SOCOTEC

Report of Geotechnical Exploration

PROPOSED NORTH COLLIER FIRE STATION 49

14483 Cocohatchee Road
Naples, Collier County, Florida 34110

Socotec Consulting, Inc. Project No. VS257085

November 2025

SOCOTEC

November 17, 2025

NORTH COLLIER FIRE CONTROL AND RESCUE DISTRICT
Attn: Mr. Kristopher Thomas, Deputy Chief
6495 Taylor Road, Naples, Florida 34109
Direct: 239.552.1369
Mobile: 239.227.8921
E-Mail: KThomas@northcollierfire.com

Subject: Report of Geotechnical Exploration
PROPOSED NORTH COLLIER FIRE STATION 49
14483 Cocohatchee Road
Naples, Collier County, Florida 34110
Socotec Consulting, Inc., Project No. VS257085

Socotec Consulting, Inc. (SOCOTEC) is pleased to present this report of our geotechnical exploration for the proposed project and completed in general services authorized by you. This report presents the project information provided to us, the findings of our exploration, together with our geotechnical evaluation and recommendations.

Purpose

The purpose of this geotechnical study was to explore the general soil conditions at the subject site and to provide geotechnical recommendations relating to foundation options and site preparation considerations. Environmental assessments or other studies were beyond the scope of our services. This report has been prepared for the North Collier Fire Control and Rescue District and their consultants for specific application to the proposed fire station at the subject site. SOCOTEC has endeavored to comply with the generally accepted geotechnical engineering practice common to the local area. SOCOTEC makes no other warrants, express or implied.

Project Information

Our understanding of your needs for this project is based on information provided by you, together with some assumptions that we have made based on our experience. SOCOTEC was provided

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with Site Development Plans (PL20240001457) prepared by LJA dated February 6, 2025 to utilize in preparing this report.

We assume the proposed project consists of constructing a single-story high bay fire station, underground utilities, and asphaltic concrete pavement at the site. We assume the building structures will be constructed with pre-engineered wood roof trusses, reinforced concrete masonry block exterior walls, concrete cast-in-place beams, and slabs, and founded on a shallow foundation system. For the purposes of this evaluation, we assume maximum column and wall loads will be less than 90-kips and 6-kips per linear foot, respectively.

Site Conditions

The site is located north of Wiggins Pass, west of Tamiami Trail North, and on the south side of Cocohatchee Road in Naples, Collier County, Florida. At the time of our exploration, the site had been cleared and was relatively level. The Site Location Aerial provided in the Appendix of this report presents the site relative to its surroundings.

Subsurface Conditions

The subsurface conditions at the site were explored with two (2) Standard Penetration Test (SPT) borings drilled to a depth of 25-feet below the existing grade. The quantity and depth of the borings were determined by SOCOTEC, while the locations were staked in the field by others and agreed upon by SOCOTEC.

An engineer from SOCOTEC classified soil samples taken from the borings. It should be noted that stratification lines on the soil boring logs represent approximate transitions between material types. In-situ stratum changes could occur gradually or at slightly different depths. Also, the logs depict conditions disclosed at the particular location and times indicated.

Below we provide a generalized profile of the subsurface conditions encountered. Boring logs summarizing our findings are presented in the Appendix of this report.

GENERALIZED SUBSURFACE PROFILE			
DEPTH (FT)		SOIL DESCRIPTION	USCS (1)
FROM	TO		
0	13	Loose to Medium Dense SAND, Occasional Roots	SP
13	18	Very Loose to Loose SAND	SP
18	25	Very Loose to Medium Dense Gravelly SAND with Silt (Weathered Limestone)	SW
(1) Unified Soil Classification System per ASTM D2478			

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The groundwater level was encountered at depths of approximately 2.5-feet below the existing grade at the time of drilling. We anticipate the groundwater level will fluctuate due to seasonal rainfall variations, surface water runoff patterns, construction operations, and other interrelated factors. The designers should anticipate that the seasonal high ground water level might rise to the existing ground surface, and above the existing ground surface in extreme weather events.

Evaluation and Recommendations

Our evaluation and recommendations are based on the project information provided to us, the findings of our field exploration program, and our experience in the area. The subsurface conditions may vary across the site. Should new information become available during design, or the conditions encountered during construction be substantially different from the information presented in this report, we should be engaged to evaluate the new information.

It is our opinion that conventional shallow foundation systems may be used to support the proposed fire station. We estimate maximum settlement of 1-inch or less and differential settlement of 1/2-inch or less will occur due to maximum column and wall loads of 90-kips and 6-kips per linear foot, respectively, providing the site soils are prepared as outlined in this report.

General Foundation Design Parameters

The following list summarizes our conventional shallow foundation recommendations for this project.

- Shallow foundations for the fire station can be designed using a maximum allowable bearing pressure of 2.5-ksf.
- The minimum foundation width should be 16-inches for continuous foundations, 12-inches at the base of turned down slabs, and 24-inches for individual column footings.
- The footing bottoms should bear at least 24-inches below finished grade. The bottom of turned-down slabs should bear at least 12-inches below finished grade.
- The finished grade should extend at least five feet beyond the exterior edge of the footing. The finished exterior grade shall be at least four inches below the finished floor elevation and slope away from the exterior wall.

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Grade Supported Floor Slabs

Assuming proper site preparation and fill placement, grade supported floor slabs are feasible for the proposed structure. The following features are recommended as part of the floor slab construction:

- Slabs-on-grade may be designed with a modulus of subgrade reaction 180 pci for compacted granular material (existing or select fill) with a Unified Soil Classification of SP, SP-SM, or SW.
- Provide isolation joints in the slabs around columns and along load bearing walls.
- At joints containing dowels or keys, the slabs should be designed to permit rotation between parts of the slab while reducing sharp vertical displacements. This detail does not apply to joints at foundation elements.
- A polyethylene vapor barrier (6 mil minimum) should be used beneath the building slab where any floor coverings will be used.
- During slab placement, the base material shall be kept moist, but not wet, immediately prior to concrete placement to minimize curling of the slab. The slab surface should also be moisture conditioned during curing.

Site Preparation

The following recommendations are provided regarding site earthwork operations.

1. Clear and grub all proposed construction areas at the site. Remove all topsoil, trees, roots, and any deleterious material in its entirety and dispose of it in an appropriate and lawful manner.
2. Prior to any fill being placed, the stripped ground surface shall be proof rolled with a large vibratory roller. At least five overlapping passes in perpendicular directions shall be made. The roller shall be operated in the static mode only when within 75 feet of an existing structure.
3. The stripped grade shall be compacted until a density of at least 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density is uniformly obtained. Field density tests shall be made after compaction of the existing ground surface to verify the specified degree of compaction is obtained.
4. All soil backfill shall be granular with a Unified Soil Classification of SP, SP-SM, or SW containing no organics or any other deleterious material. All backfill shall have a maximum of 12% fine content and be moisture conditioned to readily achieve proper compaction.
5. All soil backfill shall be placed in loose lifts not exceeding 12-inches in thickness when compacted with a heavy vibratory roller. Lift height shall be reduced to 6-inches or less for material compacted with walk behind rollers or plate compactors. Each lift shall be compacted until a density of at least 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density is uniformly obtained.

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6. The bottom of the footings shall be compacted until at least 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density is uniformly obtained. Field density tests beneath building footprints shall be made with a test frequency of at least one test for each 2,000 square foot of building area in each lift of fill or backfill.

7. For foundation excavations, the field density testing frequency shall be a minimum of one test pre isolated column footing. For continuous footings, one test per every 50 linear feet of footing shall be completed. Field density tests frequency for roadways and utilities should be at least one test for every 300-feet of roadway or utility line per lift.

Utility Excavations

Following normal clearing and grubbing the surficial stratum across the site and within the depth of most all utility excavations should consist of granular soils. The soils should be easily excavated but will offer little pit sidewall stability, therefore shoring may be required to stabilize the sidewalls. Loose to medium dense SAND was encountered between the existing ground surface and 18-feet below the existing site grade. This material generally consisted of SAND with less than 5% fine content. This material will be sufficient to be utilized as structural fill or backfilling for utility excavations.

SOCOTEC recommends that all excavations are done in accordance with OSHA 1926 Subpart P – Excavation regulations and any other applicable standards/regulations. The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of any excavation as required to maintain safety/stability of both the excavation sides and bottom. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

Dewatering

With the water table encountered at a depth of 2.5-feet below the existing grade, dewatering will likely be required to install utilities. Water levels should be maintained at least two feet below the bottom of all excavations. Depending on the size of the excavation and length of time required for construction, various dewatering techniques could be employed. Dewatering methods such as sumps may be suitable for small and quick excavation work while larger and longer excavations will require well points.

The construction of elevator pits or other aspects of construction that will occur below the water table and will require dewatering should be done prior to the construction of any above ground structures and allow for the water table in the area to recharge. If construction of structures begins

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prior to the water table being recharged, soils may encounter greater pressures thus, increased settlement may occur.

Parking Area Recommendations

Flexible Asphaltic Concrete Pavement

For areas that are designed to have 1 ½ feet or greater separation between the estimated wet season high groundwater table and the bottom of the Limerock base material, SOCOTEC recommends that the following minimum asphalt pavement parameters outlined below be considered during the asphaltic pavement design.

MINIMUM ASPHALTIC PAVEMENT SECTION THICKNESS

Service Level	Flexible Asphalt Concrete Thickness (in.)	Base Thickness (in.)	Stabilized Subbase Thickness (in.)
Standard Duty	1.5	6	12
Heavy Duty	2.0	8	12

Stabilized Subgrade

SOCOTEC recommends that stabilized subbase material be the first course placed during the re-construction of the subject site's parking area. It is recommended that the stabilized subgrade material be a Gravely SAND blend and should have a minimum Limerock Bearing Ratio (LBR) value of 40, as specified by F.D.O.T.

Base Subgrade

SOCOTEC recommends that a base material be placed on top on the stabilized subgrade material during the construction of the subject site's roadways. The base material is recommended to be a crushed Limerock material having a minimum LBR value of 100.

Flexible Asphalt Concrete

We recommend one lift of F.D.O.T. SP-9.5 (S-III) asphalt mix be placed for a standard duty pavement section. For heavy duty pavement section, we recommend two lifts of flexible asphaltic concrete be placed. The base asphaltic lift should be a F.D.O.T. SP-12.5 (S-I) asphalt mix overlain with an S-III mix. Specific requirements for asphaltic concrete, as outlined in the latest edition of the F.D.O.T. Road and Bridge Constriction specifications, should be followed during the construction and placement of the asphaltic concrete pavement.

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The stabilized subbase should be placed in 1-foot lifts and should be compacted to at least 95 percent of the Modified Proctor maximum density. The base material should be placed in maximum 6-inch lifts and also compacted to at least 98 percent of the Modified Proctor maximum density. Both bases should be tested at a frequency of at least one test per 10,000 square feet of pavement section, or a minimum of four tests, whichever is greater.

Additional Services

SOCOTEC could be engaged to provide Construction Materials Engineering and Testing (CoMET) services before and during the construction of the project to verify that our recommendations are properly interpreted and implemented. Our services could include completing the construction materials testing on this project and visiting the project during construction to observe the site conditions encountered and the construction techniques used. SOCOTEC shall be released of any and all liability relating to recommendations stated in this report if we are not retained for CoMET services.

Closing

We appreciate working with you as your geotechnical consultant and look forward to working with you on the remainder of this project. Please contact us when we may be of further assistance, or if you have any questions regarding this report.

Sincerely,
SOCOTEC CONSULTING, INC.

Digitally signed by Yehia Z Kabbani
Reason: This Item Has Been Digitally Signed and Sealed by Yehia Z Kabbani, P.E. On The Date Shown. Printed Copies Of This Document Are Not Considered Signed And Sealed And The Signature Must Be Verified On Any Copies
Date: 2025.11.17 10:18:24 -05'00'

YEHIA Z. KABBANI LICENSE NO. PE 67300 STATE OF FLORIDA PROFESSIONAL ENGINEER

Steve M. Rancier
Steve M. Rancier, E.I.
Project Engineer

Yehia Z. Kabbani, P.E.
Senior Engineer
FL Registration No. 67300

Appendix: Site Location Aerial
Boring Location Plan
Boring Logs (B-1 and B-2)
General Notes for Boring Logs

Distribution: 1 – Addressee (via e-mail)
1 – File

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APPENDIX

SITE LOCATION AERIAL

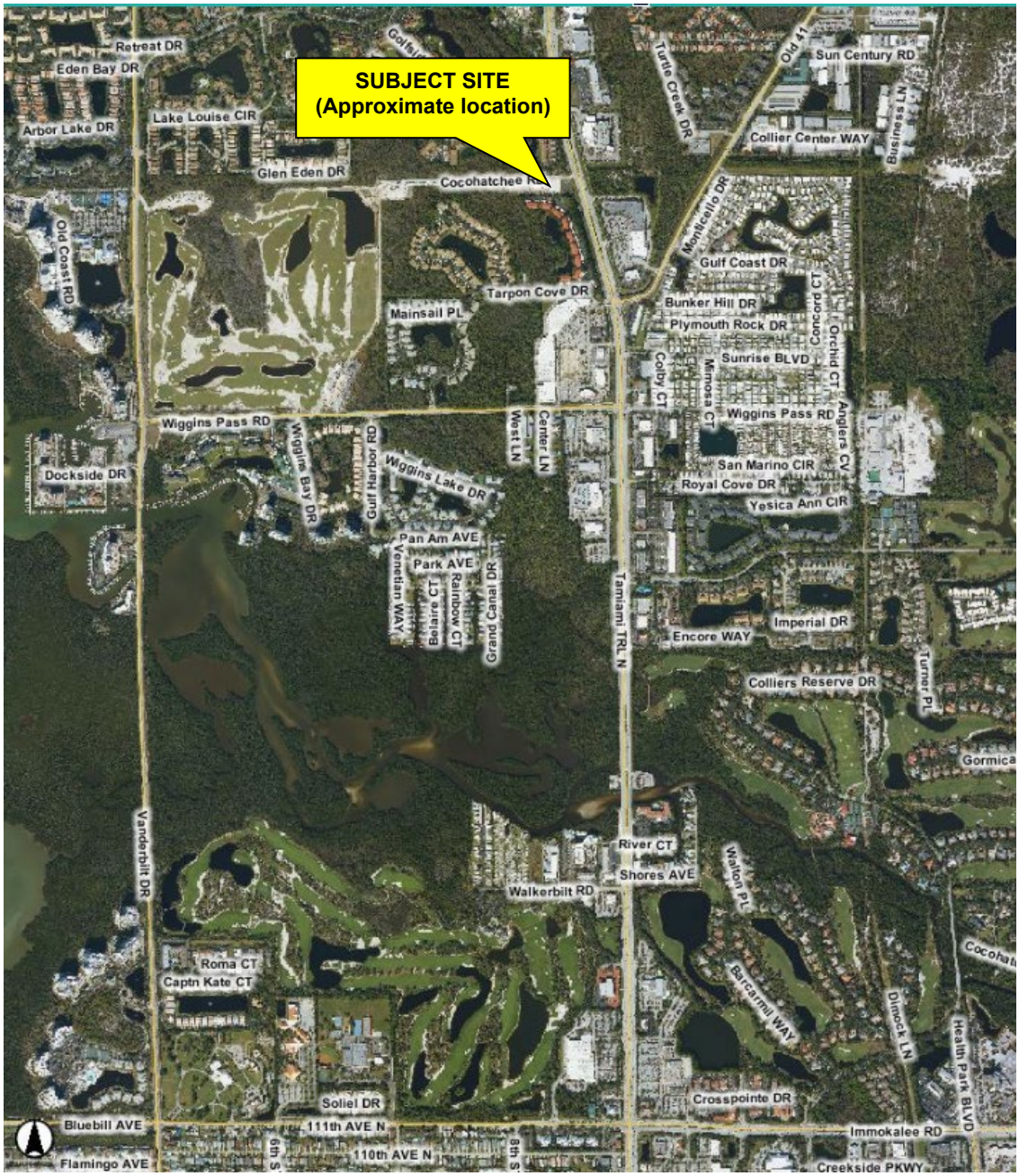

Image from Collier County Property Appraiser Website: 2025 Aerial

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BORING LOCATION PLAN

Image from Collier County Property Appraiser Website: 2025 Aerial

B-1 Number and Approximate Soil Boring Location

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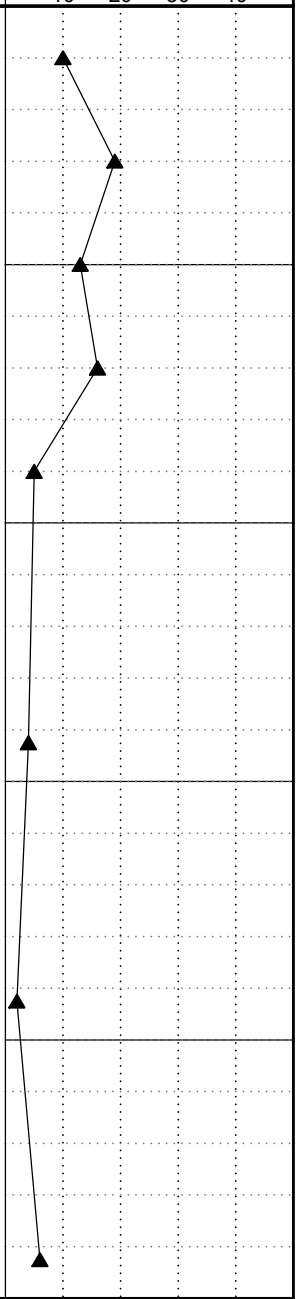
Telephone: 239-514-4100

BORING NO. B-1

CLIENT North Collier Fire Control and Rescue District
PROJECT NAME Proposed North Collier Fire Station 49
PROJECT NUMBER VS257085
PROJECT LOCATION 14483 Cocohatchee Road, Naples, FL 34110
DATE STARTED 4/10/23 **COMPLETED** 4/10/23
GROUND ELEVATION NA **HOLE SIZE** 2 7/8-in.
DRILLING EQUIPMENT D-50
GROUND WATER LEVELS:
DRILLING METHOD MUD Rotary
▽ **AT TIME OF DRILLING (FEET)** 2.5
LOGGED BY SM **CHECKED BY** SR
STEEL CASING DEPTH (FEET) 0
NOTES Borehole was grouted after drilling
GROUT USED (BAG) 2

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	ORGANIC CONT. (%)
0		(SP) Loose, Brown SAND	SS 1	100	2-4-6-8 (10)	
▽		- Transition to Medium Dense	SS 2	100	8-10-9-7 (19)	
5			SS 3	100	6-6-7-9 (13)	
			SS 4	100	9-9-7-8 (16)	
		- Transition to Loose	SS 5	100	2-2-3-2 (5)	
10						
		- Transition to Very Loose	SS 6	100	2-2-2 (4)	
15						
		- Transition to Light Brown	SS 7	100	1-1-1 (2)	
20						
		(SP) Loose, Brown SAND with Gravel	SS 8	56	2-3-3 (6)	
25						

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
10 20 30 40



Boring Terminated at 25.0 feet.

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Naples, Florida 34109
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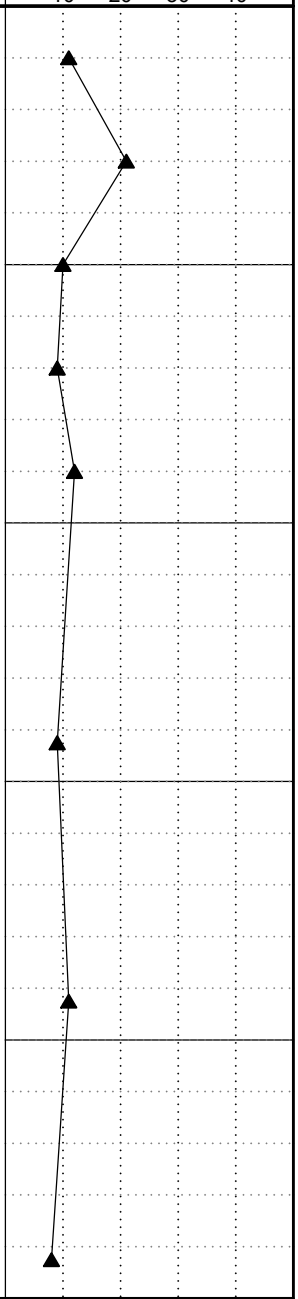
BORING NO. B-2

CLIENT North Collier Fire Control and Rescue District
PROJECT NAME Proposed North Collier Fire Station 49
PROJECT NUMBER VS257085
PROJECT LOCATION 14483 Cocohatchee Road, Naples, FL 34110
DATE STARTED 4/10/23 **COMPLETED** 4/10/23
GROUND ELEVATION NA **HOLE SIZE** 2 7/8-in.
DRILLING EQUIPMENT D-50
GROUND WATER LEVELS:
DRILLING METHOD MUD Rotary
▽ **AT TIME OF DRILLING (FEET)** 2.5
LOGGED BY SM **CHECKED BY** SR
STEEL CASING DEPTH (FEET) 0
NOTES Borehole was grouted after drilling
GROUT USED (BAG) 2

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	ORGANIC CONT. (%)
0		(SP) Medium Dense, Brown SAND	SS 1	100	2-4-7-8 (11)	
▽		(SP) Medium Dense, Brown SAND, Trace Small Roots	SS 2	100	8-12-9-8 (21)	
5		- Transition to Loose	SS 3	100	6-5-5-6 (10)	
		(SP) Loose, Brown SAND	SS 4	100	6-5-4-5 (9)	
10		(SP) Medium Dense, Light Brown SAND	SS 5	100	4-6-6-8 (12)	
15		- Transition to Loose	SS 6	100	5-5-4 (9)	
20		(SW) Medium Dense, Brown, Gravelly SAND with Silt (Weathered Limestone)	SS 7	22	6-6-5 (11)	
25		- Transition to Loose	SS 8	100	3-4-4 (8)	

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
10 20 30 40



Boring Terminated at 25.0 feet.

GENERAL NOTES FOR BORING LOGS

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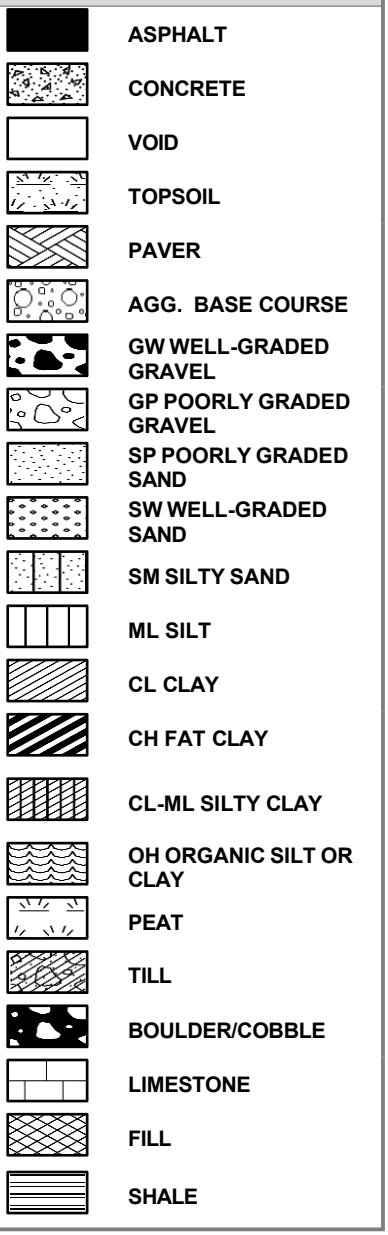
MATERIAL



DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	DMT	Flat Dilatometer Test
WS	Wash Sample	RD	Rock Bit Drilling
BS	Bulk Sample	RC	Rock Core, NX, BX, AX
AU	Auger Cutting	REC	Rock Sample Recovery %
HAS	Hollow Stem Auger	SD	Sound Drilling
SSD	Solid Stem Auger	MRD	Mud Rotary Drilling
HA	Hand Auger	DP	Direct Push

PARTICLE SIZE IDENTIFICATION

DESIGNATION			PARTICLE SIZE
Coarse Grained	Boulders		12 inches (300 mm) or larger
	Cobbles		3 inches to 12 inches (75 mm to 300 mm)
	Gravel:	Coarse	3/4 inch to 3 inches (19 mm to 75 mm)
		Fine	#4 to 3/4 inch (4.75 mm to 19 mm)
	Sand:	Coarse	#10 to #4 (2.00 mm to 4.75 mm)
		Medium	#40 to #10 (0.425 mm to 2.00 mm)
		Fine	#200 to #40 (0.075 mm to 0.425 mm)
Fine Grained	Silt		0.002 mm to 0.075 mm
	Clay		Less than 0.002 mm

AUTOMATIC HAMMER FINE GRAINED SOILS

SPT (BPF)	CONSISTENCY
<1	Very Soft
1-3	Soft
4-6	Medium Stiff
7-12	Stiff
13-24	Very Stiff
>24	Hard

AUTOMATIC HAMMER COARSE GRAINED SOILS

SPT (BPF)	DENSITY
<3	Very Loose
3-8	Loose
9-24	Medium Dense
25-40	Dense
>40	Very Dense

RELATIVE AMOUNT	PERCENT BY WEIGHT (%)
Trace	<5
Few	5-14
Little	15-29
Some	30-49

NOTE: Number of blows per foot required to drive a 2-inch O.D. split-spoon sampler using a 140-lb. weight hammer falling freely for 30 inches, unless otherwise noted. Groundwater measured during drilling.

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based upon following standards:

ASTM D2487 "Standard Practice for Classification of Soils for Engineering Purposes (USCS)"
ASTM D2488 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)"

Coarse grained soils are classified based on their in-place relative density, and fine grained soils are classified based on their consistency.

ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied because of local practice or professional judgment.