

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
Revised November 19, 2023**


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

B&G PROJECT NO. 1943A

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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" and utilize the DELMARVA unit hydrograph with a NOAA 24-hour Storm Curve D.

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 "H. 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

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 consists 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 “H. 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

	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

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)

POA	Exist	Target	Proposed	Delta
2	0.02	0.01	0.07	+0.06*
10	0.46	0.345	0.3	-0.045
100	3.71	2.968	1.21	-1.758

*See below Volume Table

Volume Comp (POA)

POA	Exist	Prop	Delta
2	0.016	0.009	-0.007
10	0.097	0.032	-0.065
100	0.394	0.103	-0.291

Time for basin to drain

For 100-year storm:

Peak Basin Elevation = 43.58 ft @ 18.75 hours

Basin at Invert Elevation 38.00 @ 53.90 hours

Basin drains in 35.15 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 "B". 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 "F". The calculations in Appendix "F" show that the proposed on-site storm sewer system has the design capacity to convey the 25-year storm runoff for the proposed improvements.

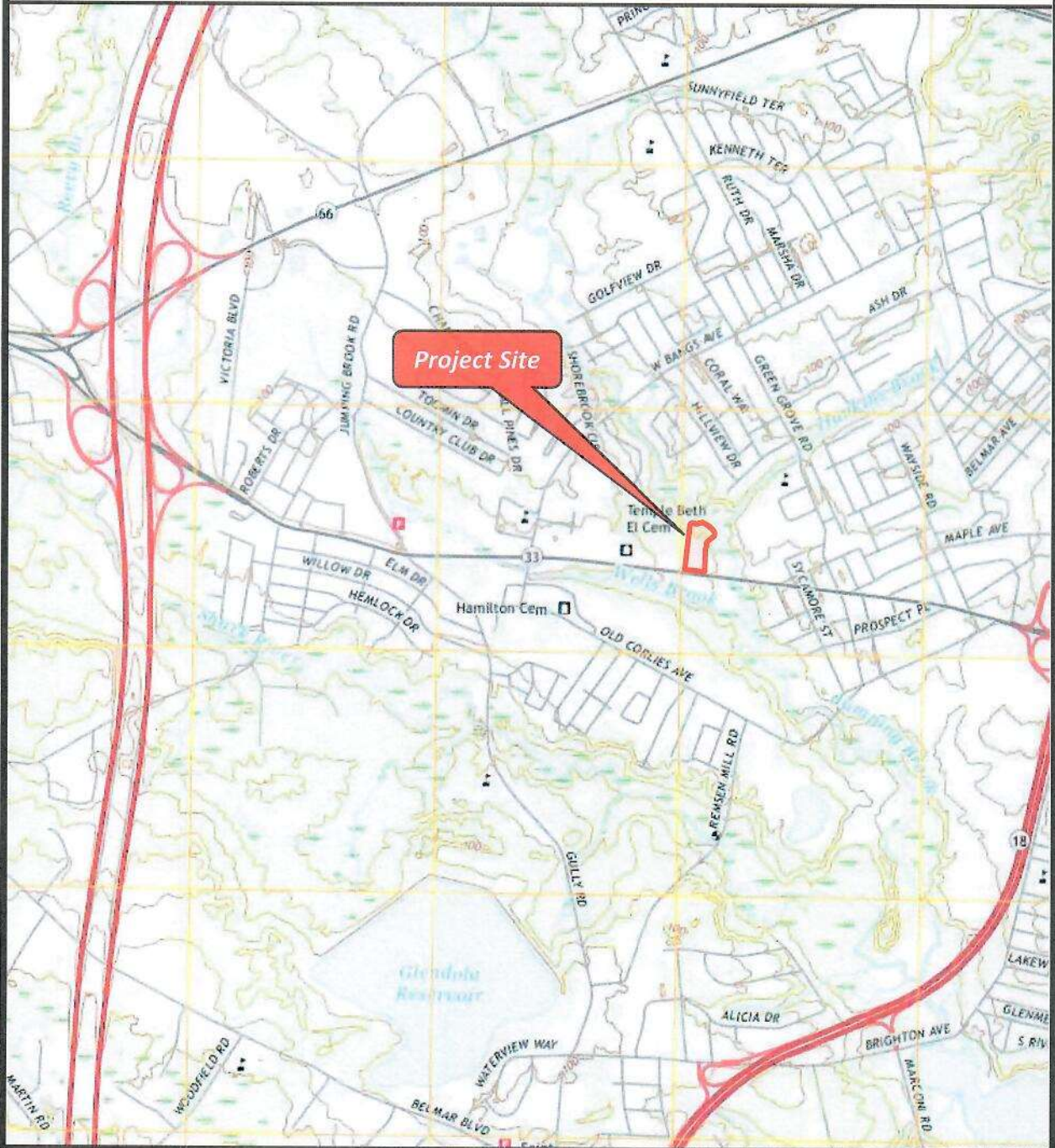
CONCLUSIONS

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 "F" 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_i - 0 to 2 inches: slightly decomposed plant material
A - 2 to 4 inches: sand
E - 4 to 18 inches: sand
B_h - 18 to 32 inches: sand
BC - 32 to 45 inches: sand
C - 45 to 54 inches: sand
C_g - 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_{sat}): 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



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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.

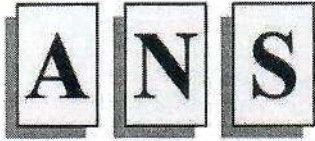
Atulkumar N. Shah, PE
President
New Jersey PE License # 24GE03443900
ANS / RM

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

File: ANX-5349_01.SB

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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.

"ANSwers to your construction inspection and testing needs."

An equal opportunity employer

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 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 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 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.

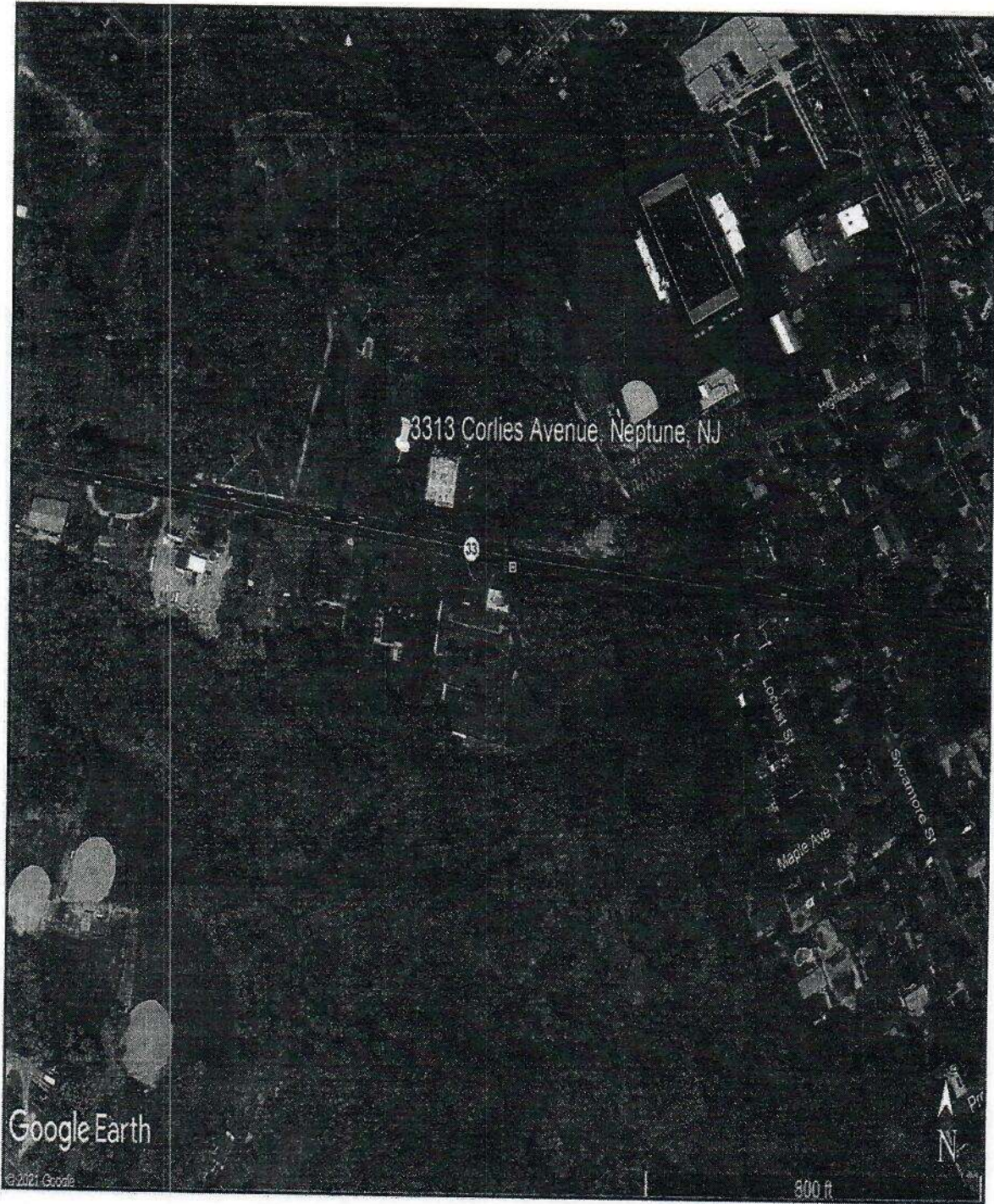


Atulkumar N. Shah, PE
President
New Jersey PE License # 24GE03443900
ANS / RM

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

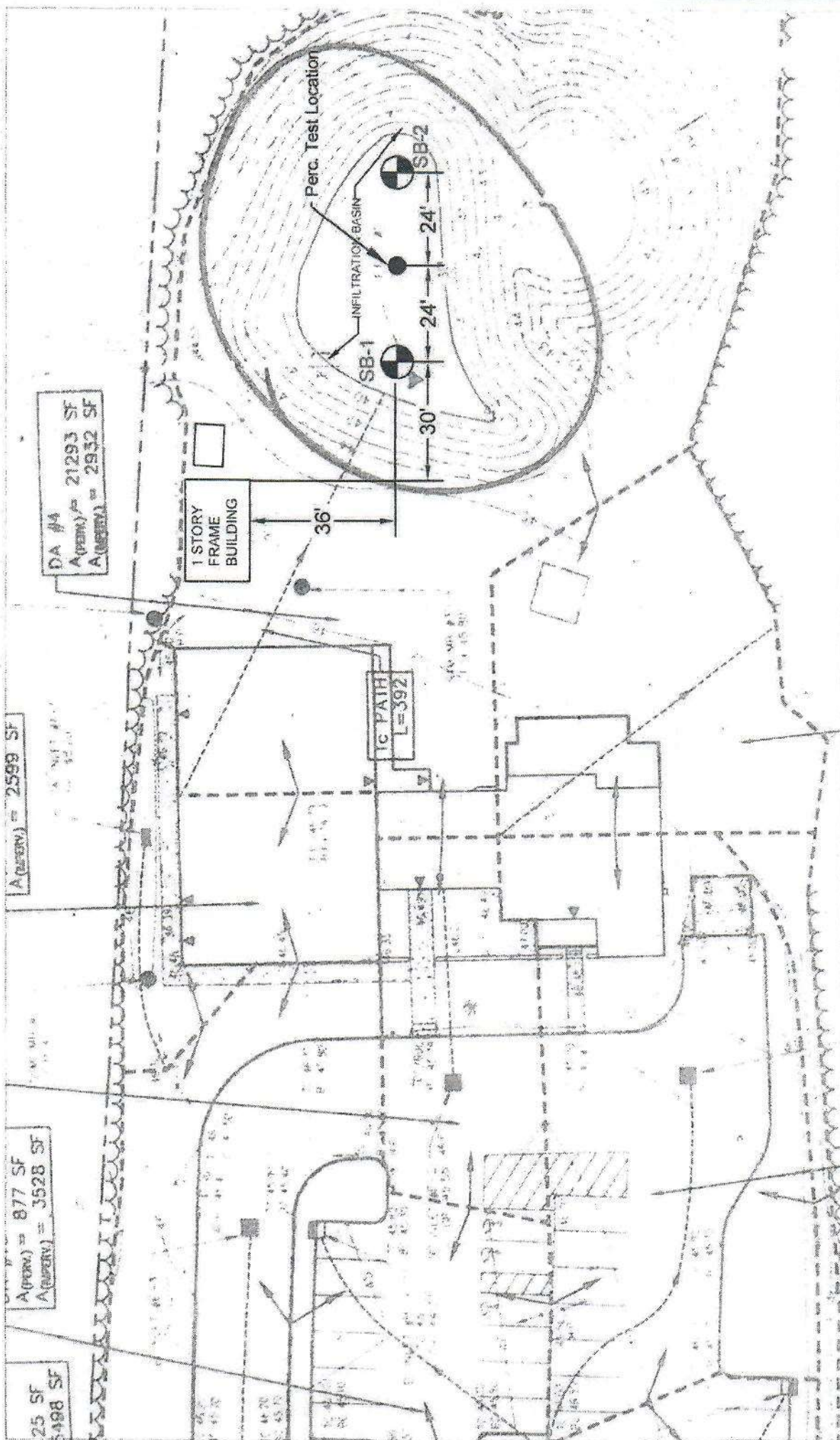
wp1001

Data use subject to license
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SITE LOCATION MAP
 3313 Corlies Ave, Twp of Neptune, NJ

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



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 gavel, 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

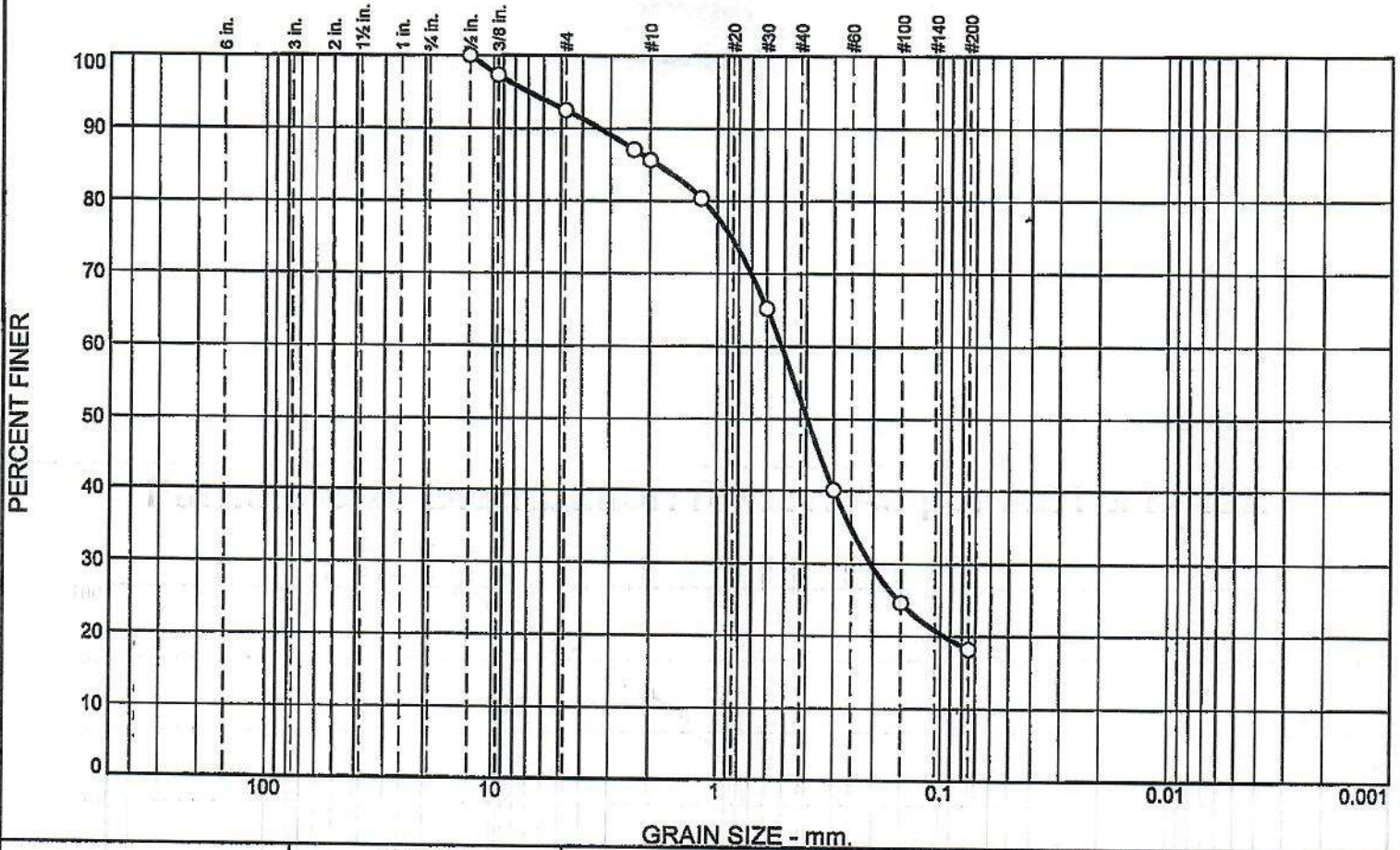
ROCK

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		

Material Description
Brown in color. silty sand

Atterberg Limits
 PL= NP LL= NV PI= NP

Coefficients
 D₉₀= 3.3740 D₈₅= 1.8519 D₆₀= 0.5156
 D₅₀= 0.3953 D₃₀= 0.2049 D₁₅=
 D₁₀= C_u= C_c=

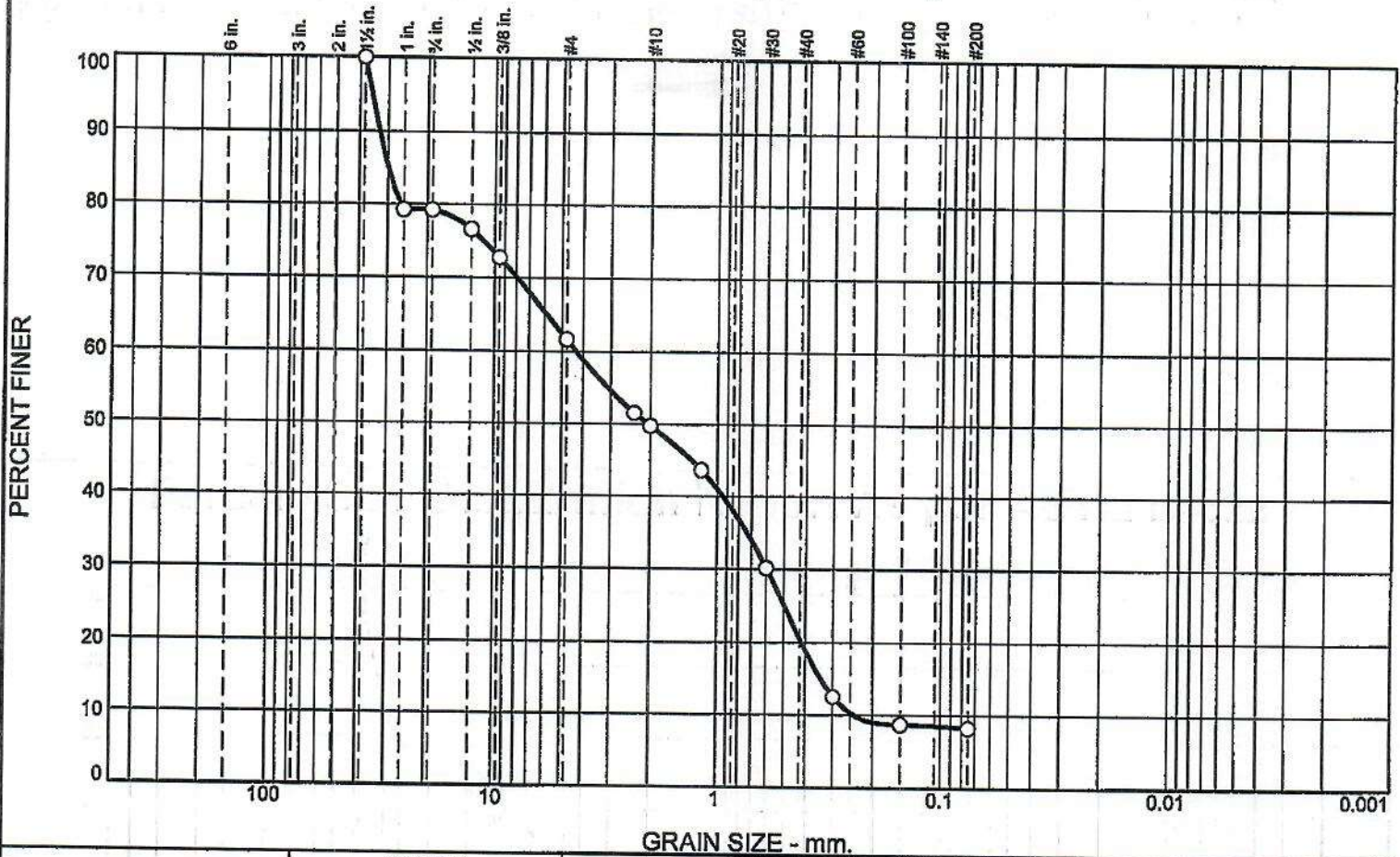
Classification
 USCS= SM AASHTO= A-2-4(0)

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

* (no specification provided)

Location: B-1, 4'-6' Sample Number: S-1 Depth: 4'-6' Date: 02/25/2021

Particle Size Distribution Report As per ASTM D-422



GRAIN SIZE - mm.

% +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		

* (no specification provided)

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

Atterberg Limits
 PL= NP LL= NV PI= NP

Coefficients
 D₉₀= 32.6536 D₈₅= 29.8317 D₆₀= 4.2933
 D₅₀= 2.0533 D₃₀= 0.5964 D₁₅= 0.3408
 D₁₀= 0.2429 C_u= 17.68 C_c= 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

Location: B-2, 2'-4'
 Sample Number: S-2 Depth: 2'-4'

Date: 02/25/2021

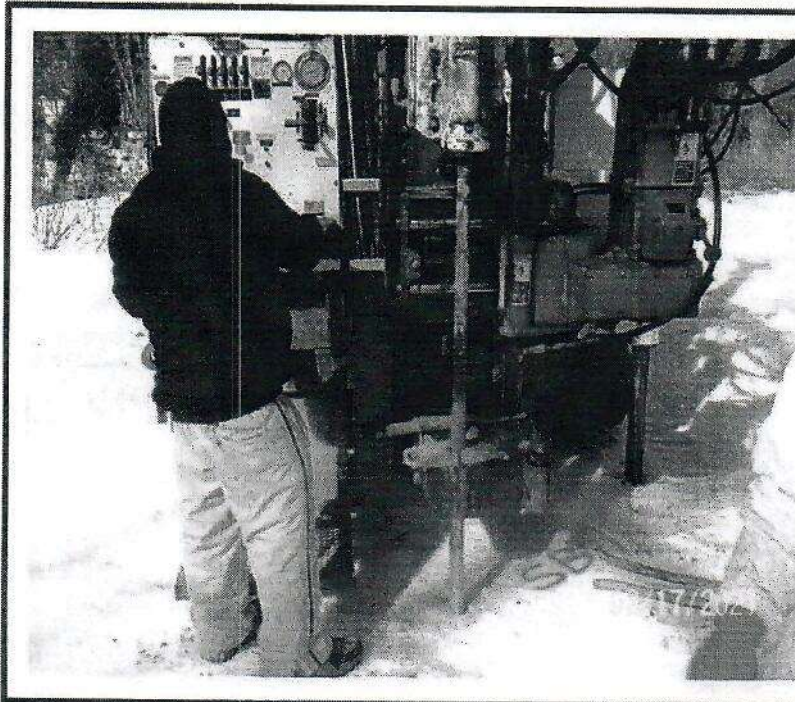
Appendix-C



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



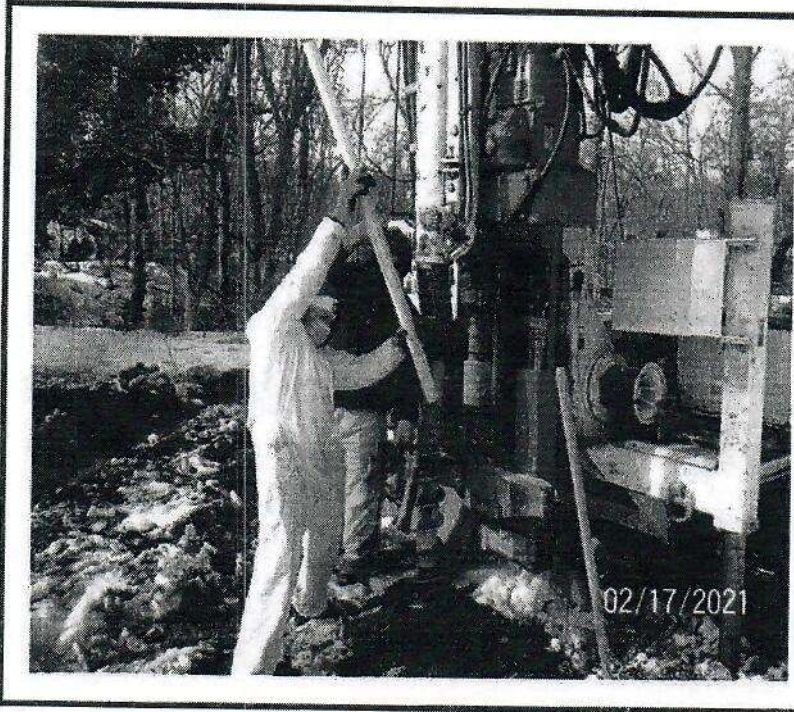
Sample procurement using split spoon samplers and augurs



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



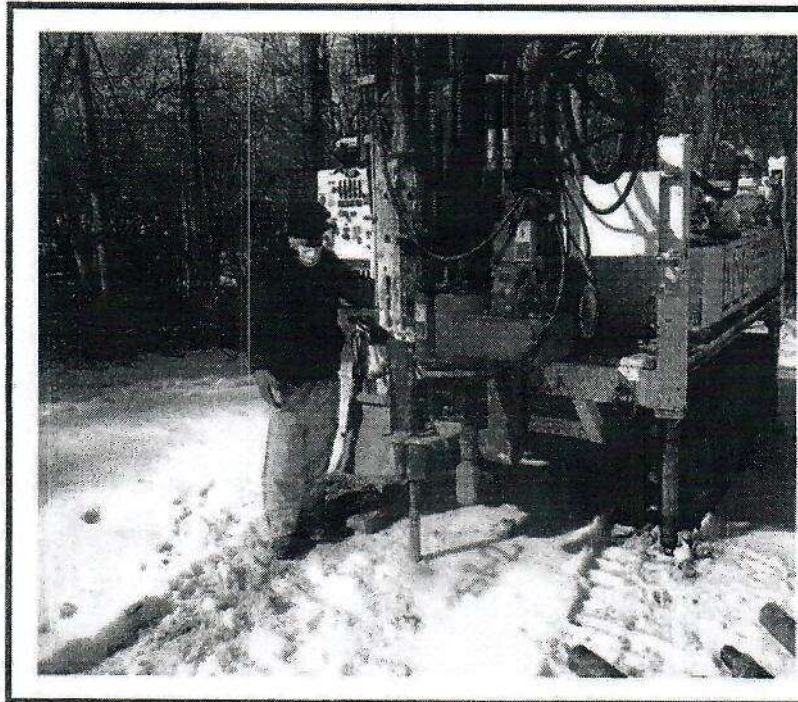
Field Percolation Test



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 C

PRE- DEVELOPMENT RUNOFF CALCULATIONS

APPENDIX D

**POST DEVELOPMENT RUNOFF/BASIN
ROUTING CALCULATIONS**

APPENDIX E

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

1943A-Proposed SPILLWAY

NOAA 24-hr D 100-Year Rainfall=9.24"

Prepared by {enter your company name here}

Printed 11/20/2023

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

Summary for Pond 1P: INFILTRATION BASIN

[81] Warning: Exceeded Pond 13P by 5.26' @ 24.01 hrs

Inflow Area = 1.482 ac, 63.50% Impervious, Inflow Depth = 6.35" for 100-Year event
 Inflow = 11.83 cfs @ 12.09 hrs, Volume= 0.784 af
 Outflow = 11.79 cfs @ 12.09 hrs, Volume= 0.784 af, Atten= 0%, Lag= 0.0 min
 Primary = 11.79 cfs @ 12.09 hrs, Volume= 0.784 af

Routing by 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= 44.76' @ 12.09 hrs Surf.Area= 4,001 sf Storage= 27,050 cf (1,047 cf above start)

Plug-Flow detention time= 480.7 min calculated for 0.187 af (24% of inflow)
 Center-of-Mass det. time= 3.1 min (801.9 - 798.8)

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 13.00 columns X 13 rows C= 0.600 in 36.0" x 36.0" Grate (52% open area) Limited to weir flow at low heads
#2	Primary	42.32'	18.0" Round Culvert L= 16.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.32' / 42.00' S= 0.0200 ' / Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Primary	44.50'	45.0 deg x 15.0' long x 0.50' rise Sharp-Crested Vee/Trap Weir Cv= 2.56 (C= 3.20)

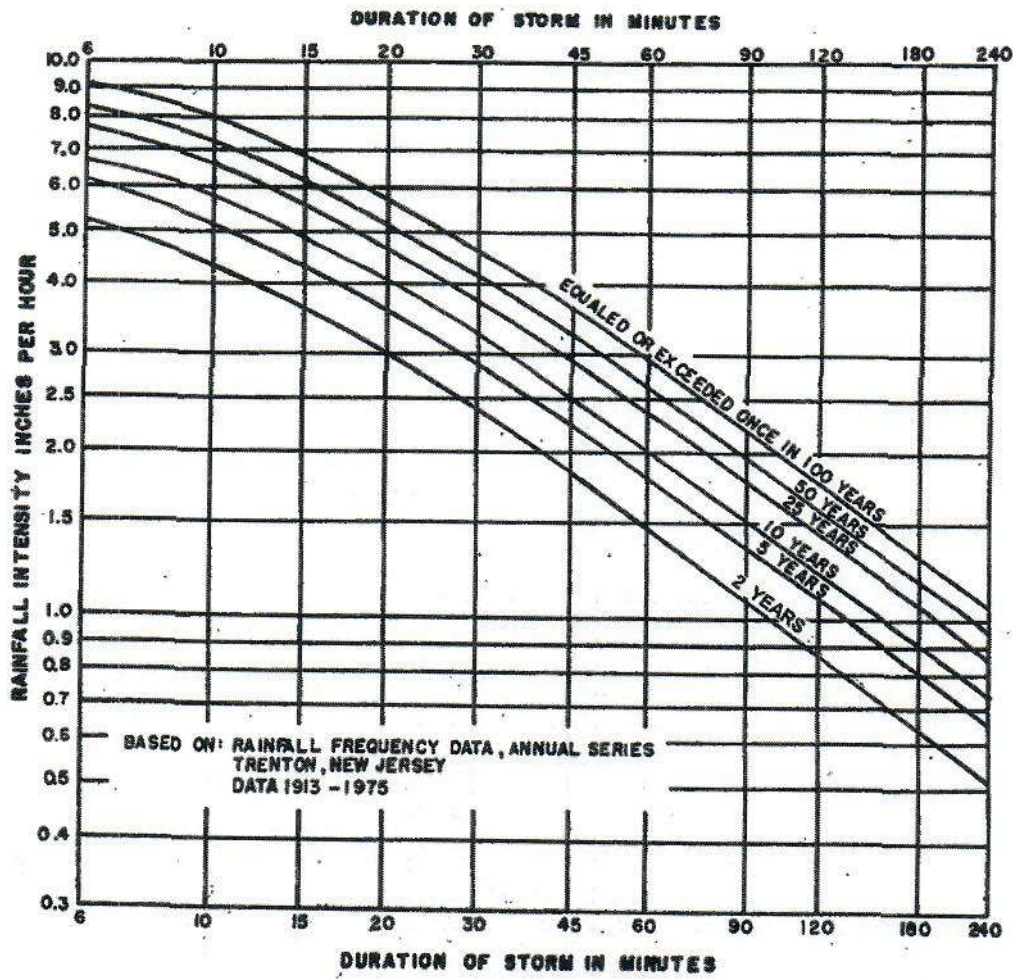
Primary OutFlow Max=11.60 cfs @ 12.09 hrs HW=44.76' (Free Discharge)

2=Culvert (Passes 5.20 cfs of 11.06 cfs potential flow)
 1=Orifice/Grate (Weir Controls 5.20 cfs @ 1.67 fps)
 3=Sharp-Crested Vee/Trap Weir (Weir Controls 6.40 cfs @ 1.63 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																		
		COUNTY: MONMOUTH																		
		DATE: DEC 2022																		
		TIME OF CONGEN.					DESIGN					PROFILE								
		Q (CFS)																		
LOCATION	STRUCTURE	AREA	RUNOFF	CXA	CXA	TIME OF	STORM	INTEN.	"Q"	"Q"	PIPE	PIPE	MANN.	"Q"	"Q"	VEL.	PIPE	UPPER	LOWER	TOP
FROM	TO	(AC.)	"C" FACTOR	INCR	ACCUM	CONC. (MIN)	FREQ. (YRS)	"I" (IN/HR)	INGREM. (CFS)	TOTAL (CFS)	SIZE (INCH)	SLOPE (FT/FT)	"I"	FULL (CFS)	VAR. (CFS)	FULL Q (FPS)	LENGTH (FEET)	INVERT (FEET)	INVERT (FEET)	ELEV (FEET)
#B-1		B	0.10	0.81	0.081	10	25	6.80	0.55			0.013	0.013	4.58	4.03	3.73	40	41.76	41.56	45.15
#B-2		B	0.13	0.72	0.094	10	25	6.80	0.64	0.55	15	0.0050	0.013	4.58	4.03	3.73	40	41.56	41.56	45.10
#B-3		B	0.10	0.90	0.090	10	25	6.80	0.61	1.19	15	0.0050	0.013	4.58	3.39	3.73	146	40.83	40.83	45.10
#E-1		E	0.20	0.72	0.144	10	25	6.80	0.98	1.80	15	0.0050	0.013	4.58	2.78	3.73	78	40.19	40.44	44.80
#A-3		A	0.03	0.69	0.021	10	25	6.80	0.14	2.78	18	0.0050	0.010	7.45	4.67	4.21	70	41.29	39.84	46.10
#A-2		A	0.004	0.11	0.0004	10	25	6.80	0.0030	0.14	8	0.0100	0.010	1.58	1.43	4.51	19	41.29	41.10	46.10
RD		PIPE	0.02	0.99	0.020	10	25	6.80	0.13	0.13	4	0.0200	0.010	0.35	0.22	4.02	10	41.64	41.44	-
#A-2		A	0.004	0.11	0.0004	10	25	6.80	0.0030	0.28	8	0.0100	0.010	1.58	1.30	4.51	41	41.10	40.69	46.10
#E-2		E	0.06	0.84	0.050	10	25	6.80	0.34	3.40	18	0.0049	0.013	7.37	3.97	4.17	49	39.84	39.60	45.55
#B-5		B	0.15	0.87	0.131	10	25	6.80	0.89	0.89	15	0.0050	0.013	4.58	3.69	3.73	94	40.32	39.85	44.70
#B-5		B	0.10	0.81	0.081	10	25	6.80	0.55	4.84	18	0.0053	0.013	7.66	2.83	4.34	17	39.60	39.51	44.70
#E-3		E	0.25	0.60	0.150	10	25	6.80	1.02	5.86	24	0.0050	0.013	16.04	10.18	5.11	68	39.07	38.73	45.00
RD		PIPE	0.02	0.99	0.020	10	25	6.80	0.13			0.010	0.010				40.52			-

PROJECT NAME: NEPTUNE PRELIMINARY & FINAL SITE PLAN - GALILEE EGLISE ADVENTISTE PROPOSED CHURCH COUNTY: MONMOUTH

TOWNSHIP: 25 YR STORM SEWER SYSTEM COMPUTATIONS DATE: DEC 2022

COMPUTED BY: BP
 CHECKED BY: BP

LOCATION		STRUCT TYPE	AREA (Ac.)	RUNOFF "C" FACTOR	CXA INCR	CXA ACCUM	TIME OF CONC. (MIN)	STORM FREQ. (YRS)	INTEN. (IN/HR)	"Q" INCR. (CFS)	"Q" TOTAL (CFS)	PIPE SIZE (INCH)	PIPE SLOPE (FT/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)	
FROM	TO																					
MH# 1						0.020					0.13	4	0.0200		0.35	0.22	4.02	9			40.34	
MH# 1		MH	0.00	0.00	0.000		10	25	6.80	0.00				0.013						38.73		46.00
# A-1						0.881					5.99	24	0.0050		16.04	10.05	5.11	36			38.55	45.20
# A-1		A	0.03	0.40	0.012		10	25	6.80	0.08				0.013						38.55		
MH# 2						0.893					6.07	24	0.0051		16.19	10.11	5.15	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		0.35	0.22	4.02	8			39.89	
MH# 2		MH	0.00	0.00	0.000		10	25	6.80	0.00				0.013						38.27		46.30
MH# 2						0.913					6.21	24	0.0050		16.04	9.83	5.11	38			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		0.35	0.22	4.02	19			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	

DESIGN PROFILE

PROJECT NAME: NEPTUNE PRELIMINARY & FINAL SITE PLAN- GALILEE EGLISE ADVENTISTE PROPOSED CHURCH
 TOWNSHIP: COUNTY: MONMOUTH
 DATE: DEC 2022

100 YR STORM SEWER SYSTEM COMPUTATIONS
 TIME OF CONGEN. Q (CFS)
 DESIGN PROFILE

COMPUTED BY: BP
 CHECKED BY: BP

LOCATION FROM	LOCATION 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 (FT/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					0.16	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	0.00				0.013					38.73		46.00
	# A-1					0.881					7.05	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	0.10				0.013	16.19	9.04	5.15	55	38.55		38.27
	MH # 2					0.893					7.15	24	0.0051						40.05		39.89
RD		PIPE	0.02	0.99	0.020		10	25	8.00	0.16				0.010					38.27		38.08
	MH# 2					0.020					0.16	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	0.00				0.013	16.04	8.74	5.11	38	38.27		46.30
	MH # 3					0.913					7.30	24	0.0050						38.08		38.08
CO # 1		CO	0.02	0.99	0.020		10	25	8.00	0.16				0.010					40.08		45.90
	MH # 3					0.020					0.16	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	0.00				0.013					38.08		45.80
	FES # 1	FES				0.933					7.46	24	0.0053		16.57	9.10	5.27	15		38.00	

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

$$T = 2 \times D(50) \text{ w/ FILTER FABRIC} = 0.50 \text{ FEET}$$

$$T = 3 \times D(50) = 0.75 \text{ FEET}$$

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

18 " RCP FES#1

Do =	1.50
Y =	1.50
Q ₍₁₀₀₎ =	7.46 CFS
TW =	0.78 2 Yr water surf elev. - Inv of Inlet Pipe = 38.78 - 38.00
Wo =	1.50 (Width of culvert @ widest point)
q =	4.97 CFS/ft (Q/Wo)

RIPRAP SIZE

D ₍₅₀₎ =	$\frac{0.0082}{Tw}$	=	1.07 INCHES
		USE	2.0 INCHES

APRON THICKNESS

T =	2 x 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 2024

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): ¹

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:²

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:³

Basin Centroid (NJ State Plane Feet):⁴

 Northing: 501,471

 Easting: 612,020

Basin Type: Infiltration

Construction: Excavated

Status phase:⁵ 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]⁶

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

Basin Outlet Structure(s)⁷

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

End of Pipe Location:⁸ Northing:

Easting:

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

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 Table¹²

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 Structures¹³

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

APPENDIX G

**GROUNDWATER RECHARGE SPREAD SHEET
GROUNDWATER MOUNDING SPREAD SHEET**

Annual Groundwater Recharge Analysis (based on GSR-32)

Project Name: Eglise Adventiste Galilee
Description: Site Plan
Analysis Date: 10/30/23

Select Township ↓
 MONMOUTH CO., NEPTUNE TWP
 Average Annual P (in) 47.4
 Climatic Factor 1.55

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.768	Open space	Lakehurst	17.5	112,091
2	0.21	Impervious areas	Lakehurst	0.0	-
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total =	2.0			15.6	112,091

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.962	Open space	Lakehurst	17.5	60,991
2	1.016	Impervious areas	Lakehurst	0.0	-
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total =	2.0			8.5	60,991

Procedures to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Annual Recharge Requirements Calculation ↓		Total Annual Recharge (in)	8.5
% of Pre-Developed Annual Recharge to Preserve =		Total Annual Recharge (in)	100%
Post-Development Annual Recharge Deficit=		Total Annual Recharge (in)	51,100
Recharge Efficiency Parameters Calculations (area averages)			
RWC = 1.66 (in)	DRWC = 1.66		
ERWC = 0.37 (in)	EDRWC = 0.37		

Project Name		Description		Analysis Date		BMP or LID Type		
Eglike Adventiste Galilee		Site Plan		10/30/23				
Recharge BMP Input Parameters		Root Zone Water Capacity Calculated Parameters		Recharge Design Parameters				
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	
BMP Area	ABMP	6656.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.45	in	
BMP Effective Depth, this is the design variable	dBMP	2.1	in	ERWC Modified to consider dEXC	EDRWC	0.45	in	
Upper level of the BMP surface (negative if above ground)	dBMP _u	-5.2	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.36	in	
Depth of lower surface of BMP, must be >= dBMP _u	dEXC	0.0	in					
Post-development Land Segment Location of BMP	SegBMP	1	unitless					
Input Zero if Location is distributed or undetermined								
Parameters from Annual Recharge Worksheet		BMP Calculated Size Parameters		CALCULATION CHECK MESSAGES				
Post-D Deficit Recharge (or desired recharge volume)	Vdef	51,100	cu.ft	ABMP/Aimp	Ratio	0.15	unitless	
Post-D Impervious Area (or target Impervious Area)	Aimp	44,257	sq.ft	BMP Volume	V/BMP	1,150	cu.ft	
Root Zone Water Capacity	RWC	2.02	in	System Performance Calculated Parameters				
RWC Modified to consider dEXC	DRWC	2.02	in	Annual BMP Recharge Volume		51,100	cu.ft	
Climatic Factor	C-factor	1.55	no units	Avg BMP Recharge Efficiency		76.6%	Represents % Infiltration Recharged	
Average Annual P	Pavg	47.4	in	%Rainfall became Runoff		78.2%	%	
Recharge Requirement over Imp. Area	dr	13.9	in	%Runoff Infiltrated		48.8%	%	
				%Runoff Recharged		37.4%	%	
				%Rainfall Recharged		29.2%	%	
<p>How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.</p> <p>To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.</p>								
				<p>Recharge Design Parameters</p> <p>Inches of Runoff to capture</p>		Qdesign	0.32	in
				<p>Inches of Rainfall to capture</p> <p>Recharge Provided Avg. over Imp. Area</p>		Pdesign	0.42	in
				<p>Runoff Captured Avg. over imp. Area</p>		13.9	in	
				<p>BMP Location</p>		18.1	in	
				<p>Volume Balance</p> <p>dBMP Check</p> <p>dEXC Check</p>		OK	OK	
				<p>BMP Location</p>		OK	OK	
				<p>OTHER NOTES</p> <p>Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP. make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.</p>				

Input Values

2.25
0.150
2.00
31.600
31.600
42.00
10.00

R
Sy
Kh
x
y
t
h_i(0)

Recharge rate (permeability rate) (in/hr)
 Specific yield, S_y (dimensionless)
 default value is 0.15; max value is 0.2 provided that a lab test data is submitted
 Horizontal hydraulic conductivity (in/hr)
 $K_h = 5R$ Recharge Rate (R) in the coastal plain; $K_h = R$ outside the coastal plain
 1/2 length of basin (x direction, in feet)
 1/2 width of basin (y direction, in feet)
 Duration of infiltration period (hours)
 Initial thickness of saturated zone (feet)

37.100
27.100

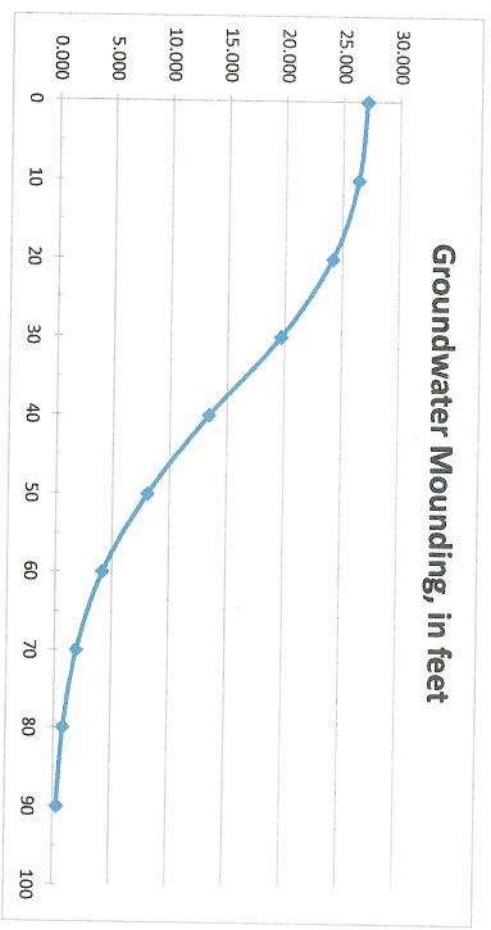
h(max)
h_b(max)
Distance from

Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
 Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	center of basin in x direction, in feet
27.100	0
26.397	10
24.130	20
19.679	30
13.393	40
8.042	50
4.177	60
1.913	70
0.807	80
0.325	90



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

APPENDIX H

**STORM SEWER DRAINAGE AREA MAP
PRE & POST DEVELOPMENT DRAINAGE AREA
MAPS**