06	0.84	0.050		10	25	8.00	0.40			0.013						39.84			45.55
	#B-5				0.500						4.00	18	0.0049		7.37	3.37	4.17	49		39.60	39.60	
#B-4		B	0.15	0.87	0.131		10	25	8.00	1.04			0.013						40.32			44.70
	#B-5				0.131						1.04	15	0.0050		4.58	3.54	3.73	94		39.85	39.85	
#B-5		B	0.10	0.81	0.081		10	25	8.00	0.65			0.013						39.60			44.70
	#E-3				0.711						5.69	18	0.0053		7.66	1.97	4.34	17		39.51	39.51	
#E-3		E	0.25	0.60	0.150		10	25	8.00	1.20			0.013						39.07			45.00
	MH#1				0.861						6.89	24	0.0050		16.04	9.15	5.11	68		38.73	38.73	
RD		PIPE	0.02	0.99	0.020		10	25	8.00	0.16			0.010						40.52			-

PROJECT NAME: PRELIMINARY & FINAL SITE PLAN-GALLEE EGLISE ADVENTISTE PROPOSED CHURCH COUNTY: MONMOUTH  
 TOWNSHIP NEPTUNE 100 YR STORM SEWER SYSTEM COMPUTATIONS DATE: DEC 2022  
 COMPUTED BY: BP  
 CHECKED BY: BP

LOCATION		STRUCT	AREA	RUNOFF	CXA	CXA	TIME OF	"Q"	"Q"	PIPE	PIPE	"Q"	"Q"	VEL.	PIPE	UPPER	LOWER	TOP	
FROM	TO	TYPE	(AC.)	"C" FACTOR	INCR	ACCUUM	CONC. (MIN)	FREQ. (YRS)	INTEN. (IN/HR)	SIZE (INCH)	SLOPE (FT/FT)	MANN. "n"	FULL (CFS)	VAR. (CFS)	FULL Q (FPS)	LENGTH (FEET)	INVERT (FEET)	INVERT (FEET)	ELEV (FEET)
	MH # 1					0.020				4	0.0200		0.35	0.19	4.02	9		40.34	
MH# 1		MH	0.00	0.00	0.000		10	25	8.00			0.013						38.73	46.00
	# A-1					0.881				24	0.0050		16.04	8.99	5.11	36		38.55	45.20
# A-1		A	0.03	0.40	0.012		10	25	8.00			0.013						38.55	45.20
	MH # 2					0.893				24	0.0051		16.19	9.04	5.15	55		38.27	
RD		PIPE	0.02	0.99	0.020		10	25	8.00			0.010						40.05	
	MH # 2					0.020				4	0.0200		0.35	0.19	4.02	8		39.89	
MH# 2		MH	0.00	0.00	0.000		10	25	8.00			0.013						38.27	46.30
	MH # 3					0.913				24	0.0050		16.04	8.74	5.11	38		38.08	
CO # 1		CO	0.02	0.99	0.020		10	25	8.00			0.010						40.08	45.90
	MH # 3					0.020				4	0.0200		0.35	0.19	4.02	19		39.70	
MH# 3		MH	0.00	0.00	0.000		10	25	8.00			0.013						38.08	45.80
	FES # 1	FES				0.933				24	0.0053		16.57	9.10	5.27	15		38.00	

PROFILE

DESIGN

TIME OF CONGEN. Q (CFS)

100 YR STORM SEWER SYSTEM COMPUTATIONS

DATE: DEC 2022

COUNTY: MONMOUTH

NEPTUNE

PROJECT NAME:

TOWNSHIP

PROJECT- Galilee Eglise Adventiste Inc  
 NUMBER- 1943A  
 BY- BP  
 DATE- 12/14/2022

**CONDUIT OUTLET PROTECTION CALCULATIONS**

TAILWATER < 0.5 x Do

24 " RCP -FES#1

-----  
 Do = 2.00  
 Q (25) = 6.34 CFS  
 TW = 0.40 (0.2 Do ASSUMED)  
 Wo = 2.00 (Width of culvert @ widest point)  
 q = 3.17 CFS/ft (Q/Wo)

LENGTH OF APRON

$L_a = \frac{1.8 \times q}{D_o^{1/2}} + 7 \times (D_o) = 18.03 \text{ FEET}$   
 USE 20.0 FEET

WIDTH OF APRON

$W = (3 \times W_o) + L_a = 24.03 \text{ FEET}$   
 USE 25.0 FEET

RIPRAP SIZE

$D_{(50)} = \frac{0.016}{T_w} q^{4/3} = 2.24 \text{ INCHES}$   
 USE 3.0 INCHES

APRON THICKNESS

T = 2 x D (50) w/ FILTER FABRIC      T = 3 x D (50)  
 = 0.50 FEET                                      = 0.75 FEET

USE

**1 FT**

USE

**X**

PROJECT- Galilee Eglise Adventiste Inc.  
 PROJECT NUMBER- 1943A  
 BY- BP  
 DATE- 12/14/2022

## PREFORMED SCOUR HOLE CALCULATIONS

TAILWATER > 0.5 x Do

24 " RCP FES#1

-----

$D_o = 2.00$   
 $Y = 2.00$   
 $Q_{(100)} = 7.46$  CFS  
 $TW = 0.78$  2 Yr water surf elev. - Inv of Inlet Pipe = 38.78 - 38.00  
 $W_o = 2.00$  (Width of culvert @ widest point)  
 $q = 3.73$  CFS/ft (Q/Wo)

### RIPRAP SIZE

$D_{(50)} = \frac{0.0082}{TW} q^{4/3} = 0.73$  INCHES  
 USE 2.0 INCHES

### APRON THICKNESS

$T = 2 \times D(50)$  w/ FILTER FABRIC  
 = 0.33 FEET

USE

1.00 ft

**New Jersey Department of Agriculture**  
**Hydrologic Modeling Database – Data Entry Form**

---

**Project Site Details**

Chpt. 251 Application Number: \_\_\_\_\_

Start Date (if known): Summer 2023

County: Monmouth

Street Address: 3313 State Highway Route 33

Municipality: Neptune Township

Block: 3301

Lot: 4

NJDEP Anderson Landuse Code (4 digits): \_\_\_\_\_

Landuse description: \_\_\_\_\_

Site Centroid Location (NJ State Plane Feet): <sup>1</sup>

    Northing: 501,471                      Easting: 612,020

---

**Project Contact Details**

Applicant: Galilee Eglise Adventiste Inc

Address: 3313 State Highway Route 33

Phone: 732 822 8767

Email: lavarin1961@yahoo.com

---

**Post Construction Operation & Maintenance:<sup>2</sup>**

Party Name: Galilee Eglise Adventiste Inc

Address: 3313 State Highway Route 33

Phone: 732 822 8767

Email: lavarin1961@yahoo.com

Party type: Project Manager

**New Jersey Department of Agriculture**  
**Hydrologic Modeling Database – Data Entry Form**

---

**Basin Details:**<sup>3</sup>

Basin Centroid (NJ State Plane Feet):<sup>4</sup>

    Northing: 501,471

    Easting: 612,020

Basin Type: Infiltration

Construction: Excavated

Status phase:<sup>5</sup> Design       As-built

Dam Height: (ft) N/A      top width: (ft) N/A

Dam Classification: N/A

**Drainage Area(s) to Basin [note- include any bypass areas]**<sup>6</sup>

Drainage Area Name	Drainage Area (acres)	Post-Development CN#	Percent Impervious	Time of Concentration (min)
	1.58	74	59%	6

**Basin Outlet Structure(s)**<sup>7</sup>

ID:      Emergency Overflow only. Basin fully exfiltrates 100 year storm event

End of Pipe Location:<sup>8</sup> Northing:

Easting:

Discharge Type <sup>9</sup> (weir, orifice, etc)	Dimensions (diameter, length)	Elevation (USGS)	Discharge <sup>10</sup> Coefficient	Equation Used <sup>11</sup>
Orifice (Grate)	4 ft x 4 ft	44.50	0.6	$Q = CoAg[(2gd)^{0.5}]$

**New Jersey Department of Agriculture**  
**Hydrologic Modeling Database – Data Entry Form**

---

**Basin Outlet Structure(s)**

ID:

End of Pipe Location: Northing:

Easting:

Discharge Type (weir, orifice, etc)	Dimensions (diameter, length)	Elevation (USGS)	Discharge Coefficient	Equation Used

**Basin Stage-Discharge Rating Table<sup>12</sup>**

Elevation (USGS Feet)	Storage (Acre-Ft)	Total Outlet Structure Discharge (cfs)
38.00	0.00	0.00
45.00	0.64	10.56*
* 100 yr water surface elevation = 43.86 with 0.00 cfs discharge from Outlet Structure		

**NJDEP BMP Water Quality Structures<sup>13</sup>**

Type (rain garden, green roof, seepage pit etc)	Size	Size Units (cu ft, sq ft etc)	Northing (SPF)	Easting (SPF)
Infiltration Basin	0.64	ac-ft	501,471	612,020