

SOR CONSULTING ENGINEERS, INC.

Geotechnical Engineering - Materials Testing - Forensic Studies

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SUBSURFACE INVESTIGATION REPORT SUBSURFACE STORMWATER MANAGEMENT SYSTEM WEST ORANGE, NEW JERSEY

FOR

**GARDEN HOMES
SHORT HILLS, NEW JERSEY**

**Prepared by: Sor Consulting Engineers, Inc.
98 Sand Park Road
Cedar Grove, New Jersey 07009**

**Report No. 23-C-17
Job No. 23-C-16
May 23, 2023**

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Atilla Sencar, P.E.

May 23, 2023
Job No. 23-C-16
Report No. 23-C-17

Garden Homes
820 Morris Turnpike, Suite 301
Short Hills, NJ 07078

Attention: Mark Hoffman
E-Mail: MarkH@gardenhomes.com

Re: Subsurface Investigation Report
Subsurface Stormwater Management System
West Orange, New Jersey

INTRODUCTION

Sor Consulting Engineers, Inc. (SCE) is pleased to present the results of a subsurface investigation performed for a proposed stormwater management system to be constructed at a site in West Orange, New Jersey. The site is identified as Lot 32, Block 179 on the municipal tax maps. Based on a concept plan dated September 23, 2022, the proposed development will reportedly include a combination of stormwater detention basins as well as underground perforated pipes installed at various locations beneath pavements.

PURPOSE AND SCOPE OF WORK

The purpose of this study was to:

- explore the subsurface soil and groundwater conditions within the proposed stormwater management system area;
- estimate the geotechnical engineering properties of the encountered subsurface materials including soil permeability;
- estimate the depth to the seasonal high water table; and
- present recommendations for stormwater infiltration system design.

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To accomplish this, an exploration program consisting of fourteen (14) test pits was conducted on May 8 and 9, 2023. The test pits were performed by D. Willis Excavating, Inc. using a Case Extendhoe rubber tire backhoe and extended to depths ranging from 5 to 16 feet below the existing ground surface. Tube and bag soil samples suitable for identification and laboratory testing purposes were extracted from the test pits. Upon completion, the test pits were backfilled so as not to leave any open holes.

The test pits were performed under the direct technical observation of a licensed geotechnical engineer from Sor Consulting Engineers. Our engineer logged the explorations during excavation and sampled the soils to obtain the appropriate subsurface information. The exploration locations are shown relative to the existing site features on the Exploration Location Plan included in Appendix I of this report. Detailed descriptions of the encountered subsurface conditions are presented on the individual test pit logs included in Appendix II. The subsurface profile and soil conditions at the test pit locations were logged in general accordance with the terminology and protocols described in the NJDEP Stormwater BMP Manual Appendix E and USDA and Burmeister Soil Classification Systems.

All soil samples were brought to our office where they were further examined in our soil mechanics laboratory. Mechanical grain size distribution, moisture content and falling head tube permeability test were performed on fourteen samples to assist in sample identification and evaluation of their engineering soil properties. Laboratory test results are presented in Appendix III.

The results of the subsurface exploration and geotechnical laboratory testing programs have provided the basis for our engineering analysis and geotechnical recommendations. The following discussions of our findings and recommendations are subject to the limitations contained in Appendix IV of this report.

SITE CONDITIONS

Geologic Overview: The subject is located within the New Jersey Piedmont Physiographic Province. The province is primarily a low rolling plain divided by a series

of higher ridges formed by intruding magma of Jurassic age. Locally, glacial till deposits can be found deposited directly by glacial ice during the Wisconsinian glaciation. The bedrock underlying the site is composed of a Jurassic aged basalt formation called the Preakness Basalt, a fine to coarse grained basalt that composes the second Watchung Mountain.

Surface Features: The entire property is currently moderately to heavily wooded and contains some areas of rock outcrops. Large boulders are scattered throughout the site. Several areas identified as wetlands traverse the property in a general northeast to southwest orientation. Surface grades throughout the site reportedly range from a high of Elevation +630 feet in the extreme northern section to Elevation +530 feet along the townhomes.

STORMWATER MANAGEMENT SYSTEM DESIGN CONSIDERATIONS

Basin A (TP-A1, TP-A2): The area is presently a wooded site. Topographic data provided to us indicates that the ground surface elevations range from approximately +542 to +546 feet. The preliminary bottom of basin elevation is set at + 540 feet. The subsurface conditions revealed in the test pits performed for this study encountered 8 inches of topsoil/ vegetation. The topsoil was underlain by clayey soil and extended to depths of 2 to 2.5 feet below the surface. The clayey soil was underlain by brown silty gravelly sand and extended to the maximum depth explored, 13 feet. Groundwater seepage was encountered at depths of 7 feet below the existing ground surface. Laboratory tube permeameter testing performed on the silty gravelly sand stratum (loam material) resulted in permeability rates of 0.64 to 1.39 inches per hour (K2 soils). We recommend that the stormwater management system be hydraulically connected to these materials found at depths of 2 to 2.5 feet. The system should be designed in accordance with the NJDEP Stormwater BMP Manual based on the specific measured permeability rates in each area. We also recommend that the infiltrative surface be covered with a geotextile filter fabric or properly graded soil/aggregate filter material to

provide a uniform separation layer and infiltrative surface to minimize the transmission of fines and possible soil clogging.

Basin B (TP-B1, TP-B2): The area is presently a wooded site. Topographic data provided to us indicates that the ground surface elevations range from approximately +544 to +546 feet. The preliminary bottom of basin elevation is set at + 540 feet. The subsurface conditions revealed in the test pits performed for this study encountered 12 inches of topsoil/ vegetation. The topsoil was underlain by clayey soil and extended to depths of 4 to 5 feet below the surface. The clayey soil was underlain by brown silty gravelly sand and extended to the maximum depth explored, 13 to 15 feet.

Groundwater seepage was encountered at depths of 8 to 9 feet below the existing ground surface. Laboratory tube permeameter testing performed on the silty gravelly sand stratum (loam material) resulted in permeability rates of 0.89 to 1.12 inches per hour (K2 soils). We recommend that the stormwater management system be hydraulically connected to these materials found at depths of 4 to 5 feet. The system should be designed in accordance with the NJDEP Stormwater BMP Manual based on the specific measured permeability rates in each area. We also recommend that the infiltrative surface be covered with a geotextile filter fabric or properly graded soil/aggregate filter material to provide a uniform separation layer and infiltrative surface to minimize the transmission of fines and possible soil clogging.

HDPE C (TP-C1, TP-C2): The area is presently a wooded site. Topographic data provided to us indicate that ground surface elevations range from approximately +558 feet to +560 feet. The preliminary bottom of HDPE system is set at + 557 feet. The subsurface conditions revealed in the test pits performed for this study encountered 12 inches of topsoil/vegetation. The topsoil was underlain by clayey soil and extended to depths of 3.5 to 4 feet below the surface. The clayey soil was underlain by silty gravelly sand (loam material) extended to depths of 5 to 5.5 feet. Basalt bedrock was encountered beneath the loam material. Groundwater was encountered at depths of 4.0 to 4.5 feet below the surface. Due to the presence of clayey soils which is

hydraulically restrictive, high water table and shallow bedrock presence, the area C is not suitable for stormwater infiltration design.

HDPE D (TP-D1, TP-D2): The area is presently a wooded site. Topographic data provided to us indicate that ground surface elevations range from approximately +576 feet to +580 feet. The preliminary bottom of HDPE system is set at + 570 feet. The subsurface conditions revealed in the test pits performed for this study encountered 8 to 12 inches of topsoil/vegetation. The topsoil was underlain by clayey soil and extended to a depth of 2 feet below the surface. The clayey soil was underlain by silty gravelly sand (loam material) extended to the maximum depths explored, 9 to 16 feet. TP-D2 encountered bedrock at 9' below the surface. Groundwater seepage was encountered at depths of 6 to 10 feet below the surface. Laboratory tube permeameter testing performed on the silty gravelly sand stratum (loam material) resulted in permeability rates of 0.62 to 2.64 inches per hour (K2 to K3 soils). We recommend that the stormwater management system be hydraulically connected to these materials found at a depth of 2 feet. The system should be designed in accordance with the NJDEP Stormwater BMP Manual based on the specific measured permeability rates in each area. We also recommend that the infiltrative surface be covered with a geotextile filter fabric or properly graded soil/aggregate filter material to provide a uniform separation layer and infiltrative surface to minimize the transmission of fines and possible soil clogging.

HDPE E (TP-E1, TP-E2): The area is presently a wooded site. Topographic data provided to us indicate that ground surface elevations range from approximately +582 feet to +590 feet. The preliminary bottom of HDPE system is set at + 586 feet. The subsurface conditions revealed in the test pits performed for this study encountered 8 inches of topsoil/vegetation. The topsoil was underlain by clayey soil and extended to depths of 2.5 to 3.0 feet below the surface. The clayey soil was underlain by brown silty gravelly sand (loam material) extended to the maximum depths explored, 12 to 14 feet. Groundwater seepage was encountered at depths of 7 to 9 feet below the surface. Laboratory tube permeameter testing performed on the silty gravelly sand stratum (loam

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material) resulted in permeability rates of 0.68 to 0.69 inches per hour (K2 soils). We recommend that the stormwater management system be hydraulically connected to these materials found at a depth of 2.5 to 3.0 feet. It appears that the lower section of the ware will be filled to obtain the proposed finished grades. We recommend that clayey soil should be removed prior to fill placement. The fill material should consist of granular soil and should be tested for permeability. The system should be designed in accordance with the NJDEP Stormwater BMP Manual based on the specific measured permeability rates in each area. We also recommend that the infiltrative surface be covered with a geotextile filter fabric or properly graded soil/aggregate filter material to provide a uniform separation layer and infiltrative surface to minimize the transmission of fines and possible soil clogging.

Basin F (TP-F1, TP-F2): The area is presently a wooded site. Topographic data provided to us indicates that the ground surface elevations range from approximately +608 to +610 feet. The preliminary bottom of basin elevation was not provided. The subsurface conditions revealed in the test pits performed for this study encountered 10 to 12 inches of topsoil/ vegetation. The topsoil was underlain by clayey soil and extended to a depth 3 feet below the surface at TP-F1 only. The clayey soil or topsoil was underlain by brown silty gravelly sand and extended to the maximum depths explored, 12 to 13 feet. Groundwater seepage was encountered at depths of 8 feet below the existing ground surface. Laboratory tube permeameter testing performed on the silty gravelly sand stratum (loam material) resulted in permeability rates of 1.85 to 2.32 inches per hour (K2 to K3 soils). We recommend that the stormwater management system be hydraulically connected to these materials found at depths of 1 to 3 feet. The system should be designed in accordance with the NJDEP Stormwater BMP Manual based on the specific measured permeability rates in each area. We also recommend that the infiltrative surface be covered with a geotextile filter fabric or properly graded soil/aggregate filter material to provide a uniform separation layer and infiltrative surface to minimize the transmission of fines and possible soil clogging.

Basin G (TP-G1, TP-G2): The area is presently open land. Topographic data provided to us indicates that the ground surface elevations range from approximately +536 to +538 feet. The preliminary bottom of basin elevation is set at + 530 feet. The subsurface conditions revealed in the test pits performed for this study encountered 4 to 8 inches of topsoil/ vegetation. The topsoil was underlain by clayey soil and extended to depths of 1.5 to 4 feet below the surface. The clayey soil was underlain by brown silty gravelly sand and extended to the maximum depth explored, 15 to 16 feet. Groundwater or seasonal high groundwater was not encountered at the maximum depths explored. Laboratory tube permeameter testing performed on the silty gravelly sand stratum (loam material) resulted in permeability rates of 0.74 to 0.95 inches per hour (K2 soils). We recommend that the stormwater management system be hydraulically connected to these materials found at depths of 1.5 to 4 feet. The system should be designed in accordance with the NJDEP Stormwater BMP Manual based on the specific measured permeability rates in each area. We also recommend that the infiltrative surface be covered with a geotextile filter fabric or properly graded soil/aggregate filter material to provide a uniform separation layer and infiltrative surface to minimize the transmission of fines and possible soil clogging.

RECOMMENDED SERVICES

It is recommended that Sor Consulting Engineers be provided the opportunity for a general review of the final design and specifications to assure that the stormwater management system recommendations are properly interpreted and implemented in the construction documents.

We also recommend that controlled compacted fill and backfill operations as well as stormwater management system subgrades be observed by a geotechnical engineer from our firm. This is to ensure compliance with the recommendations contained herein and to address any changes in the subsurface conditions that were not disclosed by the test pits.

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Sor Consulting Engineers appreciates the opportunity to be of assistance with this project. Should there be any questions concerning the information provided herein, please do not hesitate to contact us. The following appendices are attached and complete this report:

Appendix I: Exploration Location Plan

Appendix II: Test Pit Logs A-1 through G-2

Burmeister and USDA Soil Classification System

Appendix III: Laboratory Soil Test Results

Appendix IV: Limitations

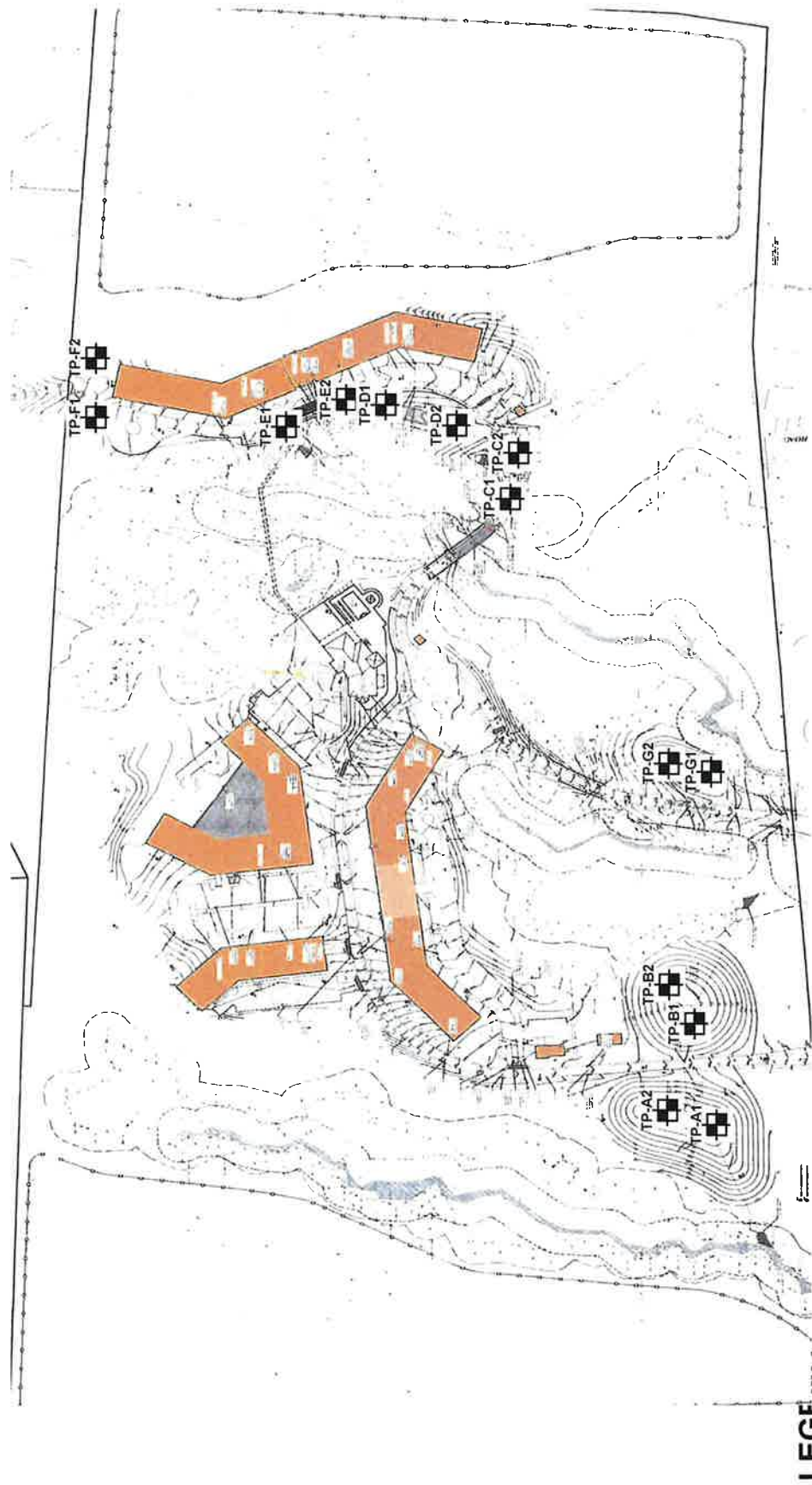
Respectfully submitted,

SOR CONSULTING ENGINEERS, INC.

Atilla Sencar, P.E.
Senior Engineer

AS/tm
Cc: Anderson Consulting Services, LLC
Attn: Paul Anderson, P.E., P.E., CME
E-Mail: pandersonpe2gmail.com

APPENDIX I
EXPLORATION LOCATION PLAN



LEGEND

TP-A1

Number and approximate location of geotechnical test pit performed by SCE for this study.

EXPLORATION LOCATION PLAN **GARDEN HOMES** **PROPOSED STORMWATER MANAGEMENT SYSTEM** **WEST ORANGE, NEW JERSEY**

SOR CONSULTING ENGINEERS, INC.

Geotechnical Engineering – Materials Testing – Forensic Studies
 98 Sand Park Road, Cedar Grove, New Jersey 07009

NOTES

1. This drawing is part of Sor Consulting Engineers, Inc. Report No. 23-C-17 and should be read together with the report for complete evaluation.
2. General Layout was obtained from a plan provided by the Client.

Prepared By : A.S.	Approved By :	DRAWING NO.
Date : 05/17/2023	Date :	23-C-16-1
Scale : NTS	Report No. : 23-C-17	Sheet No. 1 of 1

APPENDIX II

TEST PIT LOGS A-1 THROUGH G-2

BURMEISTER AND USDA SOIL CLASSIFICATION SYSTEM

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-A1
---	---------------------	---------------------------

CLIENT :	Garden Homes	GSE	+544'
PROJECT :	Stormwater Management System	WATER LEVEL	7'-0"
LOCATION :	West Orange, New Jersey	DATE	5/9/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation	
2			Yellowish Brown Clayey SILT, some medium to fine Sand (Clay Loam)	
3				
4	Dense	Moist	Brown coarse to fine Sand, some Silt, and coarse to fine Gravel, Cobbles (Loam)	Basin Bottom +540'
5				Permeability @5' K=1.39 in/hr (K2)
6				
7				
8		Wet		Water Seepage @ 7'
9				
10				
11				
12				
13				
14			Test Pit Completed at 13'-0"	
15				
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
 EQUIPMENT : Backhoe Case Extendhoe
 STL REPRESENTATIVE : A. Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-A2
---	---------------------	---------------------------

CLIENT :	Garden Homes	GSE	+545'
PROJECT :	Stormwater Management System	WATER LEVEL	7'-0"
LOCATION :	West Orange, New Jersey	DATE	5/9/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation 0'-8"	
2			Yellowish Brown Clayey SILT, some medium to fine Sand (Clay Loam) 2'-0"	
3	Dense	Moist	Brown coarse to fine Sand, some Silt, and coarse to fine Gravel, Cobbles (Loam)	Basin Bottom +540'
4				
5				
6				Permeability @5' K=0.64 in/hr (K2)
7		Wet		Water Seepage @ 7'
8				
9				
10				
11				
12				
13				
14			Test Pit Completed at 13'-0"	
15				
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A. Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-B1
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CLIENT :	Garden Homes	GSE	+545'
PROJECT :	Stormwater Management System	WATER LEVEL	8'-0"
LOCATION :	West Orange, New Jersey	DATE	5/9/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation	
2			Yellowish Brown medium to fine Sand, and Clayey Silt (Sandy Clay Loam)	
3				
4				
5	Dense	Moist	Brown coarse to fine Sand, some Silt, some coarse to fine Gravel, Cobbles (Loam)	Basin Bottom +540' Permeability @6' K=1.12 in/hr (K2) Water Seepage @ 8'
6				
7				
8				
9		Wet		
10				
11				
12				
13				
14			Test Pit Completed at 13'-0"	
15				
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
 EQUIPMENT : Backhoe Case Extendhoe
 STL REPRESENTATIVE : A. Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-B2
---	---------------------	---------------------------

CLIENT :	Garden Homes	GSE	+547'
PROJECT :	Stormwater Management System	WATER LEVEL	9'-0"
LOCATION :	West Orange, New Jersey	DATE	5/9/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation	
2				
3				
4				
5				
6	Dense	Moist	Yellowish Brown Clayey SILT, some medium to fine Sand, little medium to fine Gravel (Clay Loam)	
7				
8				
9				
10				
11		Wet	Brown coarse to fine Sand, and Silt, some coarse to fine Gravel, Cobbles (Loam)	Basin Bottom +540' Permeability @ 7' K=0.89 in/hr (K2) Water Seepage @ 9'
12				
13				
14				
15				
16				
17				
18				
19				
20				
			Test Pit Completed at 15'-0"	

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A. Sencar

SOR CONSULTING ENGINEERS, INC.		TEST PIT LOG		TEST PIT NO. TP-C1
CLIENT : Garden Homes			GSE	+558'
PROJECT : Stormwater Management System			WATER LEVEL	4'-0"
LOCATION : West Orange, New Jersey			DATE	5/8/2023
			JOB NO.	23-C-16
			REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Soft	Wet	Topsoil/Vegetation	HDPE Bottom +557' ----- Permeability <0.2in./hr. (K0) Water Seepage at 4'-0"
2			Dark Yellowish Brown Clayey SILT, some medium to fine Sand (Clay Loam)	
3				
4				
5	Dense	Wet	Brown coarse to fine Sand, some Silt, and coarse to fine Gravel (Loam)	
6			Bedrock at 5'-6"	5'-6"
7			Test Pit Completed at 5'-6"	
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A. Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-C2
---	---------------------	---------------------------

CLIENT :	Garden Homes	GSE	+559'
PROJECT :	Stormwater Management System	WATER LEVEL	4'-0"
LOCATION :	West Orange, New Jersey	DATE	5/8/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Soft	Wet	Topsoil/Vegetation 1'-0"	HDPE Bottom +557'
2			Yellowish Brown Clayey SILT (Clay Loam)	Permeability <0.2in./hr. (K0)
3				
4			3'-6"	
5	Dense	Wet	Brown coarse to fine Sand, some Silt, and coarse to fine Gravel, Cobbles (Loam)	Water Seepage at 4'-0"
6			Bedrock at 5'-0"	
7			Test Pit Completed at 5'-0"	
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-D1
---	---------------------	---------------------------

CLIENT :	Garden Homes	GSE	+578'
PROJECT :	Stormwater Management System	WATER LEVEL	10'-0"
LOCATION :	West Orange, New Jersey	DATE	5/8/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation 0'-8"	
2			Dark Yellowish Brown coarse to fine Sand, and Clayey Silt, little coarse to fine Gravel (Sandy Clay Loam) 2'-0"	
3			Dense	
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17			Test Pit Completed at 16'-0"	
18				
19				
20				

EXCAVATOR : D. Willis Excavating
 EQUIPMENT : Backhoe Case Extendhoe
 STL REPRESENTATIVE : A. Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-D2
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CLIENT : Garden Homes	GSE +574'
PROJECT : Stormwater Management System	WATER LEVEL 6'-0"
LOCATION : West Orange, New Jersey	DATE 5/8/2023
	JOB NO. 23-C-16
	REPORT NO. 23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation 1'-0"	
2			Dark Yellowish Brown coarse to fine Sand, and Clayey Silt, little coarse to fine Gravel (Sandy Clay Loam) 2'-0"	
3	Dense	Moist	Brown coarse to fine SAND, little Silt, some coarse to fine Gravel, Cobbles (Sandy Loam)	HDPE Bottom +570'
4				
5	Wet			Permeability @4' K=2.64 in/hr (K3) Water Seepage @ 6'
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
			Bedrock at 9'	
			Test Pit Completed at 9'-0"	

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A. Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-E1
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CLIENT :	Garden Homes	GSE	+590'
PROJECT :	Stormwater Management System	WATER LEVEL	7'-0"
LOCATION :	West Orange, New Jersey	DATE	5/8/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation	
2			Yellowish Brown Clayey SILT, some medium to fine Sand, little coarse to fine Gravel (Clay Loam)	
3				
4	Dense	Moist	Brown coarse to fine Sand, some Silt, little coarse to fine Gravel, Cobbles, Boulders (Loam)	HDPE Bottom +586'
5				Permeability @5' K=0.61 in/hr (K2) Water Seepage @ 7'
6				
7				
8		Wet		
9				
10				
11				
12				
13			Test Pit Completed at 12'-0'	
14				
15				
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-E2
---	---------------------	---------------------------

CLIENT :	Garden Homes	GSE	+586'
PROJECT :	Stormwater Management System	WATER LEVEL	9'-0"
LOCATION :	West Orange, New Jersey	DATE	5/8/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation	HDPE Bottom +586'
2			Dark Yellowish Brown Clayey SILT, some medium to fine Sand, little coarse to fine Gravel (Clay Loam)	
3				
4	Dense	Moist	Brown coarse to fine Sand, some Silt, some coarse to fine Gravel, Cobbles, Boulders (Loam)	Permeability @7' K=0.69 in/hr (K2) Water Seepage @ 9'
5				
6				
7		Wet		
8				
9				
10				
11				
12				
13				
14				
15			Test Pit Completed at 14'-0"	
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-F1
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CLIENT :	Garden Homes	GSE	+612'
PROJECT :	Stormwater Management System	WATER LEVEL	8'-0"
LOCATION :	West Orange, New Jersey	DATE	5/8/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation 1'-0"	Permeability @6' K=1.85 in/hr (K2) Water Seepage @8'
2			Brown coarse to fine Sand, some Clayey Silt, little coarse to fine Gravel (Sandy Clay Loam)	
3			3'-0"	
4	Dense	Moist	Brown coarse to fine SAND, little Silt, little coarse to fine Gravel, Cobbles, Boulders (Loam)	
5				
6				
7				
8		Wet	8'-0"	
9			Brown coarse to fine SAND, little Silt, some coarse to fine Gravel, w/ Rock Fragments (Sandy Loam)	
10				
11				
12				
13				
14			Test Pit Completed at 13'-0"	
15				
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A. Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-F2
---	---------------------	---------------------------

CLIENT :	Garden Homes	GSE	+612'
PROJECT :	Stormwater Management System	WATER LEVEL	8'-0"
LOCATION :	West Orange, New Jersey	DATE	5/8/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation	Permeability @ 5' K=2.32 in/hr (K3) Water Seepage @8'
2			Brown coarse to fine SAND, some, Silt, some coarse to fine Gravel (Sandy Loam)	
3				
4				
5				
6				
7		Wet		
8				
9			Brown coarse to fine SAND, little Silt, some coarse to fine Gravel, w/ Rock Fragments (Loam)	
10				
11				
12				
13				
14			Test Pit Completed at 13'-0"	
15				
16				
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-G1
---	---------------------	---------------------------

CLIENT : Garden Homes	GSE +534'
PROJECT : Stormwater Management System	WATER LEVEL N/A
LOCATION : West Orange, New Jersey	DATE 5/9/2023
	JOB NO. 23-C-16
	REPORT NO. 23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation 0'-4"	
2			Grayish Brown Clayey SILT (Clay Loam) 1'-6"	
3	Dense	Moist	Brown coarse to fine Sand, some Silt, some coarse to fine Gravel, Cobbles (Loam)	
4				Basin Bottom +530'
5				
6				Permeability @ 6' K=0.95 in/hr (K2)
7				
8				
9				
10				
11				
12			12'-0"	
13			Brown coarse to fine SAND, trace Silt, some coarse to fine Gravel (Sandy Loam)	
14				
15				
16			Test Boring Completed at 15'-0"	
17				
18				
19				
20				

EXCAVATOR : D. Willis Excavating
EQUIPMENT : Backhoe Case Extendhoe
STL REPRESENTATIVE : A Sencar

SOR CONSULTING ENGINEERS, INC.	TEST PIT LOG	TEST PIT NO. TP-G2
---	---------------------	---------------------------

CLIENT :	Garden Homes	GSE	+538'
PROJECT :	Stormwater Management System	WATER LEVEL	N/A
LOCATION :	West Orange, New Jersey	DATE	5/9/2023
		JOB NO.	23-C-16
		REPORT NO.	23-C-17

DEPTH FT.	DENSITY	MOISTURE	GROUND SURFACE	REMARKS
1	Firm	Moist	Topsoil/Vegetation	
2				
3				
4				
5	Dense	Moist	Yellowish Brown Clayey SILT (Clay Loam)	
6				
7				
8				
9		Moist	Brown coarse to fine Sand, and Silt, some coarse to fine Gravel, Cobbles (Loam)	Basin Bottom +530' Permeability @9' K=0.74 in/hr (K2)
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
			Test Pit Completed at 16'-0"	

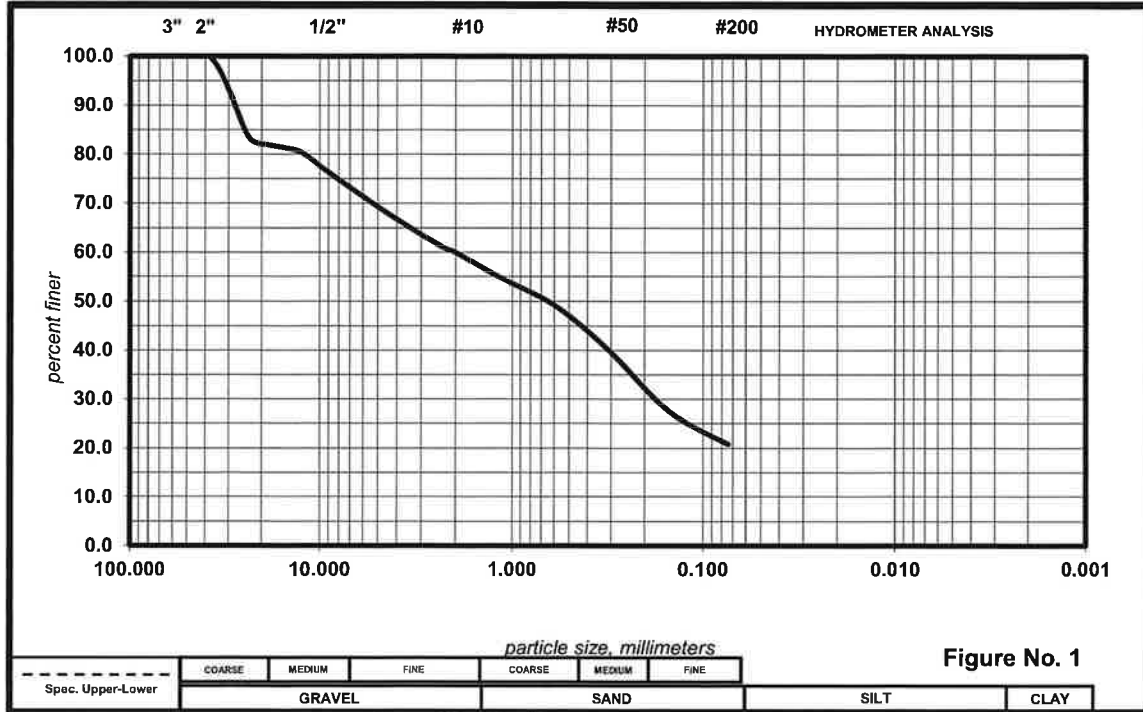
EXCAVATOR : D. Willis Excavating
 EQUIPMENT : Backhoe Case Extendhoe
 STL REPRESENTATIVE : A. Sencar

APPENDIX III
LABORATORY SOIL TEST RESULTS

SOR TESTING LABORATORIES, INC.

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PARTICLE SIZE DISTRIBUTION TEST REPORT



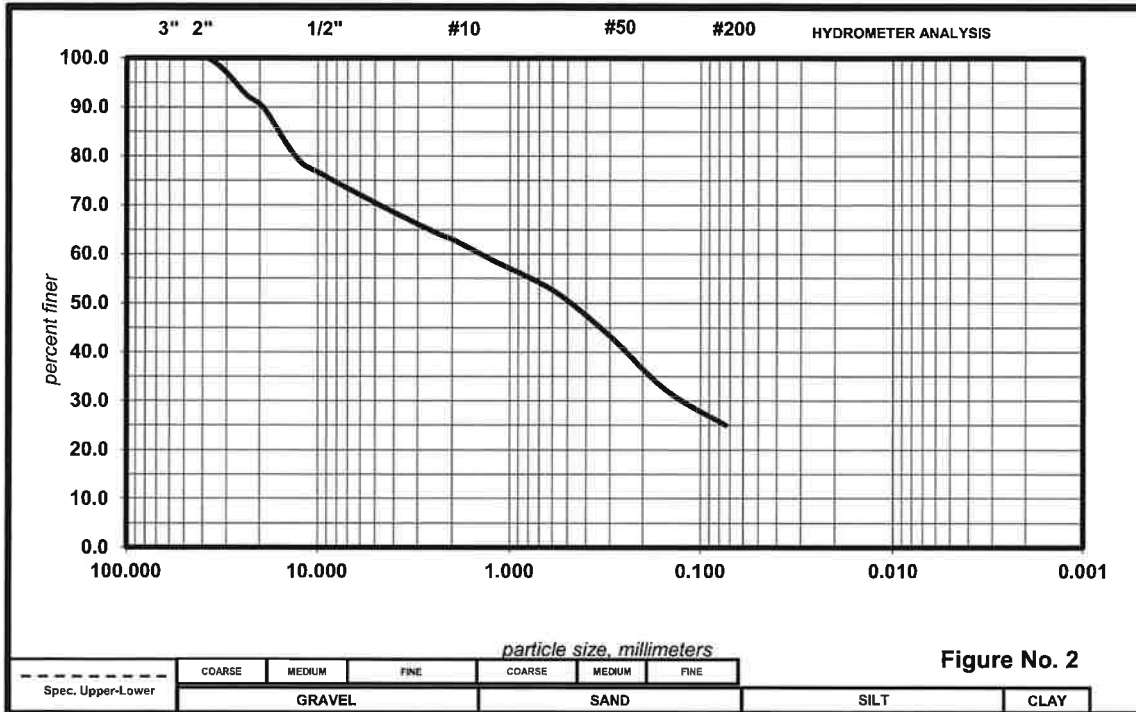
Specification*

Sieve Size	% Finer	Min.(%)	Max.(%)	Sample Identification		
3" (75 mm)				Sample No.:	TP-A1, S-1	
2 1/2" (63 mm)				Lab No.:	A23-067-01	
2" (50 mm)				Source/Location:	5'	
1 1/2" (38.1 mm)	100.0			Description:	D.Brown of Sand, some Silt, and of Gravel <i>sample description in accordance with Burmister System</i>	
1" (25 mm)	83.5					
3/4" (19 mm)	82.0					
5/8" (16 mm)						
1/2" (12.5 mm)	80.5					
3/8" (9.5 mm)	77.0			LL :	PL :	PI :
5/16" (8 mm)				As received Moisture Content: 13.2 %		
1/4" (6.3 mm)						
#4 (4.75 mm)	68.6			Classification:		
#6 (3.35 mm)				USCS:	[SM]	
#8 (2.36 mm)	61.2			AASHTO:		
#10 (2 mm)				Remarks:		
#14 (1.4 mm)				Sample received in lab on May 12, 2023		
#16 (1.18 mm)	55.0					
#20 (850 µm)				Permeability, k: 9.6 x 10-4 cm/s (1.39 in/hr) K2		
#30 (600 µm)	49.1			Permeability, k: 9.7 x 10-4 cm/s (1.40 in/hr) K2		
#40 (425 µm)				Client:	Garden Homes	
#50 (300 µm)	39.4			Project:	Stormwater Management System	
#60 (250 µm)						
#100 (150 µm)	27.5			Location:	West Orange, New Jersey	
#200 (75 µm)	20.7			Date:	17-May-23	
-				Job No.:	23-C-16	Report No.: 23-C-17

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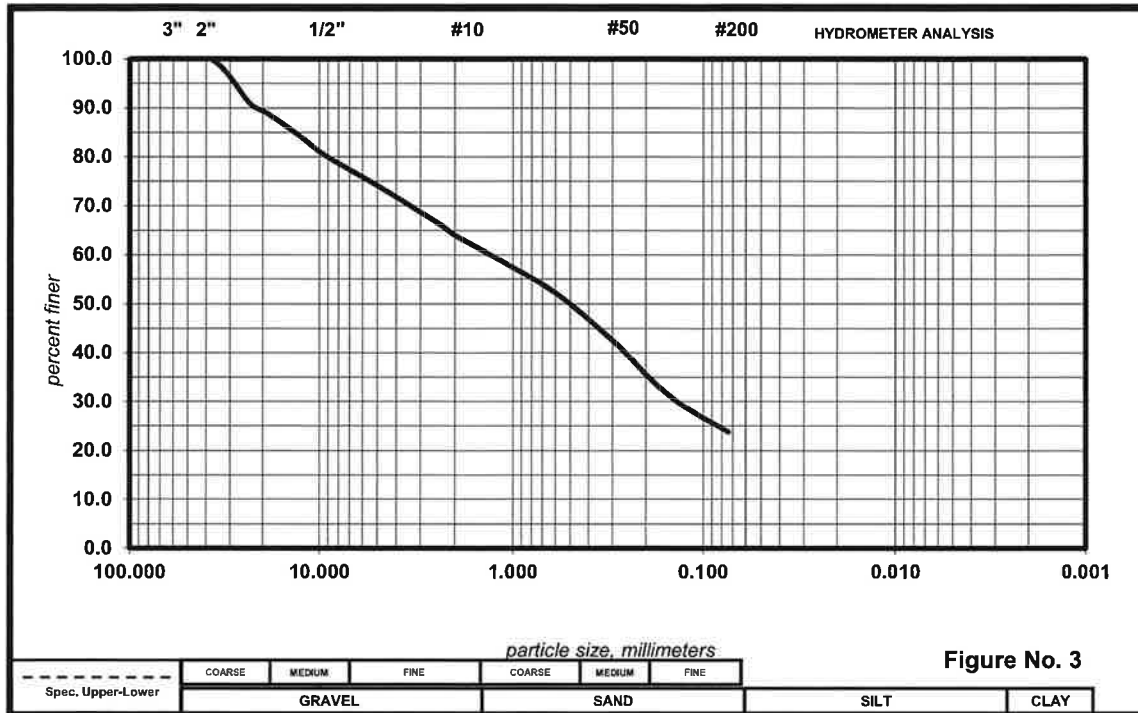


Specification*				Sample Identification		
Sieve Size	% Finer	Min.(%)	Max.(%)	Sample No.: TP-A2, S-1 Lab No.: A23-067-02 Source/Location: 5' Description: Brown of Sand, some Silt, and of Gravel sample description in accordance with Burmister System LL : PL : PI : As received Moisture Content: 12.3 % Classification: USCS: [SM] AASHTO: Remarks: Sample received in lab on May 12, 2023 Permeability, k: 4.4 x 10-4 cm/s (0.64 in/hr) K2 Permeability, k: 4.3 x 10-4 cm/s (0.62 in/hr) K2 Client: Garden Homes Project: Stormwater Management System Location: West Orange, New Jersey Date: 17-May-23 Job No.: 23-C-16 Report No.: 23-C-17		
3" (75 mm)						
2 1/2" (63 mm)						
2" (50 mm)						
1 1/2" (38.1 mm)	100.0					
1" (25 mm)	92.5					
3/4" (19 mm)	89.7					
5/8" (16 mm)						
1/2" (12.5 mm)	79.5					
3/8" (9.5 mm)	76.3					
5/16" (8 mm)						
1/4" (6.3 mm)						
#4 (4.75 mm)	70.0					
#6 (3.35 mm)						
#8 (2.36 mm)	64.2					
#10 (2 mm)						
#14 (1.4 mm)						
#16 (1.18 mm)	58.5					
#20 (850 µm)						
#30 (600 µm)	52.5					
#40 (425 µm)						
#50 (300 µm)	43.2					
#60 (250 µm)						
#100 (150 µm)	32.1					
#200 (75 µm)	25.0					
-						

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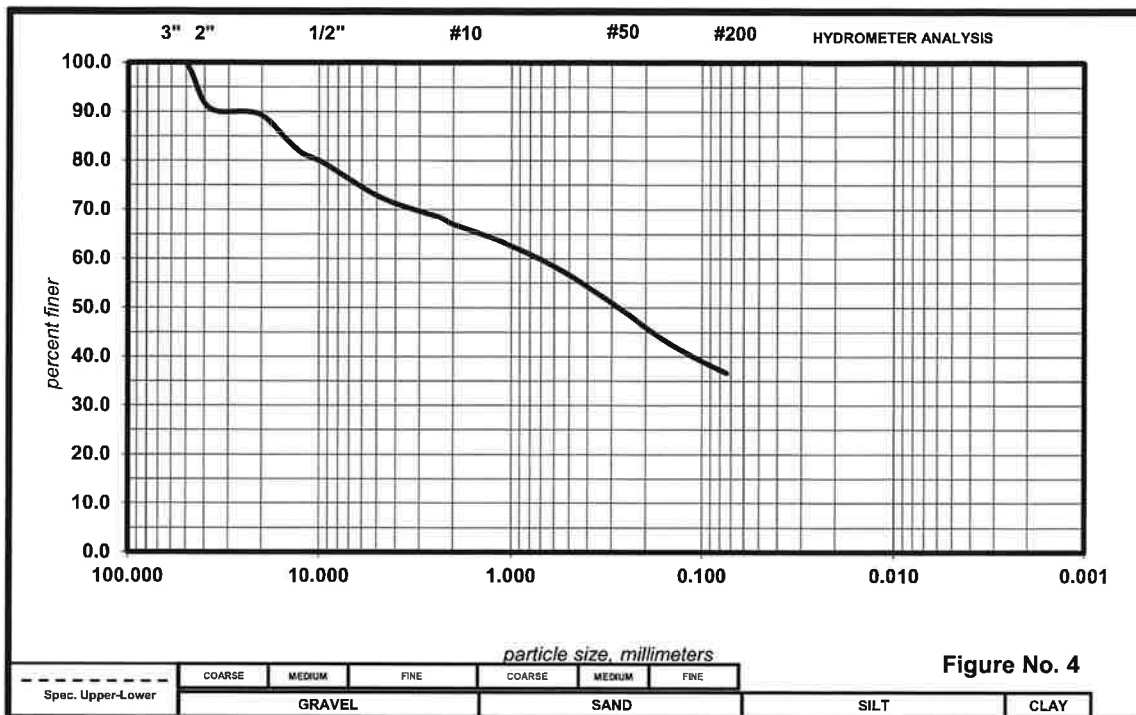
Specification*

Sieve Size	% Finer	Min.(%)	Max.(%)	Sample Identification		
3" (75 mm)				Sample No.:	TP-B1, S-1	
2 1/2" (63 mm)				Lab No.:	A23-067-03	
2" (50 mm)				Source/Location:	6'	
1 1/2" (38.1 mm)	100.0			Description:	D.Brown of Sand, some Silt, and of Gravel	
1" (25 mm)	90.9					
3/4" (19 mm)	88.9					
5/8" (16 mm)						
1/2" (12.5 mm)	84.3					
3/8" (9.5 mm)	80.5			sample description in accordance with Burmister System		
5/16" (8 mm)				LL :	PL :	PI :
1/4" (6.3 mm)				As received Moisture Content: 12.8 %		
#4 (4.75 mm)	73.6			Classification:		
#6 (3.35 mm)				USCS:	[SM]	
#8 (2.36 mm)	66.2			AASHTO:		
#10 (2 mm)				Remarks:		
#14 (1.4 mm)				Sample received in lab on May 12, 2023		
#16 (1.18 mm)	59.0			Permeability, k: 7.8 x 10-4 cm/s (1.12 in/hr) K2		
#20 (850 µm)				Permeability, k: 7.7 x 10-4 cm/s (1.11 in/hr) K2		
#30 (600 µm)	52.1			Client:	Garden Homes	
#40 (425 µm)				Project:	Stormwater Management System	
#50 (300 µm)	42.3			Location:	West Orange, New Jersey	
#60 (250 µm)				Date:	17-May-23	
#100 (150 µm)	31.1			Job No.:	23-C-16	Report No.: 23-C-17
#200 (75 µm)	23.8					

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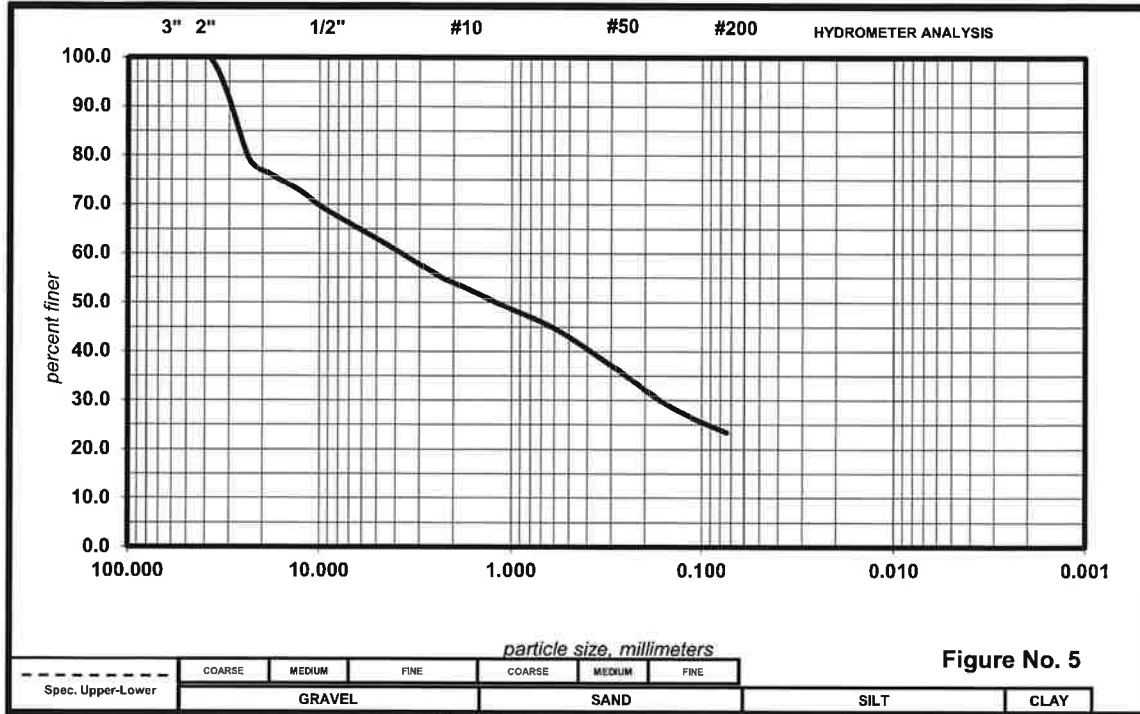
Specification*

Sieve Size	% Finer	Min.(%)	Max.(%)	Sample Identification		
3" (75 mm)				Sample No.:	TP-B2, S-1	
2 1/2" (63 mm)				Lab No.:	A23-067-04	
2" (50 mm)	100.0			Source/Location:	7'	
1 1/2" (38.1 mm)	90.8			Description:	D.Brown of Sand, and Silt, some of Gravel	
1" (25 mm)	90.0					
3/4" (19 mm)	88.7					
5/8" (16 mm)						
1/2" (12.5 mm)	81.8					
3/8" (9.5 mm)	79.6			sample description in accordance with Burmister System		
5/16" (8 mm)				LL :	PL :	PI :
1/4" (6.3 mm)				As received Moisture Content: 20.3 %		
#4 (4.75 mm)	72.4			Classification:		
#6 (3.35 mm)				USCS:	[SM]	
#8 (2.36 mm)	68.4			AASHTO:		
#10 (2 mm)				Remarks:		
#14 (1.4 mm)				Sample received in lab on May 12, 2023		
#16 (1.18 mm)	63.9			Permeability, k: 6.2 x 10-4 cm/s (0.89 in/hr) K2		
#20 (850 μm)				Permeability, k: 6.1 x 10-4 cm/s (0.88 in/hr) K2		
#30 (600 μm)	58.3			Client:	Garden Homes	
#40 (425 μm)				Project:	Stormwater Management System	
#50 (300 μm)	50.9			Location:	West Orange, New Jersey	
#60 (250 μm)				Date:	17-May-23	
#100 (150 μm)	42.6			Job No.:	23-C-16	Report No.: 23-C-17
#200 (75 μm)	36.6					
-						

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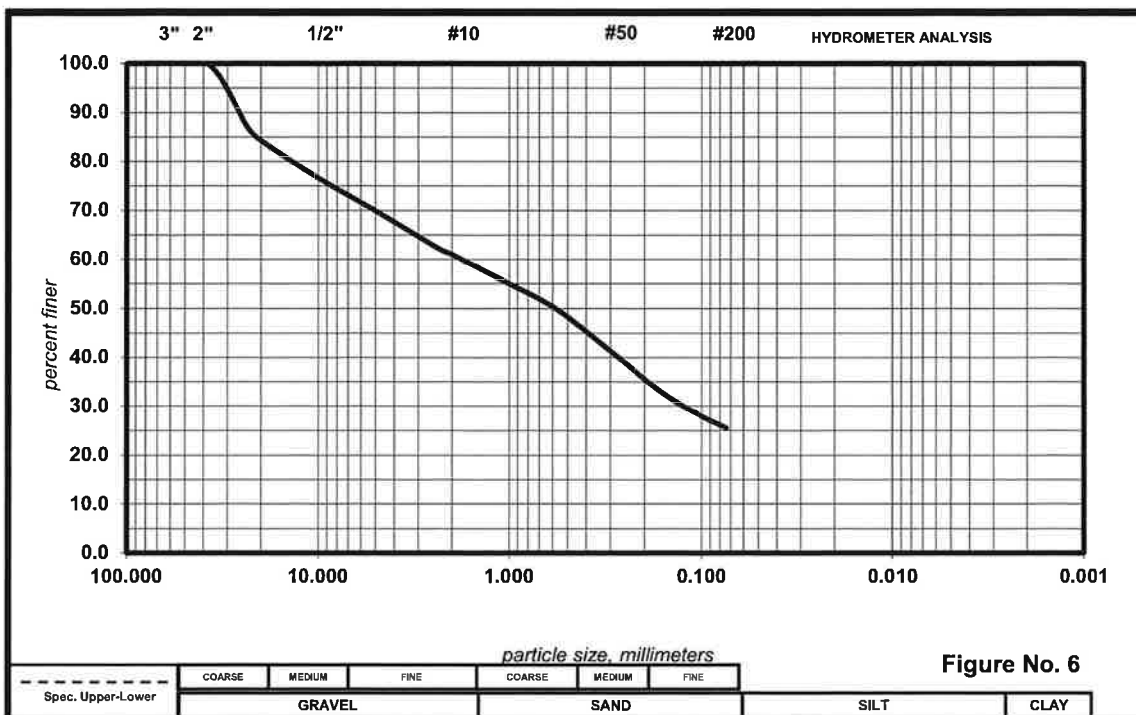


Specification*				Sample Identification		
Sieve Size	% Finer	Min.(%)	Max.(%)	Sample No.: TP-C1, S-1 Lab No.: A23-067-05 Source/Location: 39" Description: Light Brown of Sand, some Silt, and of Gravel sample description in accordance with Burmister System LL : PL : PI : As received Moisture Content: 20.3 % Classification: USCS: [SM] AASHTO: Remarks: Sample received in lab on May 12, 2023 Permeability, k: 7.5 x 10-4 cm/s (1.08 in/hr) K2 Permeability, k: 7.4 x 10-4 cm/s (1.07 in/hr) K2 Client: Garden Homes Project: Stormwater Management System Location: West Orange, New Jersey Date: 17-May-23 Job No.: 23-C-16 Report No.: 23-C-17		
3" (75 mm)						
2 1/2" (63 mm)						
2" (50 mm)						
1 1/2" (38.1 mm)	100.0					
1" (25 mm)	79.0					
3/4" (19 mm)	76.5					
5/8" (16 mm)						
1/2" (12.5 mm)	72.7					
3/8" (9.5 mm)	69.2					
5/16" (8 mm)						
1/4" (6.3 mm)						
#4 (4.75 mm)	62.5					
#6 (3.35 mm)						
#8 (2.36 mm)	55.3					
#10 (2 mm)						
#14 (1.4 mm)						
#16 (1.18 mm)	49.9					
#20 (850 µm)						
#30 (600 µm)	44.6					
#40 (425 µm)						
#50 (300 µm)	37.0					
#60 (250 µm)						
#100 (150 µm)	28.8					
#200 (75 µm)	23.4					
-						

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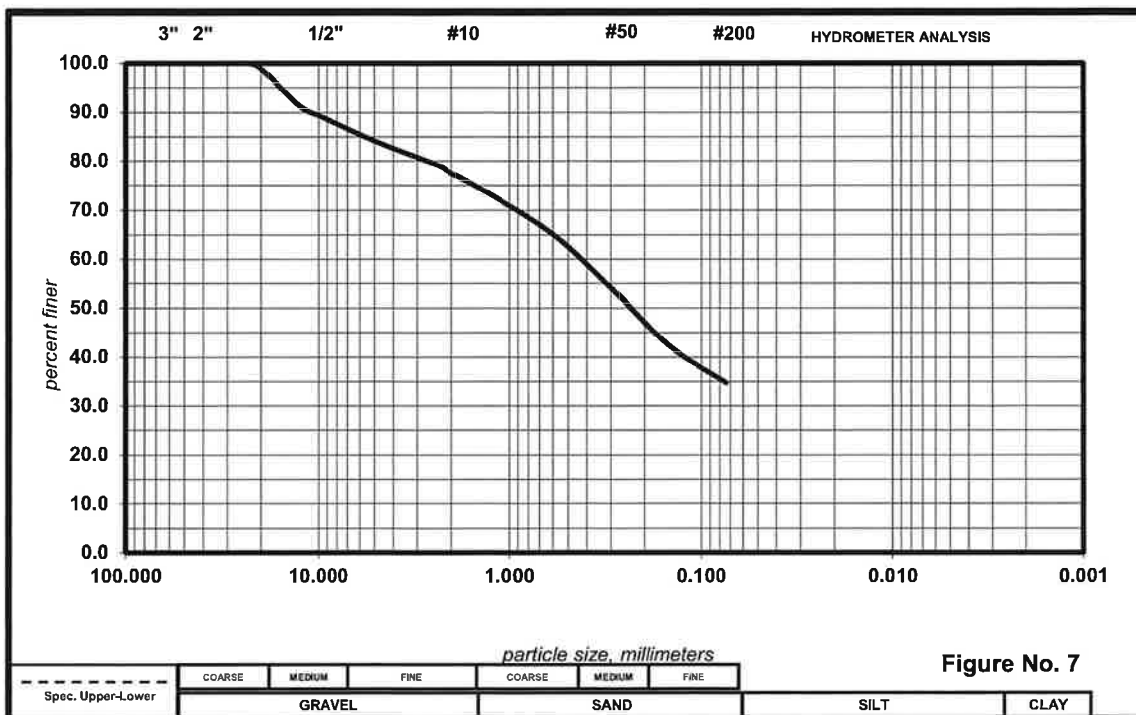


Specification*				Sample Identification		
Sieve Size	% Finer	Min.(%)	Max.(%)	Sample No.: TP-C2, S-1 Lab No.: A23-067-06 Source/Location: 38.5" Description: Light Brown of Sand, some Silt, and of Gravel sample description in accordance with Burmister System LL : PL : PI : As received Moisture Content: 23.5 % Classification: USCS: [SM] AASHTO: Remarks: Sample received in lab on May 12, 2023 Permeability, k: 5.9 x 10-4 cm/s (0.85 in/hr) K2 Permeability, k: 5.8 x 10-4 cm/s (0.84 in/hr) K2 Client: Garden Homes Project: Stormwater Management System Location: West Orange, New Jersey Date: 17-May-23 Job No.: 23-C-16 Report No.: 23-C-17		
3" (75 mm)						
2 1/2" (63 mm)						
2" (50 mm)						
1 1/2" (38.1 mm)	100.0					
1" (25 mm)	86.9					
3/4" (19 mm)	83.7					
5/8" (16 mm)						
1/2" (12.5 mm)	79.1					
3/8" (9.5 mm)	76.1					
5/16" (8 mm)						
1/4" (6.3 mm)						
#4 (4.75 mm)	69.4					
#6 (3.35 mm)						
#8 (2.36 mm)	62.4					
#10 (2 mm)						
#14 (1.4 mm)						
#16 (1.18 mm)	56.5					
#20 (850 µm)						
#30 (600 µm)	50.2					
#40 (425 µm)						
#50 (300 µm)	41.2					
#60 (250 µm)						
#100 (150 µm)	31.7					
#200 (75 µm)	25.6					

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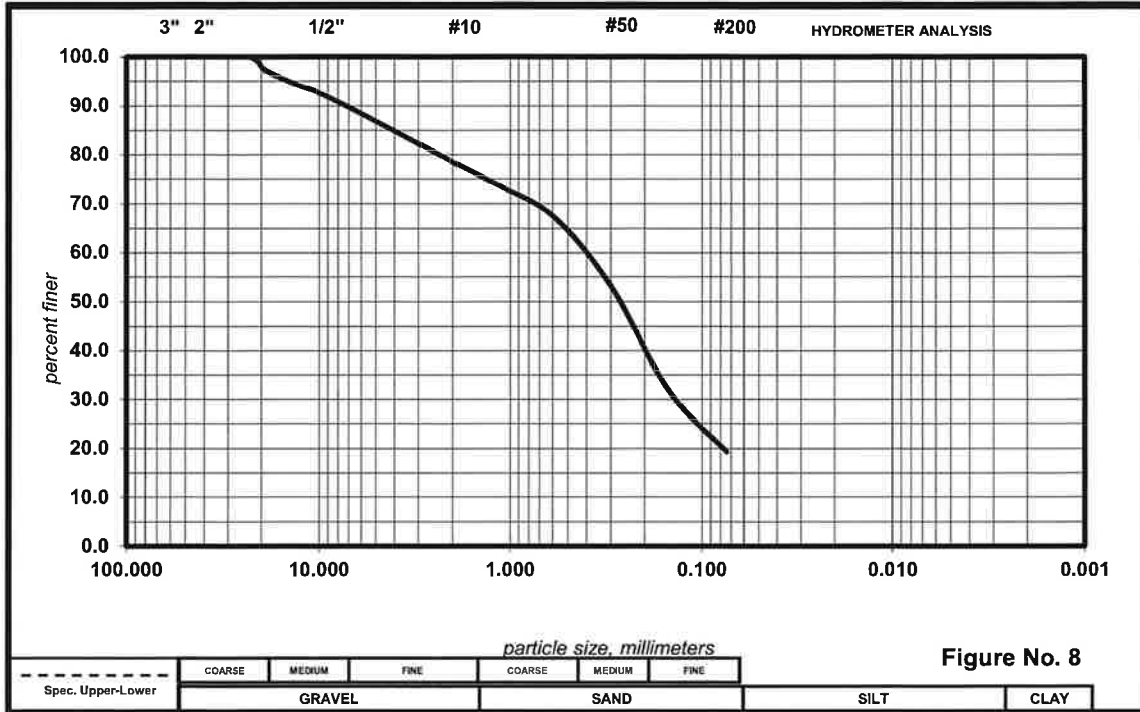
Specification*

Sieve Size	% Finer	Min.(%)	Max.(%)	Sample Identification		
3" (75 mm)				Sample No.:	TP-D1, S-1	
2 1/2" (63 mm)				Lab No.:	A23-067-07	
2" (50 mm)				Source/Location:	8'	
1 1/2" (38.1 mm)				Description:	Red.Br. of Sand, some Silt, some mf Gravel	
1" (25 mm)	100.0					
3/4" (19 mm)	98.1					
5/8" (16 mm)						
1/2" (12.5 mm)	91.3					
3/8" (9.5 mm)	89.0			sample description in accordance with Burmister System		
5/16" (8 mm)				LL :	PL :	PI :
1/4" (6.3 mm)				As received Moisture Content: 10.5 %		
#4 (4.75 mm)	83.7			Classification:		
#6 (3.35 mm)				USCS: [SM]		
#8 (2.36 mm)	79.2			AASHTO:		
#10 (2 mm)				Remarks:		
#14 (1.4 mm)				Sample received in lab on May 12, 2023		
#16 (1.18 mm)	72.7			Permeability, k: 4.3 x 10-4 cm/s (0.62 in/hr) K2		
#20 (850 µm)				Permeability, k: 4.5 x 10-4 cm/s (0.64 in/hr) K2		
#30 (600 µm)	64.9			Client: Garden Homes		
#40 (425 µm)				Project: Stormwater Management System		
#50 (300 µm)	54.0			Location: West Orange, New Jersey		
#60 (250 µm)				Date: 17-May-23		
#100 (150 µm)	42.4			Job No.: 23-C-16		
#200 (75 µm)	34.8			Report No.: 23-C-17		
-						

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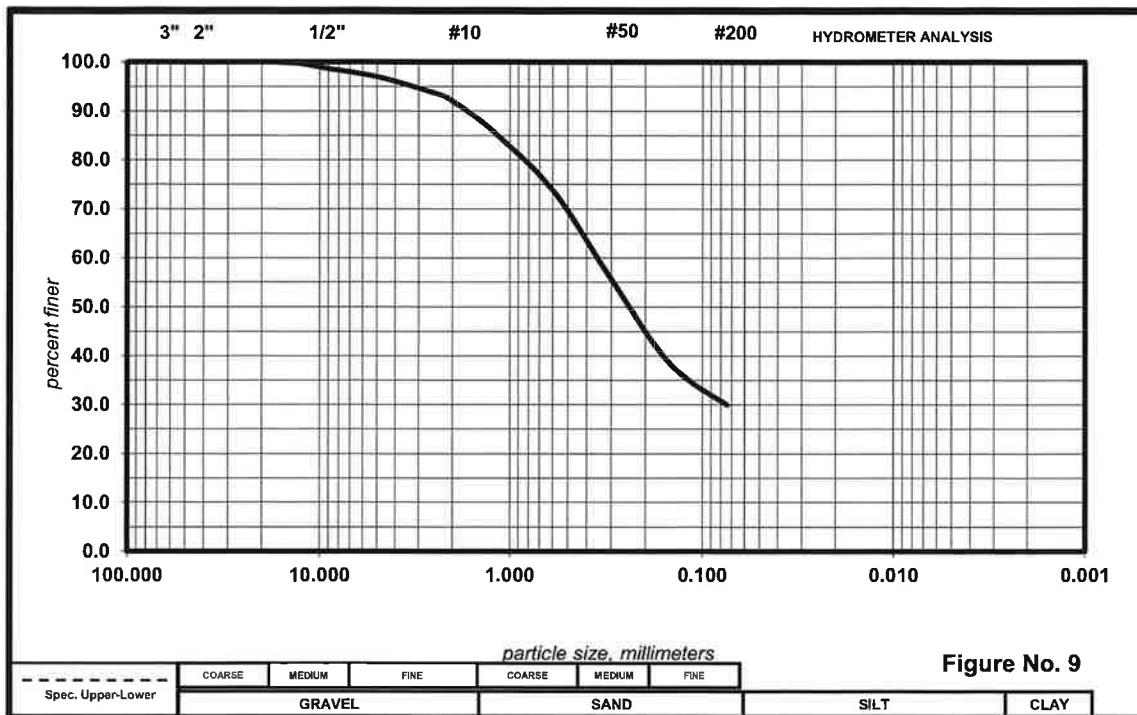
Specification*

Sieve Size	% Finer	Min.(%)	Max.(%)	Sample Identification		
3" (75 mm)				Sample No.:	TP-D2, S-1	
2 1/2" (63 mm)				Lab No.:	A23-067-08	
2" (50 mm)				Source/Location:	4'	
1 1/2" (38.1 mm)				Description:	Red.Br. cf SAND, little Silt, some mf Gravel	
1" (25 mm)	100.0					
3/4" (19 mm)	97.1					
5/8" (16 mm)						
1/2" (12.5 mm)	94.0					
3/8" (9.5 mm)	92.2			sample description in accordance with Burmister System		
5/16" (8 mm)				LL :	PL :	PI :
1/4" (6.3 mm)				As received Moisture Content: 11.4 %		
#4 (4.75 mm)	86.4			Classification:		
#6 (3.35 mm)				USCS: [SM]		
#8 (2.36 mm)	80.1			AASHTO:		
#10 (2 mm)				Remarks:		
#14 (1.4 mm)				Sample received in lab on May 12, 2023		
#16 (1.18 mm)	74.0			Permeability, k: 1.8 x 10-3 cm/s (2.64 in/hr) K3		
#20 (850 µm)				Permeability, k: 1.9 x 10-3 cm/s (2.74 in/hr) K3		
#30 (600 µm)	67.3			Client: Garden Homes		
#40 (425 µm)				Project: Stormwater Management System		
#50 (300 µm)	53.0			Location: West Orange, New Jersey		
#60 (250 µm)				Date: 17-May-23		
#100 (150 µm)	31.7			Job No.: 23-C-16 Report No.: 23-C-17		
#200 (75 µm)	19.3					
-						

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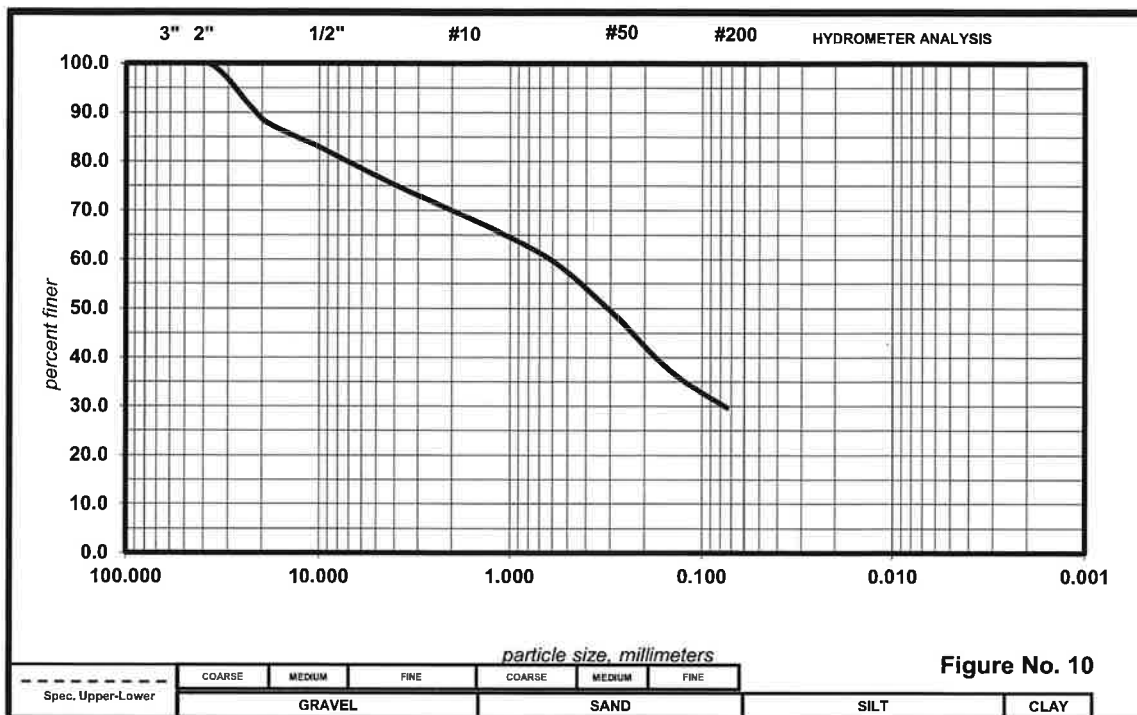


Specification*				Figure No. 9		
				COARSE	MEDIUM	FINE
				GRAVEL	SAND	SILT
				CLAY		
Sieve Size	% Finer	Min.(%)	Max.(%)	Sample Identification		
3" (75 mm)				Sample No.:	TP-E1, S-1	
2 1/2" (63 mm)				Lab No.:	A23-067-09	
2" (50 mm)				Source/Location:	5'	
1 1/2" (38.1 mm)				Description:	Red.Br. of SAND, some Silt, trace mf Gravel	
1" (25 mm)				sample description in accordance with Burmister System		
3/4" (19 mm)	100.0			LL :	PL :	PI :
5/8" (16 mm)				As received Moisture Content: 10.8 %		
1/2" (12.5 mm)	99.7			Classification:		
3/8" (9.5 mm)	98.8			USCS:	[SM]	
5/16" (8 mm)				AASHTO:		
1/4" (6.3 mm)				Remarks:	Sample received in lab on May 12, 2023	
#4 (4.75 mm)	96.8			Permeability, k: 4.7 x 10-4 cm/s (0.68 in/hr) K2		
#6 (3.35 mm)				Permeability, k: 4.2 x 10-4 cm/s (0.61 in/hr) K2		
#8 (2.36 mm)	93.4			Client:	Garden Homes	
#10 (2 mm)				Project:	Stormwater Management System	
#14 (1.4 mm)				Location:	West Orange, New Jersey	
#16 (1.18 mm)	85.4			Date:	17-May-23	
#20 (850 µm)				Job No.:	23-C-16	Report No.: 23-C-17
#30 (600 µm)	73.5					
#40 (425 µm)						
#50 (300 µm)	55.4					
#60 (250 µm)						
#100 (150 µm)	38.4					
#200 (75 µm)	29.9					
-						

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Specification*

Specification				Sample Identification				
Sieve Size	% Finer	Min.(%)	Max.(%)	Sample No.:	TP-E2, S-1			
3" (75 mm)				Lab No.:	A23-067-10			
2 1/2" (63 mm)				Source/Location:	7'			
2" (50 mm)				Description:	Red.Br. of Sand, some Silt, some of Gravel			
1 1/2" (38.1 mm)	100.0			sample description in accordance with Burmister System				
1" (25 mm)	91.6			LL :			PL :	PI :
3/4" (19 mm)	87.9			As received Moisture Content: 10.5 %				
5/8" (16 mm)				Classification:				
1/2" (12.5 mm)	84.7			USCS: [SM]				
3/8" (9.5 mm)	82.5			AASHTO:				
5/16" (8 mm)				Remarks:				
1/4" (6.3 mm)				Sample received in lab on May 12, 2023				
#4 (4.75 mm)	76.5			Permeability, k: 4.8 x 10-4 cm/s (0.69 in/hr) K2				
#6 (3.35 mm)				Permeability, k: 4.65 x 10-4 cm/s (0.67 in/hr) K2				
#8 (2.36 mm)	71.3			Client:	Garden Homes			
#10 (2 mm)				Project:	Stormwater Management System			
#14 (1.4 mm)				Location:	West Orange, New Jersey			
#16 (1.18 mm)	65.9			Date:	17-May-23			
#20 (850 µm)				Job No.:	23-C-16	Report No.: 23-C-17		
#30 (600 µm)	59.5							
#40 (425 µm)								
#50 (300 µm)	49.4							
#60 (250 µm)								
#100 (150 µm)	37.4							
#200 (75 µm)	29.7							
-								

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PARTICLE SIZE DISTRIBUTION TEST REPORT

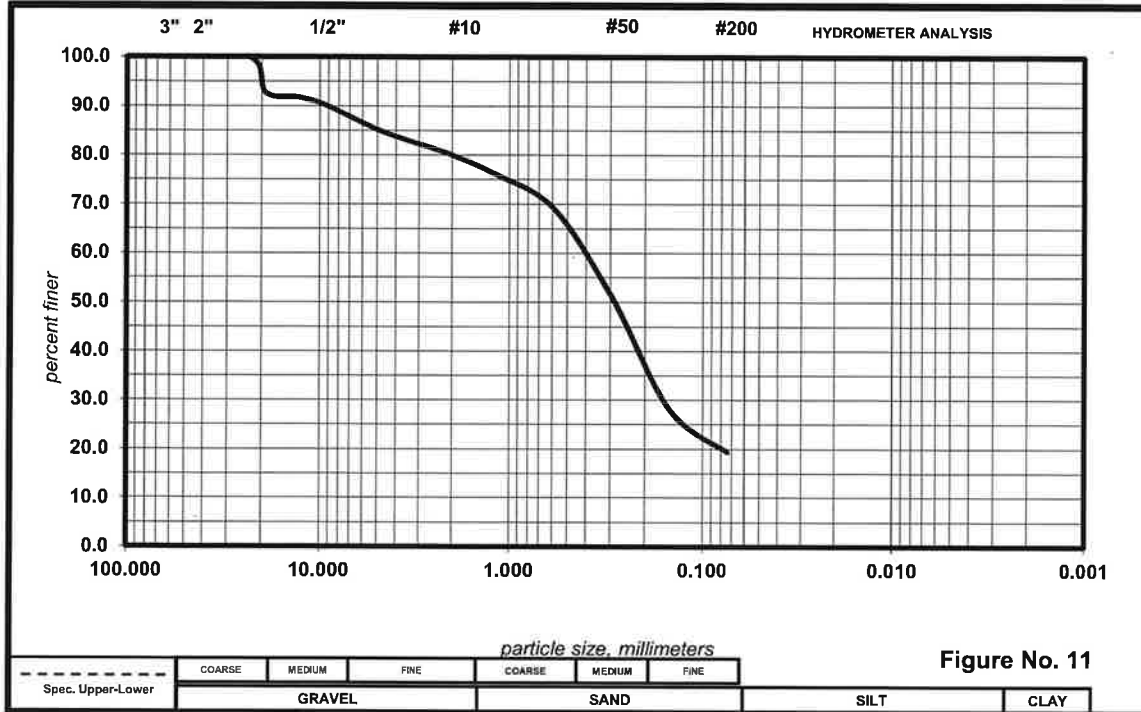


Figure No. 11

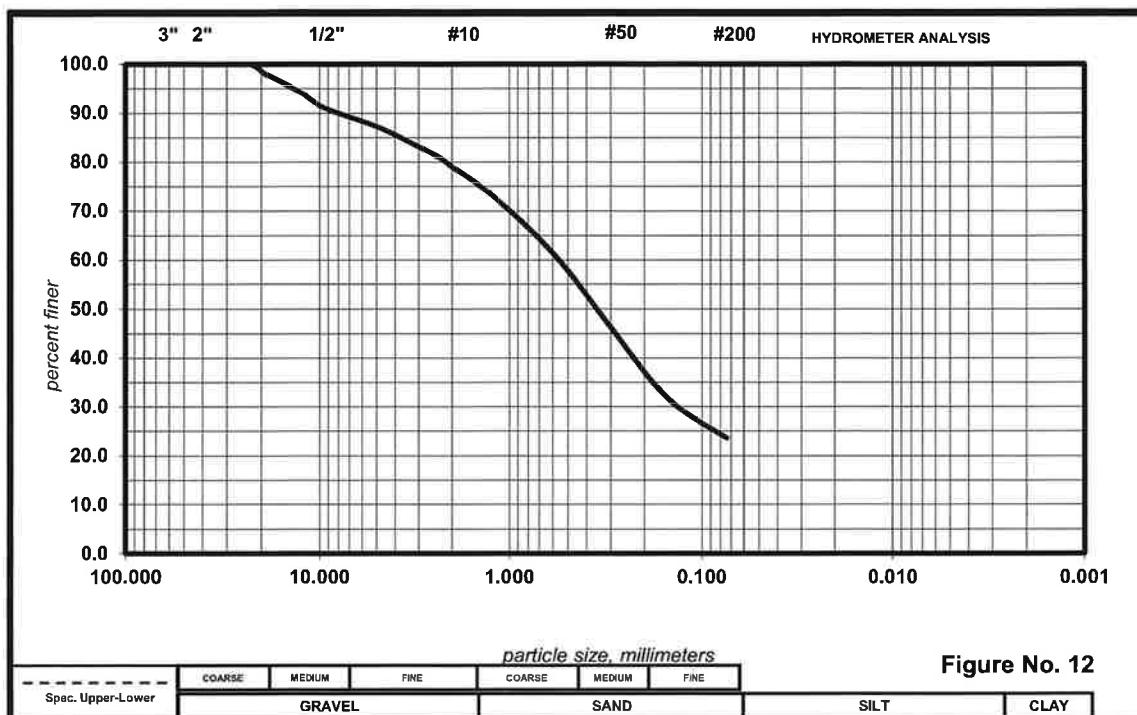
Specification*

Sieve Size	% Finer	Min.(%)	Max.(%)	Sample Identification		
3" (75 mm)				Sample No.:	TP-F1, S-1	
2 1/2" (63 mm)				Lab No.:	A23-067-11	
2" (50 mm)				Source/Location:	6'	
1 1/2" (38.1 mm)				Description:	Brown of SAND, little Silt, little mf Gravel	
1" (25 mm)	100.0					
3/4" (19 mm)	92.6					
5/8" (16 mm)						
1/2" (12.5 mm)	91.7					
3/8" (9.5 mm)	90.3			sample description in accordance with Burmister System		
5/16" (8 mm)				LL :	PL :	PI :
1/4" (6.3 mm)				As received Moisture Content: 19.5 %		
#4 (4.75 mm)	84.8			Classification:		
#6 (3.35 mm)				USCS: [SM]		
#8 (2.36 mm)	81.0			AASHTO:		
#10 (2 mm)				Remarks:		
#14 (1.4 mm)				Sample received in lab on May 12, 2023		
#16 (1.18 mm)	76.1			Permeability, k: 1.3 x 10-3 cm/s (1.85 in/hr) K2		
#20 (850 μm)				Permeability, k: 1.4 x 10-3 cm/s (2.02 in/hr) K2		
#30 (600 μm)	69.2			Client: Garden Homes		
#40 (425 μm)				Project: Stormwater Management System		
#50 (300 μm)	51.3			Location: West Orange, New Jersey		
#60 (250 μm)				Date: 17-May-23		
#100 (150 μm)	28.1			Job No.: 23-C-16 Report No.: 23-C-17		
#200 (75 μm)	19.4					
-						

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PARTICLE SIZE DISTRIBUTION TEST REPORT

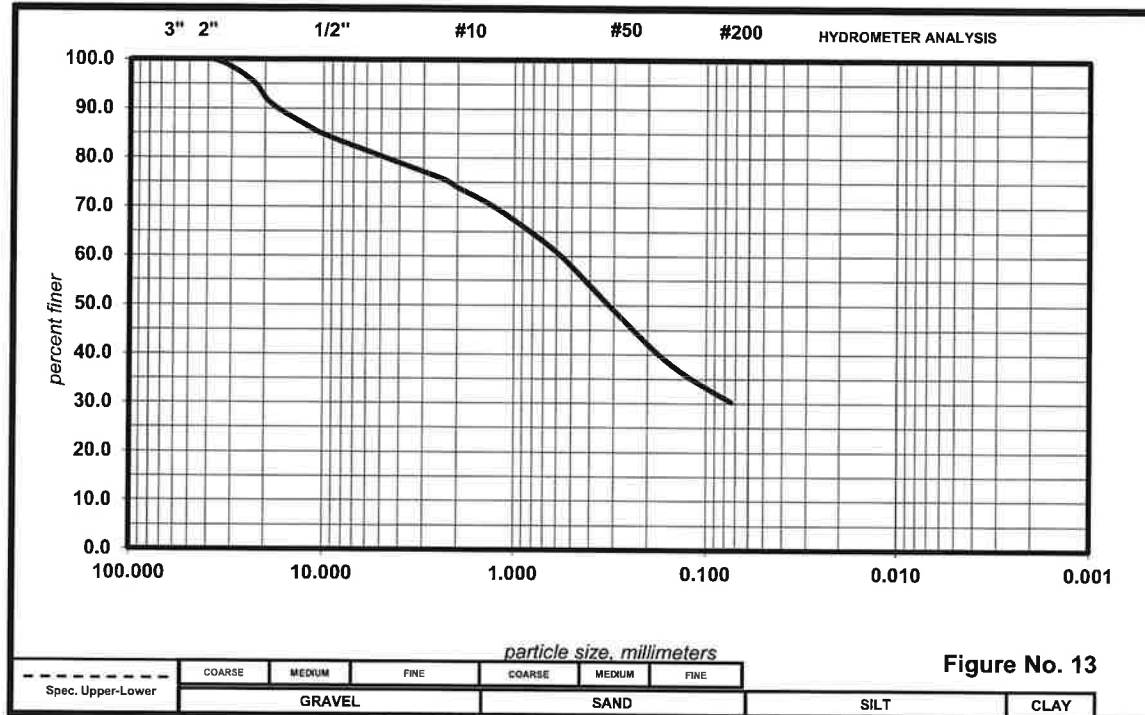


Specification*				Sample Identification				
Sieve Size	% Finer	Min.(%)	Max.(%)	Sample No.:	TP-F2, S-1			
3" (75 mm)				Lab No.:	A23-067-12			
2 1/2" (63 mm)				Source/Location:	5'			
2" (50 mm)				Description:	Light Brown of SAND, some Silt, some mf Gravel			
1 1/2" (38.1 mm)				sample description in accordance with Burmister System				
1" (25 mm)	100.0			LL :			PL :	PI :
3/4" (19 mm)	97.9			As received Moisture Content: 13.2 %				
5/8" (16 mm)				Classification:				
1/2" (12.5 mm)	94.3			USCS: [SM]				
3/8" (9.5 mm)	91.2			AASHTO:				
5/16" (8 mm)				Remarks:				
1/4" (6.3 mm)				Sample received in lab on May 12, 2023				
#4 (4.75 mm)	86.9			Permeability, k: 1.6 x 10-3 cm/s (2.32 in/hr) K3				
#6 (3.35 mm)				Permeability, k: 1.5 x 10-3 cm/s (2.16 in/hr) K3				
#8 (2.36 mm)	81.1			Client: Garden Homes				
#10 (2 mm)				Project: Stormwater Management System				
#14 (1.4 mm)				Location: West Orange, New Jersey				
#16 (1.18 mm)	72.7			Date: 17-May-23				
#20 (850 µm)				Job No.: 23-C-16				
#30 (600 µm)	61.2			Report No.: 23-C-17				
#40 (425 µm)								
#50 (300 µm)	46.0							
#60 (250 µm)								
#100 (150 µm)	31.5							
#200 (75 µm)	23.6							
-								

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Specification*				Sample Identification		
Sieve Size	% Finer	Min.(%)	Max.(%)	Sample No.: TP-G1, S-1 Lab No.: A23-067-13 Source/Location: 6' Description: D.Red.Br. cf Sand, some Silt, some cf Gravel <i>sample description in accordance with Burmister System</i>		
3" (75 mm)						
2 1/2" (63 mm)						
2" (50 mm)						
1 1/2" (38.1 mm)	100.0					
1" (25 mm)	95.7			LL : PL : PI : As received Moisture Content: 10.1 %		
3/4" (19 mm)	91.3					
5/8" (16 mm)						
1/2" (12.5 mm)	86.9					
3/8" (9.5 mm)	84.4					
5/16" (8 mm)				Classification: USCS: [SM] AASHTO:		
1/4" (6.3 mm)						
#4 (4.75 mm)	80.0					
#6 (3.35 mm)						
#8 (2.36 mm)	75.7					
#10 (2 mm)				Remarks: Sample received in lab on May 12, 2023 Permeability, k: 6.6 x 10-4 cm/s (0.95 in/hr) K2 Permeability, k: 6.7 x 10-4 cm/s (0.97 in/hr) K2		
#14 (1.4 mm)						
#16 (1.18 mm)	69.3					
#20 (850 µm)						
#30 (600 µm)	60.6					
#40 (425 µm)				Client: Garden Homes Project: Stormwater Management System Location: West Orange, New Jersey Date: 17-May-23 Job No.: 23-C-16 Report No.: 23-C-17		
#50 (300 µm)	48.8					
#60 (250 µm)						
#100 (150 µm)	37.7					
#200 (75 µm)	30.3					

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PARTICLE SIZE DISTRIBUTION TEST REPORT

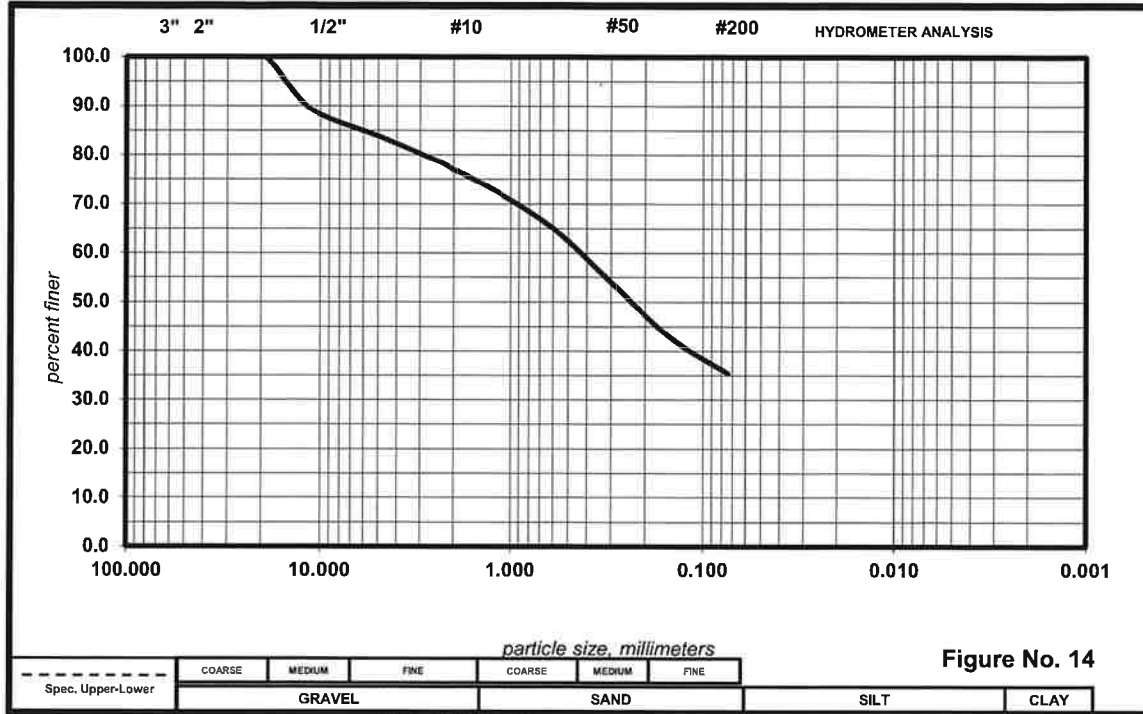


Figure No. 14

Specification*

Sieve Size	% Finer	Min.(%)	Max.(%)	Sample Identification		
3" (75 mm)				Sample No.:	TP-G2, S-1	
2 1/2" (63 mm)				Lab No.:	A23-067-14	
2" (50 mm)				Source/Location:	10'	
1 1/2" (38.1 mm)				Description:	D.Red.Br. of Sand, and Silt, some mf Gravel	
1" (25 mm)						
3/4" (19 mm)	100.0					
5/8" (16 mm)						
1/2" (12.5 mm)	91.3					
3/8" (9.5 mm)	87.9			sample description in accordance with Burmister System		
5/16" (8 mm)				LL :	PL :	PI :
1/4" (6.3 mm)				As received Moisture Content: 10.8 %		
#4 (4.75 mm)	83.5			Classification:		
#6 (3.35 mm)				USCS: [SM]		
#8 (2.36 mm)	78.6			AASHTO:		
#10 (2 mm)				Remarks:		
#14 (1.4 mm)				Sample received in lab on May 12, 2023		
#16 (1.18 mm)	72.5			Permeability, k: 5.2 x 10-4 cm/s (0.74 in/hr) K2		
#20 (850 µm)				Permeability, k: 5.3 x 10-4 cm/s (0.76 in/hr) K2		
#30 (600 µm)	64.9			Client:		
#40 (425 µm)				Garden Homes		
#50 (300 µm)	53.9			Project:		
#60 (250 µm)				Stormwater Management System		
#100 (150 µm)	42.8			Location:		
#200 (75 µm)	35.4			West Orange, New Jersey		
-				Date:		
				17-May-23		
				Job No.:		
				23-C-16 Report No.: 23-C-17		

APPENDIX IV
LIMITATIONS

SOR CONSULTING ENGINEERS, INC

LIMITATIONS

The conclusions and recommendations contained in this geotechnical report no. 23-C-17 are based upon the applicable standards of our profession at the time this report was prepared.

The analyses and recommendations submitted in this report are based in part upon the data obtained from fourteen (14) test pits performed for this study. The stratification lines shown on the individual logs of the subsurface explorations represent the approximate boundaries between soil types. However, the transition between soil types may be gradual.

In our opinion, the number of explorations performed for this study is adequate for a general understanding of the site's subsurface conditions. However, the nature and extent of variations between the explorations may not become evident until construction. If, during construction, variations become evident, it will be necessary to re-evaluate the recommendations of this report.

In the event that any changes in the nature, design, or location of the stormwater systems are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and conclusions of this report modified or verified in writing.

This report may be referred to or included in the project specifications for general information purposes only but should not be solely used as the technical specifications for the work.

This geotechnical engineering report was prepared for the project by Sor Consulting Engineers, Inc. for design purposes only, and may not be sufficient to prepare an accurate bid. Contractors utilizing the information in the report should do so with the express understanding that its scope is limited to design considerations. Prospective bidders should obtain the owner's permission to perform whatever additional explorations or data gathering they deem necessary to prepare their bid accurately.

This report has been prepared in accordance with generally accepted geotechnical engineering practices for the exclusive use of Garden Homes and/or their authorized representatives for specific application to the design of the proposed stormwater management system to be constructed on Lot 32, Block 179 in West Orange, New Jersey. No other warranty, expressed or implied, is made.