Appendix E
Geotechnical Investigation Report

GEOTECHNICAL-STUDY REPORT
WOODBURY ROAD ROADWAY CONCEPTUAL ANALYSIS
ORANGE COUNTY, FLORIDA
AEA PROJECT No. 201903

Antillian Engineering Associates, Inc.
3309 Bartlett Boulevard
Orlando, Florida 32811
(407) 422-1441

ANTILLIAN
ENGINEERING ASSOCIATES, INC.

November 6, 2020

Inwood Consulting Engineers, Inc.
3000 Dovera Drive, Suite 200
Oviedo, Florida 32765

Attention: David Dangel, P.E.

Reference: Geotechnical-Study Report
Woodbury Road Roadway Conceptual Analysis
Orange County, Florida
AEA Project No. 201903

Dear Mr. Dangel:

Antillian Engineering Associates, Inc. has completed a geotechnical-engineering study to support the Roadway Conceptual Analysis for the planned widening of Woodbury Road in northeastern Orange County, Florida. We did the work in general accordance with the scope of services in our itemized fee-proposal dated January 15, 2019.

This report contains the results of our desk study, limited field-exploration and laboratory-testing programs, and a discussion of our findings as they relate to this Roadway Conceptual Analysis. It supersedes the version dated September 15, 2020. All copies of that report should be discarded.

It has been our pleasure to serve Inwood Consulting Engineers and the Orange County Department of Public Works on this project. Please contact our office if you have any questions or if you need additional information.

Respectfully submitted,
ANTILLIAN ENGINEERING ASSOCIATES, INC.
Certificate of Authorization CA6685

PETER G. SUAH · LICENSE · 46910 · STATE OF FLORIDA · PROFESSIONAL ENGINEER

11.20.2020

Peter G. Suah, P.E.
Florida P.E. No. 46910
Principal Engineer/President

Attachments:
Figures
Appendix A: Field Explorations and Laboratory-Testing Results
Appendix B: Important Information About This Geotechnical Engineering Report
Appendix C: Constraints and Restrictions

PROJECT DESCRIPTION

The Orange County Department of Public Works ("OCDPW") selected Inwood Consulting Engineers, Inc. ("ICE") to conduct a Roadway Conceptual Analysis ("RCA") for the planned widening of Woodbury Road between Lake Underhill Road and State Road 50 ("SR 50"), also known as East Colonial Drive. The approximate location of this project is shown on Figure 1. ICE retained Antillian Engineering Associates, Inc. to conduct a preliminary, geotechnical-engineering study to support the RCA. The project includes a short segment of road ("spur") along Waterford Lakes Parkway. A bridge to convey the new lanes over State Road 408 is also planned, but will be addressed during the design study for the project.

AVAILABLE INFORMATION

For general information about the project vicinity, we reviewed the United States Geological Survey ("USGS") map "Recharge and Discharge Areas of Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida," the USGS quadrangle topographic map for the area, and the US Department of Agriculture Soil Conservation Service ("SCS") Soil Survey of Orange County, Florida. For project-specific information, we examined interim design drawings that ICE staff provided ("ICE drawings").

The USGS recharge map showed the general area where Woodbury Road is located as an area of "low to moderate recharge." The general consensus among geotechnical engineers currently practicing in central Florida is that a high risk of sinkholes is usually associated with areas of high recharge. As a result, we anticipate that the risk of sinkhole activity along Woodbury Road is likely to be low compared to the average risk across central Florida.

The USGS topographic map showed the project vicinity as gently-sloping terrain near the eastern edge of a broad, irregularly-shaped knoll that was bordered on the east by freshwater marsh and wetlands. Land use on the knoll was mapped as undeveloped land and woodlands. We were able to identify SR 50 and a section of Woodbury Road that extended south from SR 50 for about 7,800 feet. Woodbury Road crossed some low-lying areas where wetlands were mapped. Lake Underhill Road and the residential and commercial developments known to exist in the area were not shown. The ground surface was mapped between the Elevation 65 feet NGVD ("El.+65") contour and the El.+75 contour. A point along SR 50 near the Woodbury Road intersection was mapped at El.+69. The wetlands and freshwater marsh areas to the south and east were mapped below the El.+60 contour. An isolated wetland area west of Woodbury Road was mapped below the EL.+75 contour. The portion of the USGS map that covered this area is reproduced in this report as Figure 1.

The SCS Soil Survey sheet that covered the project area reported the main soil-units in the area as Immokalee fine sand, Smyrna fine sand, and St. Johns fine sand. Ona fine sand and Pomello fine sand were mapped in areas that corresponded to higher elevations on the USGS topographic map, while Basinger fine sand was shown in areas along the road mapped as wetlands or marsh. Samsula muck was mapped in nearby wetlands. A portion of the SCS Soil Survey sheet that covered the project area is reproduced in this report as Figure 2.

Immokalee fine sand, Smyrna fine sand, and St. Johns fine sand are found on broad, low-lying plains throughout Orange County. These soils are reported to be nearly level to level, and poorly drained, with seasonal high groundwater levels within a foot of the ground surface in natural, undisturbed, typically rural areas. Ona fine sand and Pomello fine sand are found on low knolls and ridges on these low-lying plains. These soils are reported to be nearly level to gently sloping, and moderately well drained to well drained, with seasonal high groundwater levels between two feet and about four feet below the natural ground surface.

Basinger fine sand is found in wetlands, marshes, broad drainage areas, natural depressions, and other localized, low-lying areas on the terrain. These soils are nearly level to level, and very poorly drained. They are often submerged for most of the year, sometimes by as much as two feet during the rainy season. These soils have a surficial layer of organic material about a foot deep, but other organic soils such as Samsula muck or Hontoon muck are sometimes found in areas mapped as Basinger fine sand, depressional. The surficial layer of organic material in these muck soils may be more than four feet deep.

Characteristics of the reported soils are summarized below in Table 1.

TABLE 1
USDA SCS SOIL SURVEY MAP UNITS IN PROJECT AREA

SOIL-UNIT		DESCRIPTION	AASHTO GROUP	ESTIMATED SEASONAL HIGH WATER DEPTH (feet)	HYDRO-LOGIC SOIL GROUP
No.	NAME				
3	Basinger fine sand, depressional	Fine sand	A-3, A-2-4	+2 - 1.0	D
20	Immokalee fine sand	Fine sand	A-3, A-2-4	0 - 1.0	B/D
26	Ona fine sand	Fine sand	A-3, A-2-4	0 - 1.0	B/D
34	Pomello fine sand	Fine sand	A-3, A-2-4	2.0 - 3.5	C
37	St Johns fine sand	Fine sand	A-3	0 - 1.0	B/D
42	Sanibel muck	Muck, fine sand	A-8, A-2-4	+2 - 1.0	B/D
44	Smyrna fine sand	Fine sand	A-3, A-2-4	0 – 1.0	B/D

The ICE drawings were two roll-plots that showed aerial images of the existing roadway and adjoining properties. The planned roadway-widening and a survey baseline with stationing were superimposed on the roll-plots. The spur along Waterford Lakes Parkway was also shown.

FIELD EXPLORATIONS

AEA staff developed preliminary, exploration-location plans using the ICE roll-plots and Google Earth™ imagery as references. We selected 16 roadway-auger-boring locations along Woodbury Road spaced about 600 feet apart as requested by County staff, and one at the western end of the Waterford Lakes Parkway spur. We established the boring locations in unpaved areas along the northbound ("right") shoulder of Woodbury Road near the stations shown on the baseline survey. We selected five pavement-core locations along Woodbury Road in collaboration with ICE staff.

We designated the roadway-auger-boring locations using approximate roadway stationing and the position of the boring location relative to the baseline survey. For example, boring "6R" was on the right side of Woodbury Road near Sta.106+00, and boring "70R" was on the right side of Woodbury Road near Sta.170+00. We designated the boring along Waterford Lakes Parkway as "WL2L," and the core locations as "C-1" through "C-5," in order of increasing stationing.

We conducted field reconnaissances to obtain general information about the surface conditions in the project corridor and set out the exploration locations. We marked the roadway-auger-boring locations with paint for underground-utility location in accordance with Florida statutes, and we staked them to facilitate identification by the field crew.

The field crew drilled the borings to 20 feet in accordance with ASTM D1452 in October 2019, using continuous-flight augers powered by a rotary-drill rig. They logged the soils recovered on the auger flights, selected representative samples, sealed them in airtight containers, measured the encountered depth to groundwater in the boreholes, and recorded their observations and measurements on field logs. They backfilled the completed boreholes with soil and drill-cuttings. We cannot confirm that the boring locations were surveyed, so the locations presented and discussed in this report should be considered as approximate.

The crew cored the pavement on November 4, 2020 at the five locations discussed above, to measure the component-layer thicknesses and to observe the nature of the underlying soils. They extracted each core; measured the thicknesses of the pavement layers; described the underlying soils; recorded their measurements on field logs, and filled each core hole to the pavement surface with hand-tamped, cold-mix asphalt. Core information is presented in the PAVEMENT CORE section of this report.

LABORATORY TESTING

A geotechnical engineer examined the recovered soil samples in our laboratory, confirmed the descriptions on the field logs, examined the soils using visual-manual methods in accordance with ASTM D2488, and developed a representation of the soil stratigraphy at each auger-boring location. The engineer selected representative specimens for laboratory testing, which consisted of 26 soil-gradation analyses, one natural moisture content test, and one organic content test. We conducted the tests in accordance with applicable American Association of State Highway and Transportation Officials ("AASHTO") methods. Test results are presented on the Report of Tests sheet, the Summary of Laboratory Test Results tables, and the graphs in Appendix A.

GENERAL COMMENTS ON RECOMMENDATIONS

The following assessments are based on our review of the available information, the findings of our preliminary field explorations and our limited laboratory-testing results, our understanding of the planned road construction, and our experience with similar projects and similar subsurface conditions. We prepared this report for the exclusive use of ICE and OCDPW to preliminarily assess subsurface conditions for this project only. It should not be used for other projects, *even at the same exploration locations*, without consulting us.

Soils are natural materials, so variations in composition and other physical characteristics are normal and should be expected. Because of natural variations in the depth and composition of soils and the broad spacing between the borings that we drilled for this study, materials other than those we encountered during our explorations (including possibly unfavorable or unsuitable materials) may be encountered during the design geotechnical study and should be anticipated.

DISCUSSION OF ENOUNTERED SUBSURFACE CONDITIONS

The boreholes that we drilled for this study encountered three soils that were mostly sandy, plus a zone of organic soil about four feet below the ground surface at 40R. Some sandy soils near the ground had variations in color and composition that did not appear to be naturally caused. We saw numerous underground-utility markings around the boring locations, and we occasionally recovered pieces of broken concrete on the auger flights.

We designated the sandy soils as “Stratum 1” through “Stratum 3” and we classified them using AASHTO Designation M-145 as “A-3” and “A-2-4.” We designated the organic soil “Stratum 4” and classified it as “A-8.” Descriptions and AASHTO designations for each stratum are presented on the Report of Tests Sheet, while stratifications at each location are presented on the Report of Auger Borings sheets in Appendix A.

Florida Department of Transportation Standard Plan 120-002 Utilization of Embankment defines A-3 and A-2-4 materials as “select” materials, and defined “A-8”materials as “muck.” Stratum 1 soils had the variations in color and composition that did not appear to be naturally caused, and contained the pieces of broken concrete, so we characterized them as “possible fill/possible backfill.” Based on the encountered groundwater levels, widening of the existing embankment accompanied by some over-excavation of organic materials may be needed in low-lying areas and should be anticipated.

We encountered groundwater in the boreholes between two feet and eight feet below the existing ground surface at the boring locations. These variations may be partly due to differences in ground surface elevation, as well as differences in surface-drainage characteristics as a result of land development and road construction in this corridor.

ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL

During the rainy season in Florida, groundwater levels are generally higher than those observed at other times of the year. The extent of that variation depends on factors such as, but not limited to, terrain; intensity, duration, and frequency of rainfall; hydrogeologic properties of the soils; and the presence and proximity of artificial-drainage facilities.

Because of the time of year at which we conducted this study, we do not expect the groundwater levels to become more elevated under the normal, cyclic influence of seasonal rainfall than those we encountered. We observed artificial-drainage facilities nearby, so those facilities are likely to change the natural drainage characteristics of the project area. Based on the groundwater levels observed in the boreholes, we recommend setting the estimated seasonal high groundwater levels at the same level as the encountered levels for roadway design, with due consideration for variations in topography, as well as natural and man-made variations in soils that can be expected within the project limits. Encountered groundwater levels and estimated seasonal high groundwater levels are shown on the Report of Auger Borings sheets in Appendix A.

PAVEMENT CORES

As discussed earlier in this report, we cored the pavement at five locations along Woodbury Road. Approximate locations, layer types, and encountered thicknesses are presented below in Table 2.

TABLE 2
SUMMARY OF PAVEMENT CORES

CORE No.	ASPHALT-CONCRETE SURFACE COURSE THICKNESS (inches)	BASE COURSE TYPE AND THICKNESS (inches)	APPROXIMATE LOCATION
C-1	1⅛ + 1¾	8½ shell-cement	SB turn lane, 500 ft north of Lake Underhill Road
C-2	1 + 1 + 1⅞	7¾ apparent limerock	Median, 1750 ft north of Lake Underhill Road
C-3	1⅛ + 2¾	4 cement-stabilized limerock	Median, 200 ft north of Waterford Lakes Parkway
C-4	1¼ + 1¾	6¾ shell-cement	SB lane at Parkbury Drive
C-5	1¼ + 2½	11½ shell cement	NB turn lane, 500 ft south of east Colonial Drive

NOTE: Asphalt-concrete thicknesses shown for each core correspond to the number and thicknesses of sub-layers that we observed. The overall thickness of the asphalt-concrete surface course is the sum of the sublayer thicknesses shown.

The material beneath the pavement base appeared to silty sand, partially mixed at some locations with clay lumps or shell fragments that appeared to be subgrade-stabilizing material.

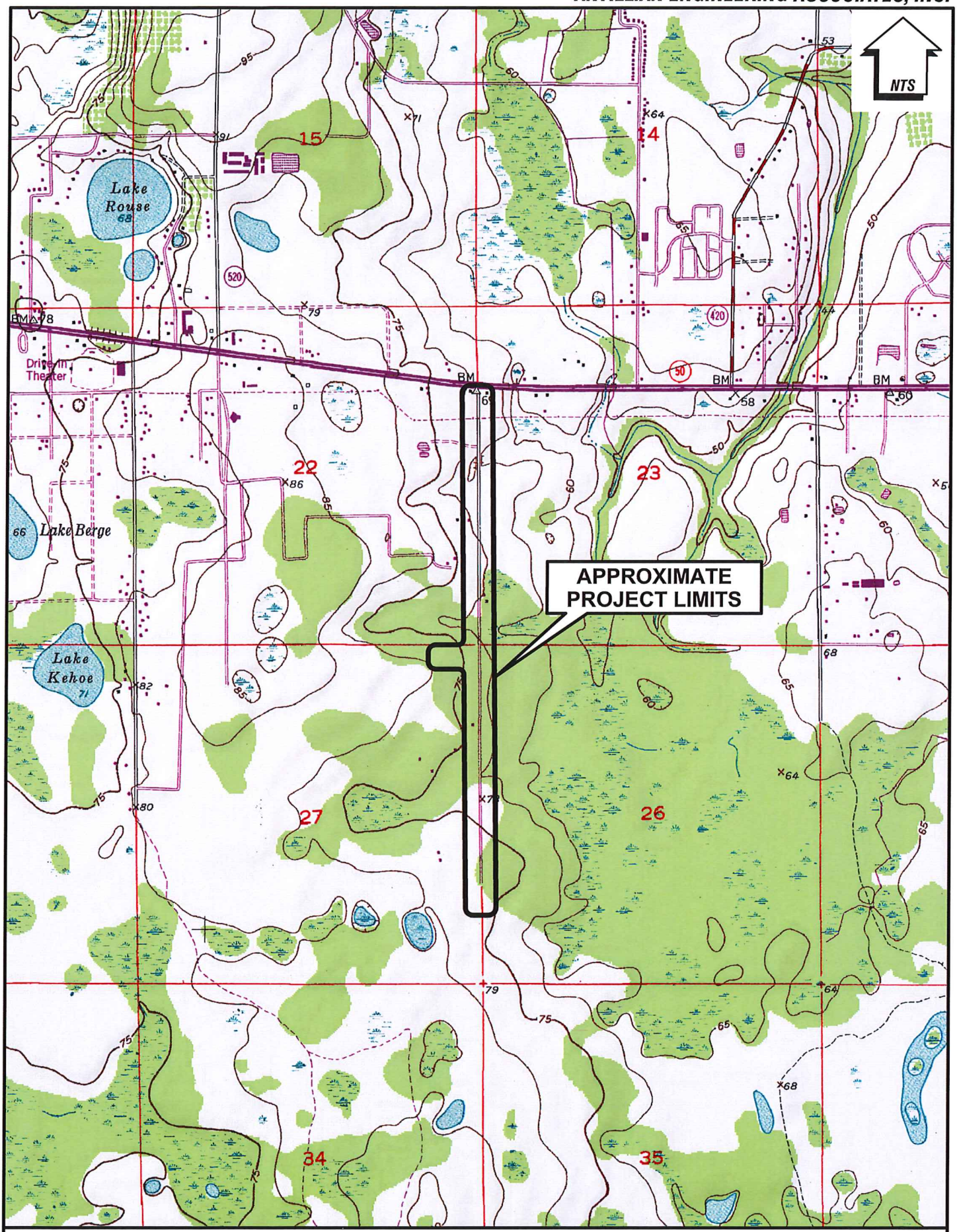
LIMITATIONS

This report presents an assessment of the subsurface conditions we encountered, using customary, accepted geotechnical-engineering procedures for site characterization in central Florida. We did not examine or test any recovered soil samples in any way for chemical composition or for potential environmental hazards.

We confined this study to the zone of soil likely to be affected by the proposed construction. We did not address the potential of surface expression of geologic activity such as sinkholes, which requires a more extensive range of services than those performed for this study.

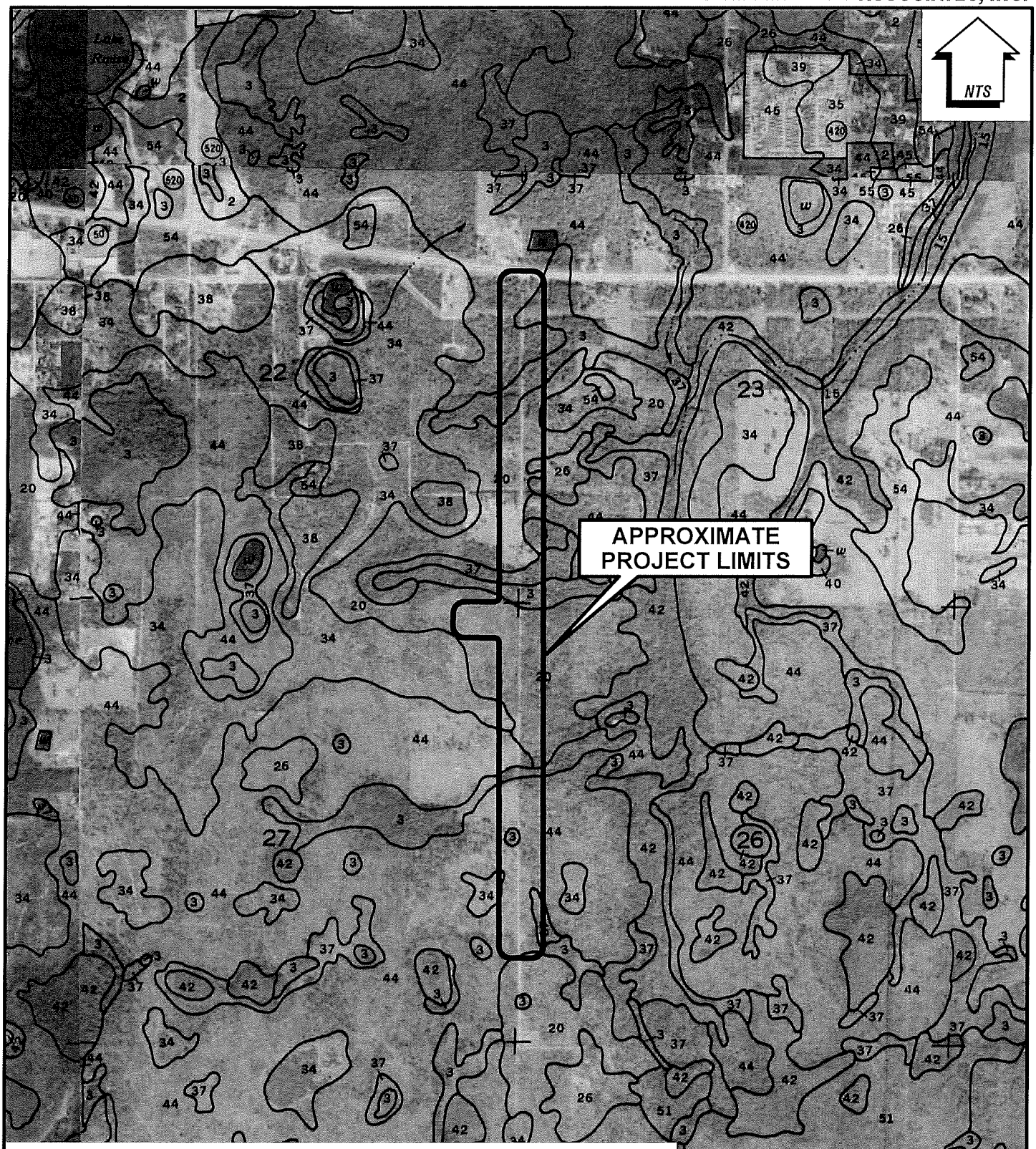
Because of the natural limitations inherent in working below the ground surface, a geotechnical engineer cannot predict and address all possible problems. During construction, geotechnical challenges not addressed in this report may arise. We included the bulletin Important Information About This Geotechnical-Engineering Report in Appendix B to help explain what one can reasonably expect from a geotechnical-engineering report. We also presented information in Appendix C to discuss the potential concerns and the basic limitations of a typical geotechnical-engineering report.

FIGURES



PROJECT LOCATION MAP

201903	WOODBURY ROAD RCA	FIG. 1



SOIL LEGEND

3 – BASINGER FINE SAND, DEPRESSIONAL
20 – IMMOKALEE FINE SAND
26 – ONA FINE SAND
34 – POMELLO FINE SAND, 0 TO 5 PERCENT SLOPES
37 – ST. JOHNS FINE SAND
44 – SMYRNA FINE SAND

Figure developed from UDSA SCS Soil Survey of Orange County, Florida, issued August, 1989

USDA SCS SOIL SURVEY MAP

201903	WOODBURY ROAD RCA	FIG. 2

APPENDIX A

ROADWAY SOILS SURVEY
REPORT OF TESTS

TOWNSHIP: 22 SOUTH
RANGE: 31 EAST
SECTIONS: 22,23,27,26

PROJECT NO.: AEA PROJ. NO. 201903
ROAD NO.: WOODBURY ROAD RCA
SUBMITTED BY: ANTILLIAN ENGINEERING ASSOCIATES, INC.

DATE OF SURVEY: 10/15/19 – 10/16/19
SURVEYED BY: ANTILLIAN ENGINEERING ASSOCIATES, INC.
SURVEY BEGINS STA. NO.: 100+50
SURVEY ENDS STA. NO.: 170+00
DATE REPORTED: 09/15/20

		ORGANIC CONTENT			SIEVE ANALYSIS RESULTS (% PASSING)						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				ENVIRONMENTAL CLASSIFICATION (SUBSTRUCTURE)	
STRATUM NO.	LBR VALUE	NO. OF TESTS	% ORGANIC	MOISTURE CONTENT %	NO. OF TESTS	#10 MESH	#40 MESH	#60 MESH	#100 MESH	#200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTICITY INDEX	AASHTO GROUP	DESCRIPTION	RESISTIVITY ohm-cm	CHLORIDES ppm	SULFATES ppm	pH	CONCRETE	STEEL
1	--	--	--	--	2	100	95-97	75-82	22-30	7-9	--	--	--	A-3	DARK GRAYISH BROWN, DARK BROWN, VERY DARK BROWN, LIGHT BROWNISH GRAY, GRAY, SAND WITH PIECES OF CONCRETE, A FEW FINE TREE ROOTS (POSSIBLE FILL/POSSIBLE BACKFILL)	--	--	--	--	--	--
2	--	--	--	--	16	100	89-100	55-98	12-81	6-10	--	--	--	A-3	BROWN, DARK BROWN, VERY DARK BROWN, DARK YELLOWISH BROWN, DARK GRAYISH BROWN, VERY DARK GRAYISH BROWN, DARK REDDISH BROWN, REDDISH BROWN, YELLOWISH BROWN, DARK GRAY, BROWNISH YELLOW, PALE BROWN, LIGHT YELLOWISH BROWN, GRAY, SAND	--	--	--	--	--	--
3	--	--	--	--	6	100	93-99	69-92	25-46	11-16	--	--	--	A-2-4	VERY DARK BROWN, YELLOWISH BROWN, DARK YELLOWISH BROWN, DARK REDDISH BROWN, DARK BROWN, BROWN, SILTY SAND	--	--	--	--	--	--
4	--	1	40	122	--	--	--	--	--	--	--	--	--	A-8	BLACK ORGANIC SILT	--	--	--	--	--	--

NOTES

1. THE SYMBOL "--", IF PRESENT, REPRESENTS UNMEASURED SOIL PARAMETERS.
2. SOIL BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH BORING LOCATION ONLY. ANY SUBSOIL CONNECTING LINES SHOWN ARE FOR ESTIMATING EARTHWORK ONLY AND DO NOT INDICATE ACTUAL STRATUM LIMITS. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED AS INDICATED IN SECTION 2-4 OF THE FDOT STANDARD SPECIFICATIONS.
3. ▼ – ENCOUNTERED GROUNDWATER LEVEL AT THE TIME OF SURVEY
4. ▽ – ESTIMATED HIGH GROUNDWATER LEVEL FOR PAVEMENT DESIGN PURPOSES ONLY
5. GNE – GROUNDWATER NOT ENCOUNTERED
6. STRATUM 4 AND ORGANIC MATERIAL SHALL BE REMOVED IN ACCORDANCE WITH FDOT STANDARD PLAN 120-001.
7. PLASTIC MATERIAL SHALL BE REMOVED IF ENCOUNTERED, IN ACCORDANCE WITH FDOT STANDARD PLAN 120-001.
8. ALL MATERIAL USED IN EMBANKMENT CONSTRUCTION SHALL BE IN ACCORDANCE WITH FDOT STANDARD PLAN 120-002.
9. SUBSURFACE VARIATIONS BETWEEN BORINGS SHOULD BE ANTICIPATED AS INDICATED IN SECTION 2-4 OF THE FDOT STANDARD SPECIFICATIONS.

REVISIONS

Date	By	Description	Date	By	Description

	Names	Dates
Drawn by	K.A.S.	09-15-20
Checked by	P.G.S.	09-15-20
Designed by		
Checked by		
Approved by		

ENGINEER OF RECORD:
PETER G. SUAH, P.E.
FLORIDA REG. NO. 46910

ANTILLIAN ENGINEERING ASSOCIATES
3309 BARTLETT BOULEVARD
ORLANDO, FLORIDA 32811
PHONE: (407) 422-1441

LOGO: ANTILLIAN ENGINEERING ASSOCIATES, INC. GEOTECHNICAL ENGINEERS CERTIFICATE OF AUTHORIZATION CA6685

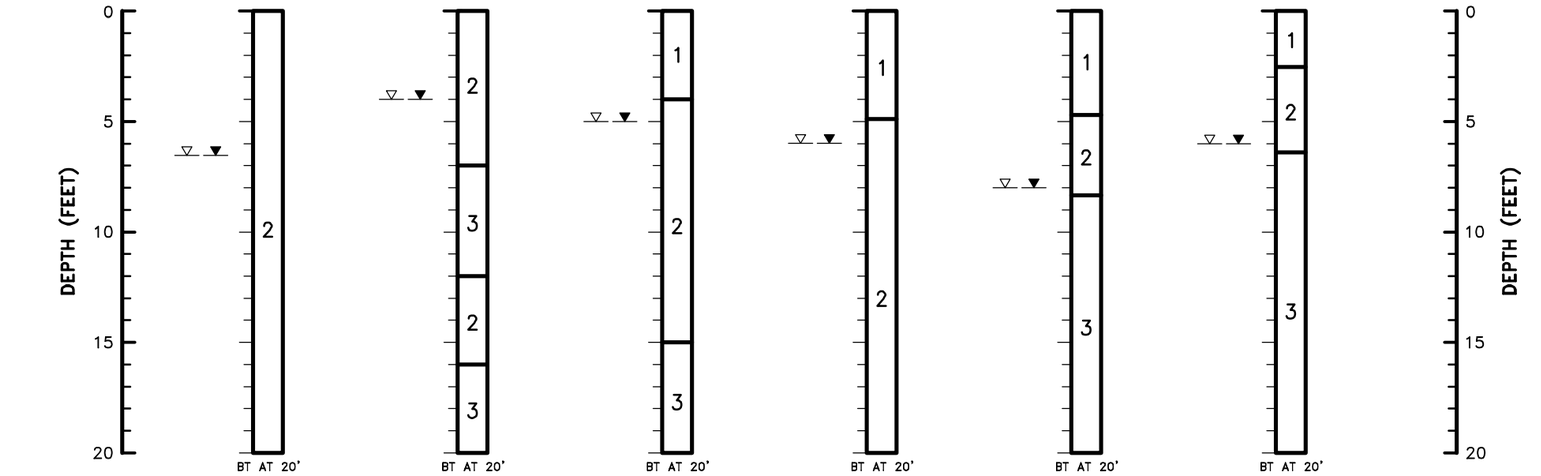
SEAL:

ORANGE COUNTY PUBLIC WORKS DEPT.
ENGINEERING DIVISION
4200 S. JOHN YOUNG PKWY. ORLANDO, FLORIDA 32839-9205 (407) 838-7950

PROJECT NAME	PROJECT NUMBER
WOODBURY ROAD RCA	XX

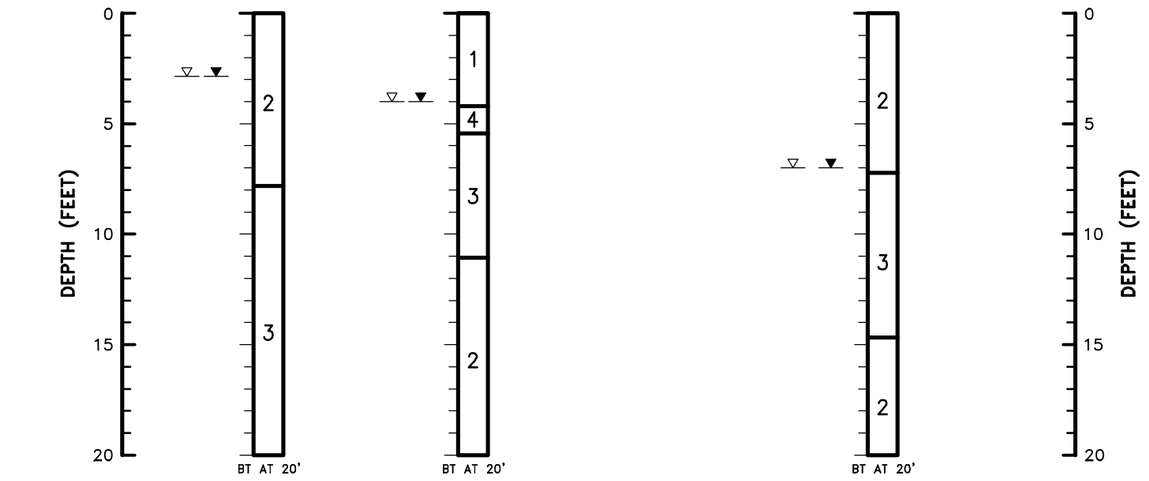
SHEET TITLE: REPORT OF TESTS
Drawing No.
PROJECT NAME: WODBURY ROAD RCA
Index No.

LAKE UNDERHILL ROAD TO SR 408



SR 408 TO WATERFORD LAKES PARKWAY

WATERFORD LAKES PARKWAY



STRATUM NO.	AASHTO SOIL CLASSIFICATION SYMBOL	DESCRIPTION
1	A-3	DARK GRAYISH BROWN, DARK BROWN, VERY DARK BROWN, LIGHT BROWNISH GRAY, GRAY, SAND WITH PIECES OF CONCRETE, A FEW FINE TREE ROOTS (POSSIBLE FILL/POSSIBLE BACKFILL)
2	A-3	BROWN, DARK BROWN, VERY DARK BROWN, DARK YELLOWISH BROWN, DARK GRAYISH BROWN, VERY DARK GRAYISH BROWN, DARK REDDISH BROWN, REDDISH BROWN, YELLOWISH BROWN, DARK GRAY, BROWNISH YELLOW, PALE BROWN, LIGHT YELLOWISH BROWN, GRAY, SAND
3	A-2-4	VERY DARK BROWN, YELLOWISH BROWN, DARK YELLOWISH BROWN, DARK REDDISH BROWN, DARK BROWN, BROWN, SILTY SAND
4	A-8	BLACK ORGANIC SILT

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4200 S. JOHN YOUNG PKWY. ORLANDO, FLORIDA 32839-9205 (407) 838-7950

PROJECT NAME	PROJECT NUMBER
WOODBURY ROAD RCA	XX

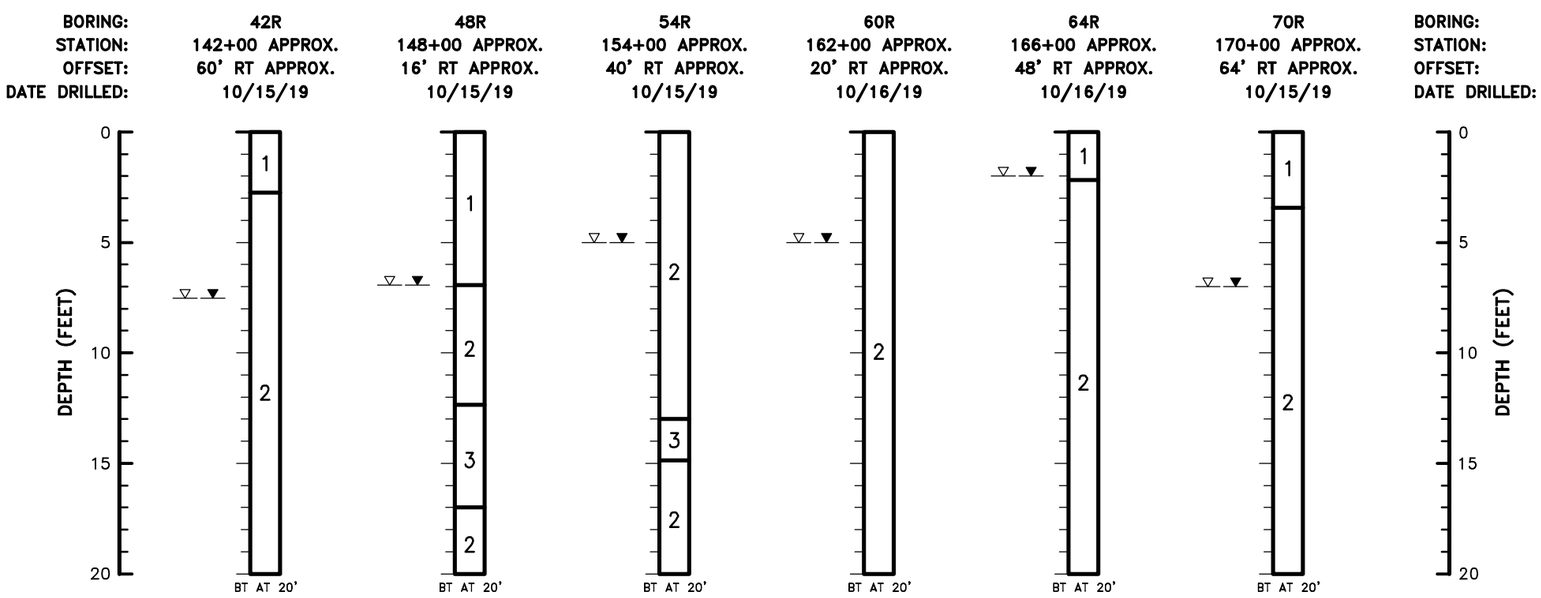
SHEET TITLE: **REPORT OF ROADWAY AUGER BORINGS (1 OF 2)**

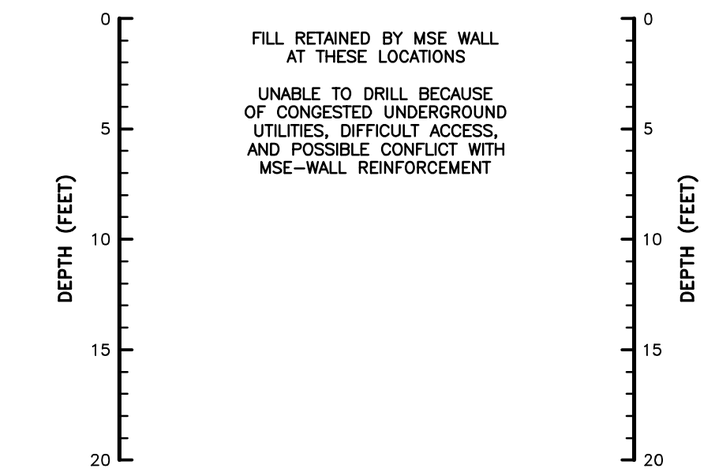
Drawing No.

PROJECT NAME: **WOODBURY ROAD RCA**

Index No.

WATERFORD LAKES PARKWAY TO SR 50





STRATUM NO.	AASHTO SOIL CLASSIFICATION SYMBOL	DESCRIPTION
1	A-3	DARK GRAYISH BROWN, DARK BROWN, VERY DARK BROWN, LIGHT BROWNISH GRAY, GRAY, SAND WITH PIECES OF CONCRETE, A FEW FINE TREE ROOTS (POSSIBLE FILL/POSSIBLE BACKFILL)
2	A-3	BROWN, DARK BROWN, VERY DARK BROWN, DARK YELLOWISH BROWN, DARK GRAYISH BROWN, VERY DARK GRAYISH BROWN, DARK REDDISH BROWN, REDDISH BROWN, YELLOWISH BROWN, DARK GRAY, BROWNISH YELLOW, PALE BROWN, LIGHT YELLOWISH BROWN, GRAY, SAND
3	A-2-4	VERY DARK BROWN, YELLOWISH BROWN, DARK YELLOWISH BROWN, DARK REDDISH BROWN, DARK BROWN, BROWN, SILTY SAND
4	A-8	BLACK ORGANIC SILT

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Checked by	P.G.S.	09-15-20
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PROJECT NAME	PROJECT NUMBER
WOODBURY ROAD RCA	XX

SHEET TITLE: **REPORT OF ROADWAY AUGER BORINGS (2 OF 2)**

Drawing No.

PROJECT NAME: **WOODBURY ROAD RCA**

Index No.

Project: **Woodbury Road RCA** Job Number: **201903** **Sheet 1 of 2**

Manager: _____ Client: _____ Project Description: _____

Location: _____ _____ _____

_____ _____ _____

Boring / Depth	Sample Description	#4	#10	#40	#60	#100	Fines #200	Water Content	LL	PI	Organic Content	k (ft/day)	Stratum No.	AASHTO	USCS
0R	Very dark brown sand														
6.0		100.0	100.0	92.2	65.7	14.8	7.1						2	A-3	
6R	Very dark grayish brown sand														
6.5		100.0	100.0	93.4	72.2	15.8	6.0						2	A-3	
12R	Very dark gray sand														
8.0		100.0	100.0	89.2	54.7	12.4	6.9						2	A-3	
12R	Very dark brown sand														
10.0		100.0	100.0	97.4	82.0	21.9	10.0						2	A-3	
18R	Dark brown sand														
4.5		100.0	100.0	95.4	75.1	22.0	7.1						1	A-3	
18R	Very dark brown sand														
9.5		100.0	100.0	93.4	70.2	20.2	10.1						2	A-3	
24R	Very dark brown sand														
2.5		100.0	100.0	97.0	82.0	29.7	8.6						1	A-3	
24R	Dark brown silty sand														
9.0		100.0	100.0	94.0	74.6	24.6	11.4						3	A-2-4	
28R	Very dark brown silty sand														
7.0		100.0	99.6	94.4	75.1	25.6	11.6						3	A-2-4	
36R	Very dark brown silty sand														
8.0		100.0	100.0	94.8	77.6	27.2	11.2						3	A-2-4	
40R	Black organic silt														
4.5								122.2			40.1		4	A-8	
40R	Very dark brown silty sand														
6.0		100.0	100.0	96.8	80.2	32.2	15.4						3	A-2-4	
40R	Dark yellowish brown sand														
11.5		100.0	100.0	95.1	74.3	20.6	7.5						2	A-3	
42R	Dark brown sand														
5.5		100.0	99.6	95.5	76.1	25.0	7.2						2	A-3	
48R	Very dark brown sand														
7.5		100.0	100.0	95.4	75.4	23.6	8.8						2	A-3	
48R	Dark yellowish brown silty sand														
13.0		100.0	100.0	98.6	92.2	45.7	15.5						3	A-2-4	
48R	Dark brown sand														
20.0		100.0	100.0	99.5	98.4	63.6	6.7						2	A-3	
54R	Very dark brown sand														
1.0		100.0	99.7	95.6	78.4	28.3	8.5						2	A-3	
60R	Very dark grayish brown sand														
7.0		100.0	100.0	96.4	85.9	35.3	8.5						2	A-3	

Summary Of Laboratory Test Results

ANTILLIAN
ENGINEERING ASSOCIATES, INC.

Project: **Woodbury Road RCA** Job Number: **201903** **Sheet 2 of 2**

Manager: _____ Client: _____ Project Description: _____

Location: _____

Boring / Depth	Sample Description	#4	#10	#40	#60	#100	Fines #200	Water Content	LL	PI	Organic Content	k (ft/day)	Stratum No.	AASHTO	USCS
64R	Dark yellowish brown sand														
12.0		100.0	100.0	99.4	98.1	81.0	7.5						2	A-3	
70R	Dark brown sand														
10.5		100.0	100.0	96.7	86.7	35.7	9.4						2	A-3	
70R	Dark yellowish brown sand														
13.0		100.0	100.0	98.0	92.5	44.4	7.8						2	A-3	
WL2L	Very dark brown sand														
1.0		100.0	100.0	96.4	85.0	41.6	9.7						2	A-3	
WL2L	Very dark brown silty sand														
7.5		100.0	100.0	92.9	69.3	24.9	15.8						3	A-2-4	
WL2L	Dark yellowish brown sand														
15.0													2	A-3	

Summary Of Laboratory Test Results

ANTILLIAN
ENGINEERING ASSOCIATES, INC.

Project: **Woodbury Road RCA** Job Number: **201903** **Sheet 1 of 2**

Manager: _____ Client: _____ Project Description: _____

Location: _____

Boring / Depth	Sample Description	#4	#10	#40	#60	#100	Fines #200	Water Content	LL	PI	Organic Content	k (ft/day)	Stratum No.	AASHTO	USCS
18R	Dark brown sand														
4.5		100.0	100.0	95.4	75.1	22.0	7.1						1	A-3	
24R	Very dark brown sand														
2.5		100.0	100.0	97.0	82.0	29.7	8.6						1	A-3	
0R	Very dark brown sand														
6.0		100.0	100.0	92.2	65.7	14.8	7.1						2	A-3	
12R	Very dark gray sand														
8.0		100.0	100.0	89.2	54.7	12.4	6.9						2	A-3	
12R	Very dark brown sand														
10.0		100.0	100.0	97.4	82.0	21.9	10.0						2	A-3	
18R	Very dark brown sand														
9.5		100.0	100.0	93.4	70.2	20.2	10.1						2	A-3	
40R	Dark yellowish brown sand														
11.5		100.0	100.0	95.1	74.3	20.6	7.5						2	A-3	
42R	Dark brown sand														
5.5		100.0	99.6	95.5	76.1	25.0	7.2						2	A-3	
48R	Very dark brown sand														
7.5		100.0	100.0	95.4	75.4	23.6	8.8						2	A-3	
48R	Dark brown sand														
20.0		100.0	100.0	99.5	98.4	63.6	6.7						2	A-3	
54R	Very dark brown sand														
1.0		100.0	99.7	95.6	78.4	28.3	8.5						2	A-3	
60R	Very dark grayish brown sand														
7.0		100.0	100.0	96.4	85.9	35.3	8.5						2	A-3	
64R	Dark yellowish brown sand														
12.0		100.0	100.0	99.4	98.1	81.0	7.5						2	A-3	
6R	Very dark grayish brown sand														
6.5		100.0	100.0	93.4	72.2	15.8	6.0						2	A-3	
70R	Dark brown sand														
10.5		100.0	100.0	96.7	86.7	35.7	9.4						2	A-3	
70R	Dark yellowish brown sand														
13.0		100.0	100.0	98.0	92.5	44.4	7.8						2	A-3	
WL2L	Very dark brown sand														
1.0		100.0	100.0	96.4	85.0	41.6	9.7						2	A-3	
WL2L	Dark yellowish brown sand														
15.0													2	A-3	
24R	Dark brown silty sand														
9.0		100.0	100.0	94.0	74.6	24.6	11.4						3	A-2-4	

Summary Of Laboratory Test Results

ANTILLIAN
ENGINEERING ASSOCIATES, INC.

Project: **Woodbury Road RCA** Job Number: **201903** **Sheet 2 of 2**

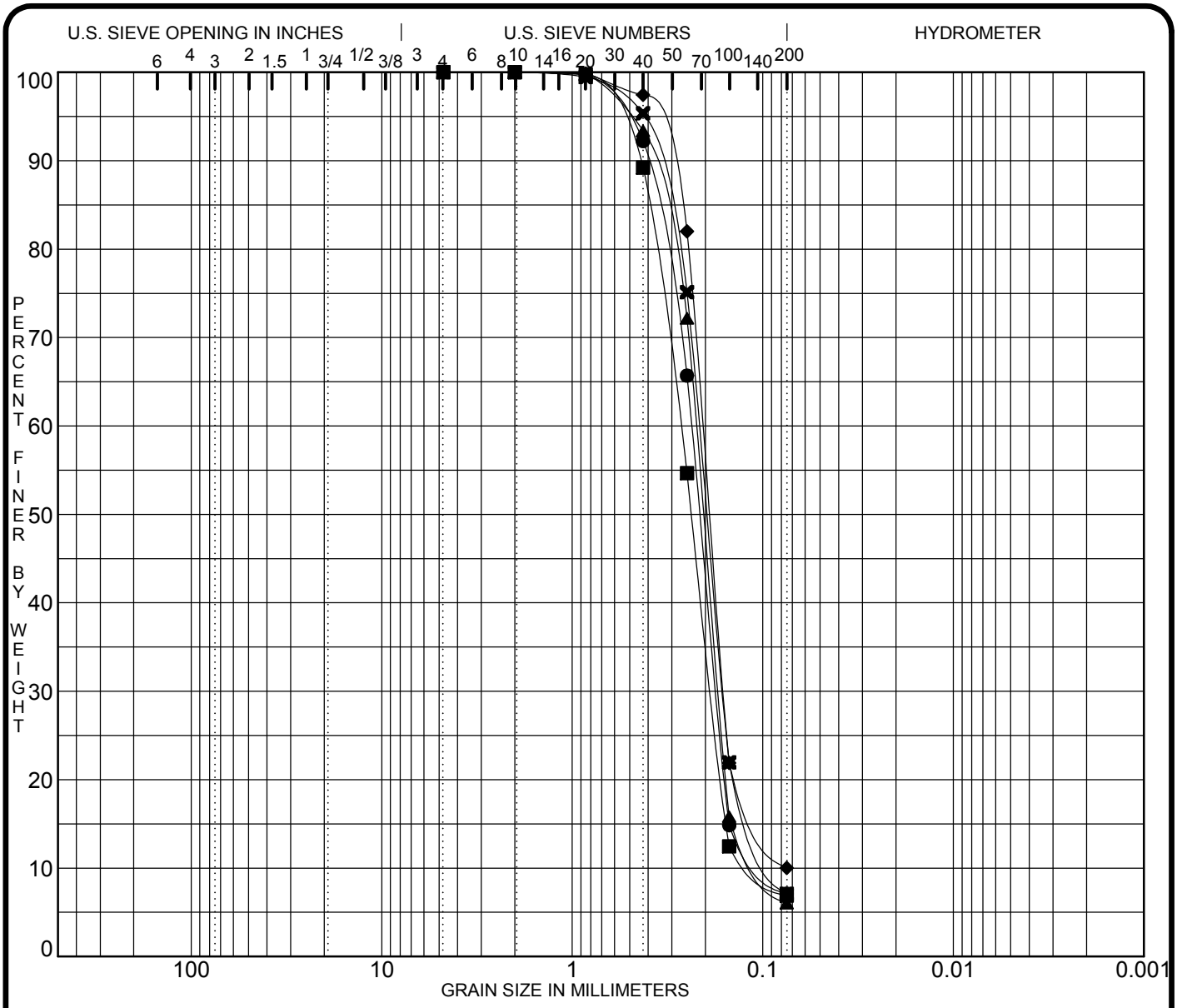
Manager: _____ Client: _____ Project Description: _____

Location: _____

Boring / Depth	Sample Description	#4	#10	#40	#60	#100	Fines #200	Water Content	LL	PI	Organic Content	k (ft/day)	Stratum No.	AASHTO	USCS
28R	**Very dark brown silty sand**														
7.0		**100.0**	**99.6**	**94.4**	**75.1**	**25.6**	**11.6**						**3**	**A-2-4**	
36R	**Very dark brown silty sand**														
8.0		**100.0**	**100.0**	**94.8**	**77.6**	**27.2**	**11.2**						**3**	**A-2-4**	
40R	**Very dark brown silty sand**														
6.0		**100.0**	**100.0**	**96.8**	**80.2**	**32.2**	**15.4**						**3**	**A-2-4**	
48R	**Dark yellowish brown silty sand**														
13.0		**100.0**	**100.0**	**98.6**	**92.2**	**45.7**	**15.5**						**3**	**A-2-4**	
WL2L	**Very dark brown silty sand**														
7.5		**100.0**	**100.0**	**92.9**	**69.3**	**24.9**	**15.8**						**3**	**A-2-4**	
40R	**Black organic silt**														
4.5								**122.2**			**40.1**		**4**	**A-8**	

Summary Of Laboratory Test Results

ANTILLIAN
ENGINEERING ASSOCIATES, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	0R	6.0	Very dark brown sand					1.33	2.4
▲	6R	6.5	Very dark grayish brown sand					1.31	2.3
■	12R	8.0	Very dark gray sand					1.15	2.5
◆	12R	10.0	Very dark brown sand					1.66	2.8
✖	18R	4.5	Dark brown sand					1.41	2.5

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	0R	6.0	4.75	0.24	0.175	0.0972	0.0	92.9	7.1	
▲	6R	6.5	4.75	0.22	0.171	0.0994	0.0	94.0	6.0	
■	12R	8.0	4.75	0.27	0.185	0.1105	0.0	93.1	6.9	
◆	12R	10.0	4.75	0.21	0.161		0.0	90.0	10.0	
✖	18R	4.5	4.75	0.22	0.162	0.0859	0.0	92.9	7.1	

PROJECT **Woodbury Road RCA**

JOB NO. **201903**

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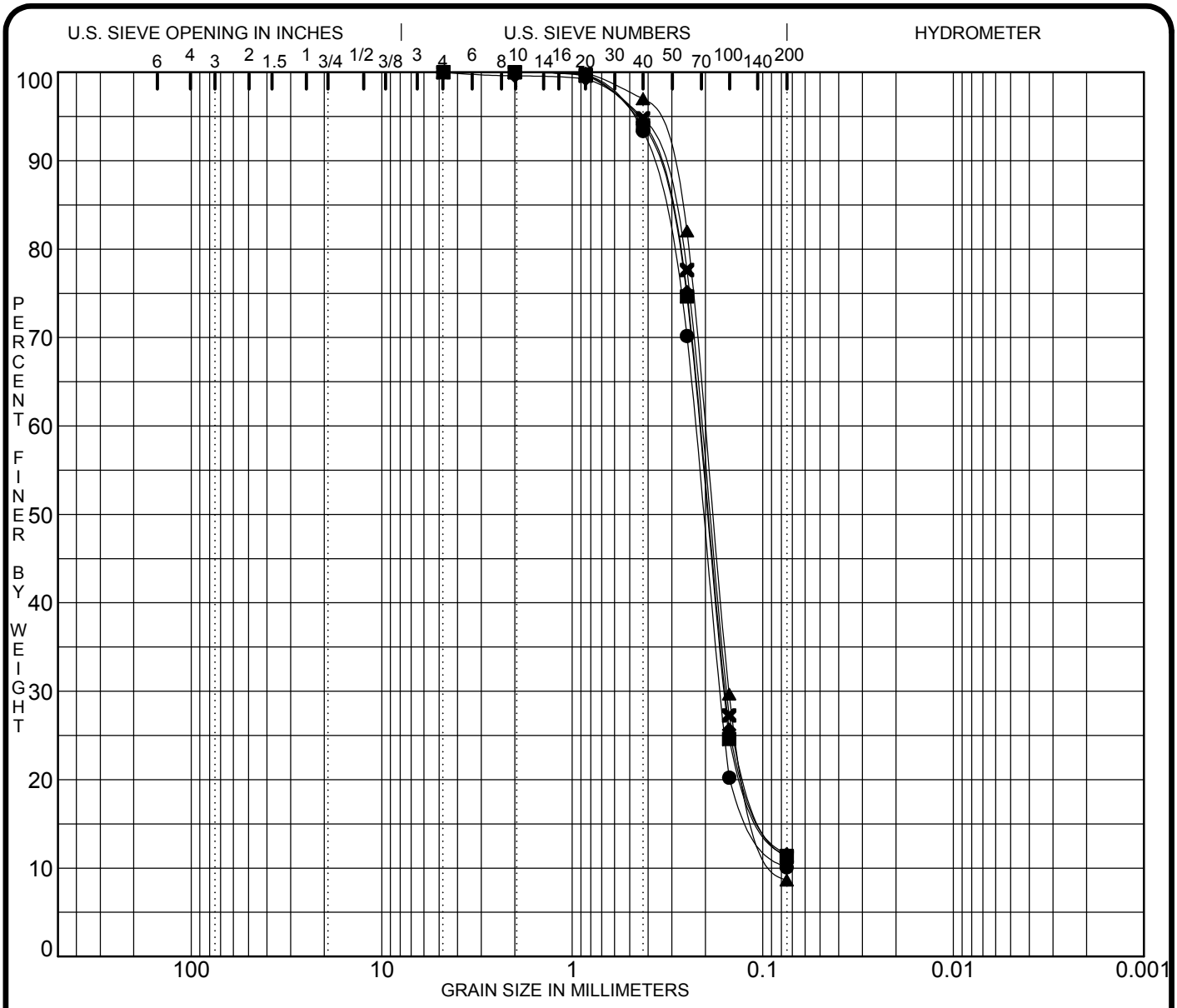
GRADATION CURVES

ANTILLIAN ENGINEERING ASSOCIATES, INC.

Orlando, Florida, USA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	18R	9.5	Very dark brown sand					1.64	3.0
▲	24R	2.5	Very dark brown sand					1.43	2.6
■	24R	9.0	Dark brown silty sand					1.67	3.1
◆	28R	7.0	Very dark brown silty sand					1.66	3.1
✖	36R	8.0	Very dark brown silty sand					1.60	2.9

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	18R	9.5	4.75	0.23	0.166		0.0	89.9	10.1	
▲	24R	2.5	4.75	0.20	0.150	0.0785	0.0	91.4	8.6	
■	24R	9.0	4.75	0.22	0.158		0.0	88.6	11.4	
◆	28R	7.0	4.75	0.21	0.157		0.0	88.4	11.6	
✖	36R	8.0	4.75	0.21	0.154		0.0	88.8	11.2	

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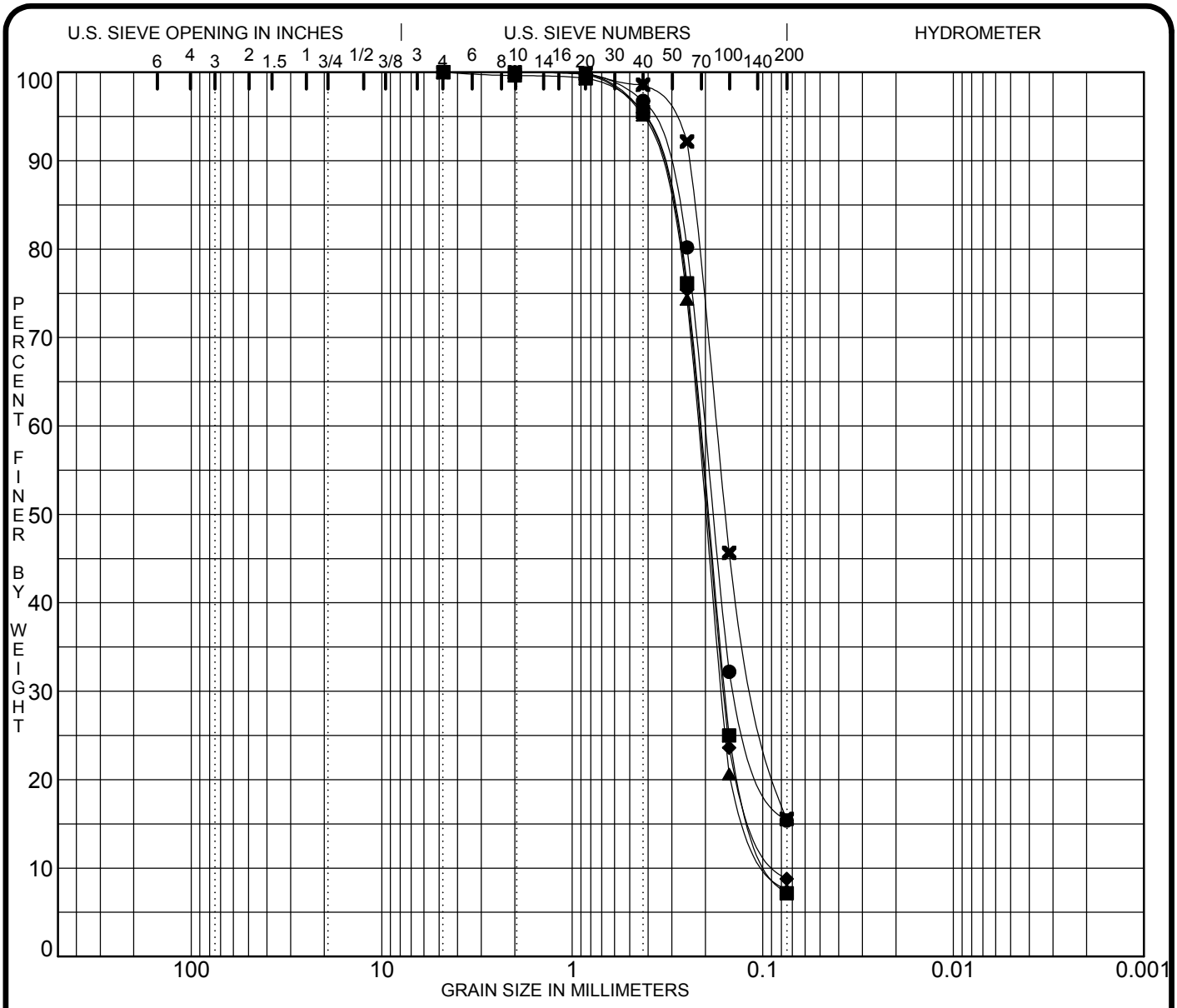

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	40R	6.0	Very dark brown silty sand						
▲	40R	11.5	Dark yellowish brown sand					1.44	2.6
■	42R	5.5	Dark brown sand					1.39	2.5
◆	48R	7.5	Very dark brown sand					1.50	2.7
✖	48R	13.0	Dark yellowish brown silty sand						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	40R	6.0	4.75	0.20	0.137		0.0	84.6	15.4	
▲	40R	11.5	4.75	0.22	0.164	0.0854	0.0	92.5	7.5	
■	42R	5.5	4.75	0.21	0.158	0.0838	0.0	92.8	7.2	
◆	48R	7.5	4.75	0.21	0.160	0.0794	0.0	91.2	8.8	
✖	48R	13.0	4.75	0.18	0.105		0.0	84.5	15.5	

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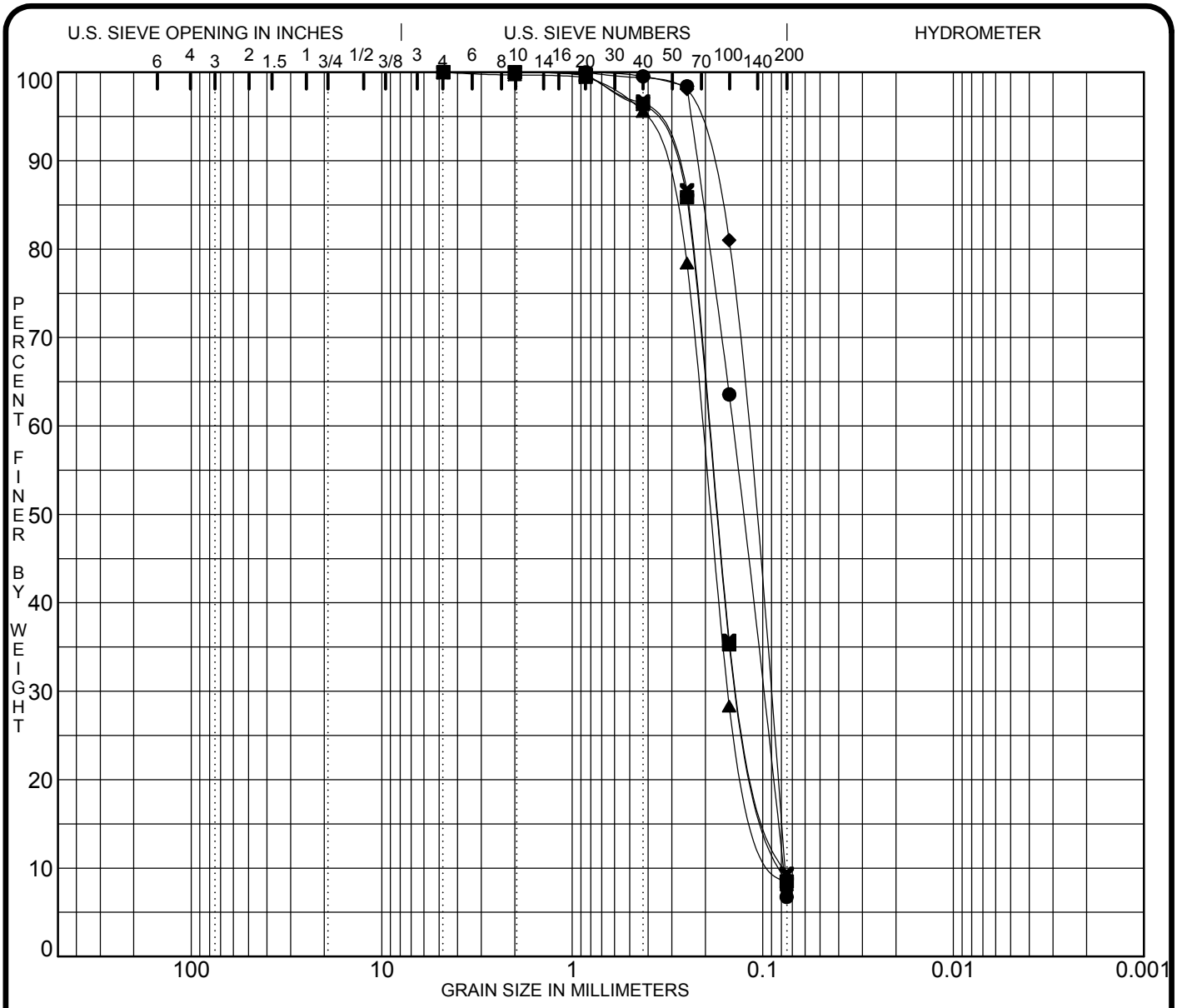

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	48R	20.0	Dark brown sand					0.89	1.8
▲	54R	1.0	Very dark brown sand					1.42	2.6
■	60R	7.0	Very dark grayish brown sand					1.14	2.5
◆	64R	12.0	Dark yellowish brown sand					0.91	1.6
✖	70R	10.5	Dark brown sand					1.14	2.5

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	48R	20.0	4.75	0.14	0.100	0.0780	0.0	93.3	6.7	
▲	54R	1.0	4.75	0.21	0.153	0.0791	0.0	91.5	8.5	
■	60R	7.0	4.75	0.19	0.131	0.0780	0.0	91.5	8.5	
◆	64R	12.0	4.75	0.12	0.093	0.0768	0.0	92.5	7.5	
✖	70R	10.5	4.75	0.19	0.129	0.0763	0.0	90.6	9.4	

PROJECT **Woodbury Road RCA**

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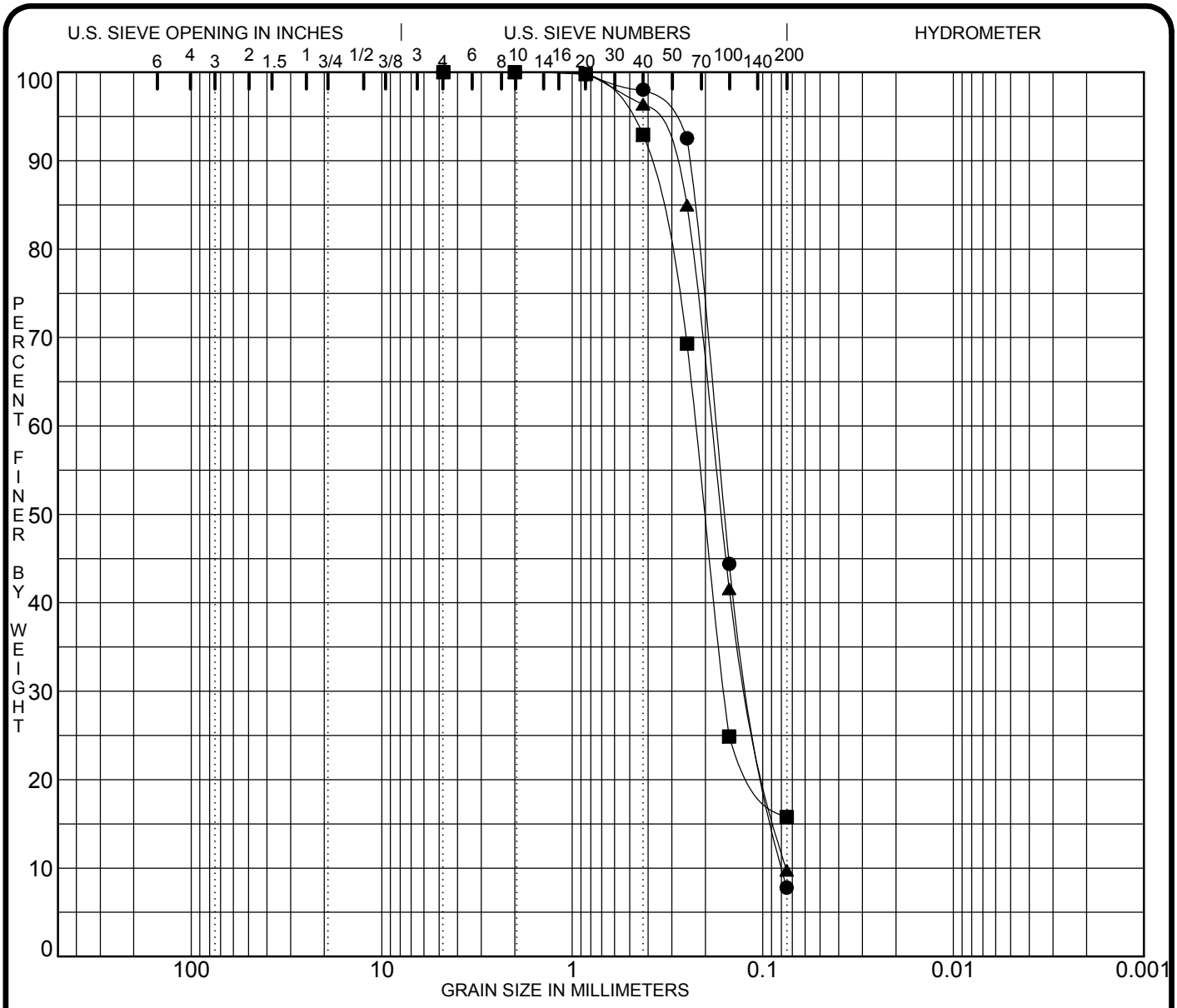
GRADATION CURVES

ANTILLIAN ENGINEERING ASSOCIATES, INC.

Orlando, Florida, USA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**70R**	**13.0**	**Dark yellowish brown sand**					**0.94**	**2.3**
▲	**WL2L**	**1.0**	**Very dark brown sand**					**0.97**	**2.5**
■	**WL2L**	**7.5**	**Very dark brown silty sand**						

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**70R**	**13.0**	**4.75**	**0.18**	**0.114**	**0.0782**	**0.0**	**92.2**	**7.8**	
▲	**WL2L**	**1.0**	**4.75**	**0.19**	**0.117**	**0.0754**	**0.0**	**90.3**	**9.7**	
■	**WL2L**	**7.5**	**4.75**	**0.22**	**0.159**		**0.0**	**84.2**	**15.8**	

PROJECT **Woodbury Road RCA**

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DATE **9/15/20**

GRADATION CURVES

ANTILLIAN ENGINEERING ASSOCIATES, INC.

Orlando, Florida, USA

APPENDIX B

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX C

ANTILLIAN ENGINEERING ASSOCIATES, INC.
CONSTRAINTS AND RESTRICTIONS

WARRANTY

Antillian Engineering Associates, Inc. has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Antillian Engineering Associates, Inc., as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Antillian Engineering Associates, Inc. of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Antillian Engineering Associates, Inc. to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Antillian Engineering Associates, Inc. is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Antillian Engineering Associates, Inc..

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Antillian Engineering Associates, Inc..

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Antillian Engineering Associates, Inc. cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Antillian Engineering Associates, Inc. to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by Antillian Engineering Associates, Inc. to locate any such buried objects. Antillian Engineering Associates, Inc. cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of investigation. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.