Appendix F

Geotechnical Engineering

TOWN OF SURFSIDE
PARKING LOT IMPROVEMENTS
MIAMI-DADE COUNTY, FLORIDA

REPORT OF SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING EVALUATIONS

PREPARED FOR: FLORIDA TRANSPORTATION ENGINEERING, INC.

PREPARED BY: GEOSOL, INC.

AUGUST 25, 2011

GEOSOL, Inc.

August 25, 2011

Florida Transportation Engineering, Inc.
7955 NW 12th Street, Suite 418
Doral, Florida 33126

Attention: Mr. Juan Calderon, PE, PTOE
Vice President

Re: **Report of Subsurface Exploration and Geotechnical Engineering Evaluations**
Town of Surfside Parking Lot Improvements
Miami-Dade County, Florida
GEOSOL Project No. 211151

Dear Mr. Calderon:

Geosol, Inc. (GEOSOL) is pleased to submit this report presenting the results of our geotechnical services for the above-referenced project. The services were provided in accordance with our proposal No. P-211177 dated July 25, 2011.You provided authorization to perform our services on July 25, 2011 by means of a subconsultant agreement.

The results of our field exploration and laboratory testing programs for the proposed parking lot improvements as well as our geotechnical engineering evaluations are presented in the accompanying report.

GEOSOL appreciates the opportunity to work on this interesting project. If you have any question or need additional information, please do not hesitate to call our office.

Sincerely,

GEOSOL, INC.

Oracio Riccobono, P.E.
Senior Geotechnical Engineer
Florida License No. 49324

OR/rv

Reinaldo Villa, P.E.
Project Geotechnical Engineer
Florida License No. 72242

cc: Addressee (4)
File (1)

GEOSOL, Inc.
5795-A NW 151st Street
Miami Lakes, FL 33014
Phone (305) 828-4367; Fax (305) 828-4235
E-mail: geosolusa@bellsouth.net

TABLE OF CONTENTS

APPENDIX

INTRODUCTION

Project Information

Based on information provided by Florida Transportation Engineering, Inc. (FTE), we understand that parking lot improvements will be required, which will consist of milling and resurfacing improvements as well as drainage improvements. Parking lot improvements will be required at the following locations:

- Town Hall Lot: NE corner of 93rd Street and Harding Avenue
- Collins Lot: SW corner of 93rd Street and Collins Avenue
- 94th Street Lot: SE corner of 94th Street and Harding Avenue
- Post Office Lot: SW corner of 95th Street and Collins Avenue (eliminated from scope)
- Shul Lot: NW corner of 95th Street and Collins Avenue
- Abbott Lot: East side of 9500 Abbott Avenue

Based on discussions with Mr. Bill Evans, Town of Surfside Capital Improvements Director, we understand that improvements to the existing Post Office Lot (located on the southwest corner of 95th Street and Collins Avenue) have been eliminated. We understand that the parking lot has been recently resurfaced.

Specifically, the geotechnical services required the performance of borehole percolation testing for use in drainage evaluations and design. Additionally, pavement cores were required in order to determine the thickness, condition and composition of the existing pavement. The field exploration and laboratory testing programs were required to investigate the subsurface and groundwater conditions and to provide geotechnical engineering recommendations for the proposed parking lot improvements. The design of temporary ground support systems for the installation of drainage structures in not part of our scope of services and we are assuming it will be performed by others.

Purpose

The purpose of this study was to evaluate the underground conditions (i.e. subsurface and groundwater) in light of the proposed construction. This report presents the results of our field exploration, laboratory testing, geotechnical engineering evaluations, and considerations for the proposed construction.

SCOPE OF SERVICES

The scope of services consisted of providing the following services:

1. Performing site reconnaissance, locating and coordinating for existing utilities.

2. Obtaining eleven (11) asphalt pavement cores from the existing pavement for determination of asphalt pavement condition, thickness and composition.

3. Performing eleven (11) Standard Penetration Test (SPT) borings to depths of 2 feet below existing grades to determine the type and thickness of the base and subbase materials.

4. Performing six (6) borehole percolation tests at depths of 15 feet below existing grades for use in drainage evaluations and design.

5. Measuring groundwater levels at the boring locations.

6. Backfilling the boreholes using grout, patching the surface of the coring locations with cold-mix asphalt, and restoring the sites to their original conditions.

7. Visually examining and classifying all recovered soil samples from in the laboratory using the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System without the aid of laboratory classification testing

8. Visually examining and classifying all recovered asphalt pavement core specimens.

9. Evaluating the results of the SPT boring information.

10. Deriving hydraulic conductivity (k) values from the percolation test field data.

11. Providing discussions of critical design or construction considerations based on the subsurface and groundwater conditions developed from the results of the geotechnical investigations.

12. Preparing a geotechnical engineering report summarizing the field testing data, subsurface and groundwater conditions, geotechnical evaluations and recommendations.

SITE CONDITIONS

Our understanding of the site conditions is based on our initial field review and our observations during the performance of the field exploration program. We have appended a Site Vicinity Map that identifies the location of the study area, which is presented in Sheet 1 of the Appendix. Test location plans are presented in Sheets 2 through 5 of the Appendix of this report. The existing conditions at the site generally consist of commercial areas. The existing roadway pavement consists of a flexible asphaltic concrete structure and is in relatively poor condition with rutting and many cracks visible at the surface of the pavement.

FIELD EXPLORATION

General

The field exploration program for this study included the performance of asphalt pavement coring, Standard Penetration Test (SPT) borings and borehole percolation testing. Specifically, the asphalt pavement coring program included collecting a total of eleven (11) asphalt pavement cores (designated as "C" series) for evaluation of milling and resurfacing improvements. The asphalt pavement coring program included the performance of SPT borings at each coring location to depths of 2 feet below the asphalt to determine the type and thickness of the base and subbase materials. Also, a total of six (6) borehole percolation tests were performed at depths of 15 feet below existing grades in each location for use in drainage evaluations and design. We understand that improvements to the Post Office Lot have been eliminated; therefore, the field exploration program for this lot (i.e. core No. C-7 and percolation test P-4) was not completed. At the time we were notified that the Post Office lot had been eliminated pavement core C-8 had already been obtained at this site.

The test locations were marked in the field by a representative of GEOSOL utilizing existing landmarks and standard taping procedures. The "as-drilled" locations for each test were obtained by utilizing a hand-held Global Positioning System (GPS) device and should be considered approximate to within a few feet. The latitude and longitude coordinates obtained with the GPS device were converted to northing and easting coordinates utilizing the software "Corpscon" developed by the United States Army Corps of Engineers. The ground surface elevations at each test location have not been provided to us at this point. A summary of the approximate test locations is presented in Table 1 and in the Test Location Plan sheets presented in the Appendix of this report.

Asphalt Pavement Coring

The asphalt pavement cores were obtained using a 6-inch diameter core barrel that was attached to an AWJ diameter drilling rod and to a truck mounted drill rig. The core barrel was advanced by slowly drilling through the asphalt pavement. Water was used to aid the drilling process and to keep the core barrel cool. Upon reaching the surface of the base materials, the coring process was terminated and the pavement core was retrieved. The total thickness of the asphalt pavement was measured and recorded. Measurements of the rut depth and cross slope were measured prior to the performance of the asphalt pavement coring program. We have prepared a "Pavement Evaluation Coring and Condition Data" sheet and is presented in the Appendix along with asphalt pavement core and site photographs. The approximate location of the pavement cores is presented in Table 1 and on the Test Location Plan sheets in the Appendix of this report.

Standard Penetration Test (SPT) Borings

The SPT boring procedures were conducted in general conformance with ASTM D-1586. All SPT borings were performed utilizing a truck-mounted drill rig (Foremost Mobile B-53) using a recently calibrated automatic hammer. After seating the sampler 6 inches, the number of successive blows required to drive the sampler 12 inches into the soil constitutes the test result commonly referred to as the "N"-value. The "N"-value has been empirically correlated with various soil properties and is considered to be indicative of the relative density of cohesionless soils and the consistency of cohesive soils. The N-value information for each SPT boring is presented in the Test Boring Records that are included in the Appendix of this report.

Borehole Percolation Testing

The percolation testing was performed in general accordance with the South Florida Water Management District (SFWMD) "Usual Open-Hole" constant head method. The tests were performed to determine the hydraulic conductivity values (k) of the subsurface materials at depths 15 feet below the existing ground surface. The boreholes were drilled by means of a 4 ¾ -inch diameter tri-cone bit and water. Upon drilling each borehole, a 4-inch diameter perforated PVC pipe was inserted in the ground and used a pump for purging the well prior the start of the test. After completion of the percolation tests, the boreholes were backfilled with grout and the site was restored as required. The hydraulic conductivity values (k) were determined from the results obtained during the field testing. The hydraulic conductivity values are reported in units of cubic feet per second per square foot of seepage area per foot of head (cfs/ft^2-ft.). The test results are presented in Table 2 in the Appendix of this report.

Water Level Measurements

Water level depths were obtained during the performance of the test boring operations. They are noted on Table 2 of the Appendix of this report. In relatively pervious soils, such as sandy (granular) soils, the indicated depths are usually reliable groundwater levels. Seasonal variations, tidal conditions, temperature variations, land uses, and recent rainfall conditions may influence the depth of groundwater levels.

LABORATORY TESTING PROGRAM

General

Representative samples collected from the test borings were visually reviewed in the laboratory by a Geotechnical Engineer to confirm the field classifications. The soil samples were classified using the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System in general accordance with the American Society of Testing and Materials (ASTM) test designation D-3282, titled "Classification of Soils and Soils-Aggregate Mixtures for Highway Construction Purposes." The classification was based on visual observations without the aid of laboratory classification testing.

SITE SUBSURFACE CONDITIONS

General

The subsurface materials generally disclosed granular fill materials based on the shallow SPT borings performed at the coring locations. Detailed information is presented in the Test Boring Records and Table 2 in the Appendix of this report. The stratification is based on visual examination of the recovered soil/rock samples, laboratory testing and interpretation of the field boring logs by a Geotechnical Engineer. The boring stratification lines represent the approximate boundaries between soil types of significantly different engineering properties; however, the actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation may have been abbreviated for clarity. The borings present the subsurface conditions at the particular test location and slight variations do occur among the borings.

Specifically, we have identified two (2) strata along the project alignment (except the asphalt pavement) and they are described in Table "A" below.

TABLE "A" – SUMMARY OF SUBSURFACE STRATIGRAPHY

STRATUM No.	MATERIAL DESCRIPTION	AASHTO SYMBOL
0	Asphalt Pavement	N/A
1	Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (FILL; BASE)	A-1-b
2	Brown Fine to Medium SAND with Shell Fragments (SUBBASE)	A-3

Groundwater Conditions

Groundwater levels were measured in the completed boreholes during the drilling operations. Measurements made in the test locations disclosed the water table to be at depths ranging from 3.8 to 7.9 feet below the ground surface. It is to be noted that borings were performed during the start of the wet season. Therefore, during the peak of the wet season the groundwater may be 12 to 18 inches higher than the levels measured at the test boring locations.

ENGINEERING EVALUATIONS AND RECOMMENDATIONS FOR ROADWAY IMPROVEMENTS

General

As we understand it the roadway improvements will consist of milling and resurfacing of the existing five (5) parking lots pavements. The results of the field testing program indicate that the project alignment is generally suitable for the proposed roadway improvements when viewed from a geotechnical perspective. The following sections provide discussions regarding geotechnical recommendations for milling and resurfacing and roadway reconstruction alternatives.

Milling and Resurfacing Recommendations

The results of the field exploration program revealed that the asphalt pavement had thicknesses ranging from 0.8 to 3.8 inches. Based on visual inspection of the cores, all specimens obtained for this project revealed cracking of the asphalt pavement throughout the full length of the cores. It should be noted that the pavement cores obtained from this project are only representative of the locations sampled and that FTE and the Town of Surfside shall be aware that it is possible that the pavement may be cracked the full depth in other locations not explored.

We understand that milling and resurfacing of the existing parking lot pavements is being considered for the improvements. However, we are of the opinion that milling and resurfacing is not the most efficient or cost effective pavement improvement alternative for the proposed improvements since nearly all of the pavement cores revealed cracks extending throughout the full length of the cores. Furthermore, we are of the opinion that the milling and resurfacing option will serve as a temporary solution and due to the reason previously discussed, future milling and resurfacing cycles may occur more frequently. Milling of the existing pavement will leave behind cracks and over time these cracks will propagate and reflect into the new asphalt pavement overlay. For these reasons, we recommend reconstruction of the existing pavements as an alternative for roadway improvement.

If the Town of Surfside ultimately decides to implement the milling and resurfacing option, we recommend milling and resurfacing the existing roadways in accordance with the following list based on the results of our field exploration program:

- Town Hall Lot: mill and resurface 1 inch
- Collins Lot: mill and resurface 2 inches
- 94th Street Lot: mill and resurface a ½ inch
- Post Office Lot: not applicable (parking lot improvements have been eliminated)
- Shul Lot: mill and resurface a ½ inch
- Abbott Lot: mill and resurface a ½ inch

The above recommendations provide a minimum of a ½-inch thick section of existing pavement be left behind in order to avoid potentially exposing and wetting the existing base materials. However, based on the pavement cores collected for the Shul and Abbott lots, less than ½ inch pavement may be left behind. As noted previously, with milling and resurfacing alternative, it is anticipated that reflective cracking will re-appear in the near future. At this point there is no way to estimate the time at which these reflective cracking will re-appear.

Recommendations for Pavement Reconstruction

If the pavement reconstruction alternative is implemented, site preparation shall be in accordance with Sections 110 and 120 of the FDOT "Standard Specifications for Road and Bridge Construction" and FDOT Standard Indices 500 and 505.

Site Preparation

The following are our discussions regarding the utilization and the site preparation requirements of the subsurface soils.

- The material from Stratum Number 0 is the asphalt pavement.
- The materials from Strata Numbers 1 and 2 (A-1-b and A-3) are considered to be select and should be utilized in accordance with FDOT Standard Index 505.

Fill Material

The embankment fill should consist of select material, meeting the requirements of Standard Index 505 and shall be constructed in general accordance of Section 120.8 of the FDOT "Standard Specifications for Road and Bridge Construction".

Pavement Design Suggestions

Based on the results of our SPT borings, it does not appear that the existing subgrade soils have an LBR value of 40, which is typically used for pavement design. If a pavement reconstruction alternative is selected, we recommend that the flexible pavement section consist of (from top to bottom) an asphaltic concrete layer, a limerock base layer and stabilized subgrade layer having a minimum LBR Value of 40.

We recommend that after placement of the first 12 inches of new fill after final subgrade elevations have been achieved, that Limerock Bearing Ratio (LBR) tests be performed per every 10,000 square feet of subgrade. If the LBR values for the stabilized subgrade materials are less than 40, we recommend that the subgrade be stabilized to depths of 12 inches to achieve minimum Limerock Bearing Ratio (LBR) value of 40. The subgrade should be compacted to at least 95 percent of maximum dry density as determined by the Modified Proctor test (ASTM D-1557).

REPORT LIMITATIONS

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This company is not responsible for the conclusions, opinions or recommendations made by others based on these data. No other warranties are expressed or implied.

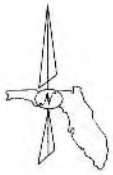
The scope of the investigation was intended to specifically evaluate subsurface conditions within the influence of the proposed parking lot improvements. The analyses and recommendations submitted in this report are based upon the data obtained from the test borings performed at the locations indicated. If any subsoil variations become evident during the course of this project, a re-evaluation of the recommendations contained in this report will be necessary after we have been informed and had an opportunity to observe the characteristics of the conditions encountered. The applicability of the report should also be reviewed in the event significant changes occur in the design.

The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.

APPENDIX

Sheet 1: Site Vicinity Map
Table 1 – Summary of Test Locations
Sheets 2 through 5: Test Location Plans
Pavement Evaluation Coring and Condition Data
Asphalt Pavement and Site Photographs
Test Boring Records (Pavement Cores)
Table 2 – Summary of Borehole Percolation Test Results
Schematics of SFWMD Usual "Open-Hole" Test Procedure

SITE VICINITY MAP



COUNTY: MIAMI-DADE COUNTY, FLORIDA

REFERENCE: GOOGLE EARTH, 2011

DATE: AUGUST, 2011

SITE VICINITY MAP
TOWN OF SURFSIDE
PARKING LOT IMPROVEMENTS
MIAMI-DADE COUNTY, FLORIDA

GEOSOL, INC.

DRAWN	SCALE	PROJ. No.
RV	N.T.S.	21115I
CHECKED	DATE	
OR	AUG., 2011	SHEET 1

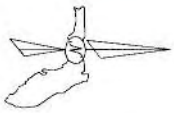
TOWN OF SURFSIDE
PARKING LOT IMPROVEMENTS
MIAMI-DADE COUNTY, FLORIDA
GEOSOL PROJECT No. 211151

TABLE 1 - SUMMARY OF TEST BORING LOCATIONS

BORING No.	LOCATION	APPROXIMATE TEST LOCATION (FEET)		GROUND SURFACE ELEVATION
		NORTHING	EASTING	
C-1/P-1	TOWN HALL LOT	563504.9	944745.6	N/A
C-2	TOWN HALL LOT	563580.1	944740.8	N/A
C-3/P-2	COLLINS LOT	563701.1	944515.3	N/A
C-4	COLLINS LOT	563782.7	944558.6	N/A
C-5/P-3	94TH ST. LOT	564025.8	944539.4	N/A
C-6	94TH ST. LOT	564210.3	944477.4	N/A
C-8	POST OFFICE LOT	564771.2	944541.3	N/A
C-9	SHUL LOT	565011.3	944599.1	N/A
C-10/P-5	SHUL LOT	565012.5	944513.4	N/A
C-11/P-6	ABBOTT LOT	564993.3	944120.2	N/A
C-12	ABBOTT LOT	565125.4	944163.8	N/A

Notes: 1) Test locations C-7 and P-4 were eliminated from this project.

TEST LOCATION PLANS



LEGEND

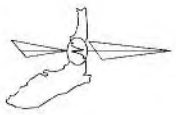
- C-1: APPROXIMATE PAVEMENT CORE LOCATION
- P-1: APPROXIMATE PERCOLATION TEST LOCATION

TEST LOCATION PLAN
TOWN OF SURFSIDE
PARKING LOT IMPROVEMENTS
MIAMI-DADE COUNTY, FLORIDA

GEOSOL, INC.

DRAWN	SCALE	PROJ. No.
RV	N.T.S.	211151
CHECKED	DATE	
OR	AUG., 2011	SHEET 2

TEST LOCATION PLANS



LEGEND

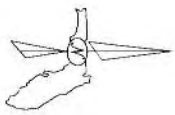
- C-1: APPROXIMATE PAVEMENT CORE LOCATION
- P-1: APPROXIMATE PERCOLATION TEST LOCATION

TEST LOCATION PLAN
TOWN OF SURFSIDE
PARKING LOT IMPROVEMENTS
MIAMI-DADE COUNTY, FLORIDA

GEOSOL, INC.

DRAWN	SCALE	PROJ. No.
RV	N.T.S.	21115I
CHECKED	DATE	
OR	AUG., 2011	SHEET 3

TEST LOCATION PLANS



LEGEND

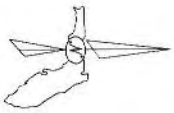
- C-1: APPROXIMATE PAVEMENT CORE LOCATION
- P-1: APPROXIMATE PERCOLATION TEST LOCATION

TEST LOCATION PLAN
TOWN OF SURFSIDE
PARKING LOT IMPROVEMENTS
MIAMI-DADE COUNTY, FLORIDA

GEOSOL, INC.

DRAWN	SCALE	PROJ. No.
RV	N.T.S.	211151
CHECKED	DATE	
OR	AUG., 2011	SHEET 4

TEST LOCATION PLANS



LEGEND

- C-1: APPROXIMATE PAVEMENT CORE LOCATION
- P-1: APPROXIMATE PERCOLATION TEST LOCATION

TEST LOCATION PLAN
TOWN OF SURFSIDE
PARKING LOT IMPROVEMENTS
MIAMI-DADE COUNTY, FLORIDA

GEOSOL, INC.

DRAWN	SCALE	PROJ. No.
RV	N.T.S.	211151
CHECKED	DATE	
OR	AUG., 2011	SHEET 5

State of Florida Department of Transportation

PAVEMENT EVALUATION AND CONDITION DATA

Cored by: GEOSOL, INC. Date: 8/12/2011 - 8/17/2011 Page: 1 OF 1 Typical Section No.:

GEOSOL Project No.: 211151 Name: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS Lanes: N/A (PARKING LOT)

County: MIAMI-DADE S.R. No.: N/A Shoulder Type & Cond. N/A

Inside: N/A

Outside: N/A

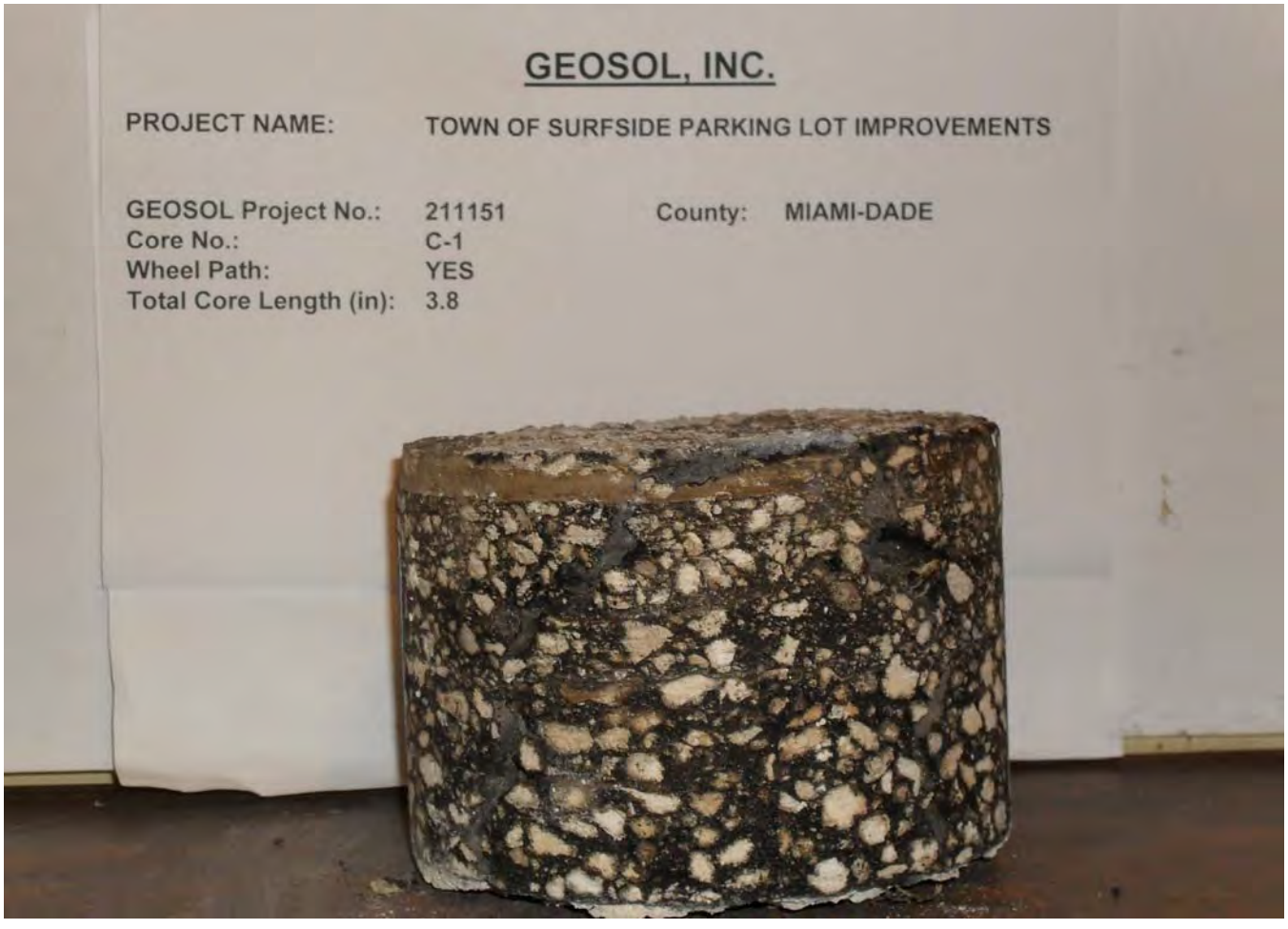
Median Curbed? N/A (NO MEDIAN) Lawn? N Other? Curb & Gutter? N

Core No.	Parking Lot Location	Wheel Path	Pavement Layer (inches) Top FC-2	FC-4	S-III	S-I	S-II	Type-I	Binder	Core Length (inches)	Base (inches)	Sub Base (inches)	Crack Depth (inches)	Type	Class	Extent	Pavement Condition	Rut Depth (in.)	Cross Slope (ft / 6 ft)	Comments
C-1	COLLINS LOT	X	-	-	-	1.0	-	2.8	-	3.8	8.2	≥15.8	3.8	-	-	-	P	1/4	0.038	
C-2		X	-	-	-	1.0	-	2.0	-	3.0	9.0	≥15	-	-	-	-	F	1/8	0.049	
C-3	TOWN HALL LOT	X	-	-	-	1.5	-	-	-	1.5	10.5	≥13.5	1.5	-	-	-	P	1/16	0.017	
C-4		X	-	-	-	1.8	-	-	-	1.8	10.2	≥13.8	1.8	-	-	-	P	1/8	0.007	
C-5	94TH ST. LOT	X	-	-	-	1.0	-	-	-	1.0	9.0	≥15	1.0	-	-	-	P	1/8	0.014	
C-6		X	-	-	-	1.3	-	-	-	1.3	10.7	≥13.3	1.3	-	-	-	P	1/16	0.003	
C-8	POST OFFICE LOT	X	-	-	-	1.0	-	1.6	-	2.6	13.0	≥11	-	-	-	-	P	1/8	0.007	
C-9	SHUL LOT	X	-	-	-	0.8	-	-	-	0.8	13.6	≥10.4	-	-	-	-	F	1/16	0.003	
C-10		X	-	-	-	1.0	-	-	-	1.0	11.0	≥13	1.0	-	-	-	P	1/8	0.007	
C-11	ABBOTT LOT	X	-	-	-	0.8	-	-	-	0.8	11.2	≥12.8	0.8	-	-	-	P	1/32	0.003	
C-12		X	-	-	-	1.0	-	-	-	1.0	17.0	≥7	1.0	-	-	-	P	1/32	0.010	

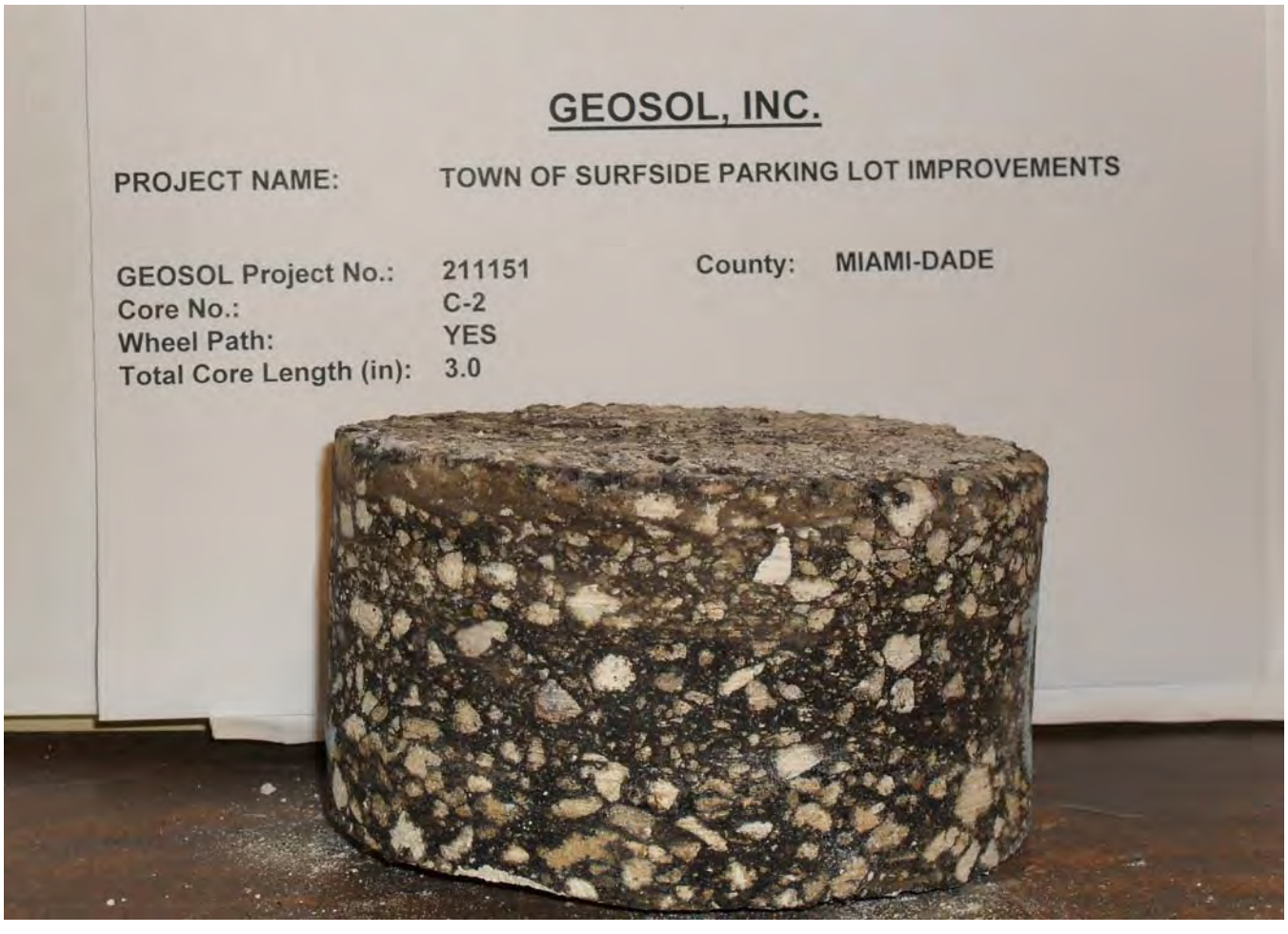
NOTES:

1) THE BASE MATERIALS CONSIST OF SLIGHTLY SILTY FINE TO MEDIUM SAND WITH SOME LIMEROCK FRAGMENTS (A-1-b).
2) THE SUBBASE MATERIALS CONSIST OF NATURAL FINE TO MEDIUM SAND WITH SHELLS (A-3)
3) CORE No. C-7 WAS ELIMINATED FROM THIS PROJECT.


C-1


GEOSOL, INC.
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
GEOSOL Project No.: 211151
County: MIAMI-DADE
Core No.: C-1
Wheel Path: YES
Total Core Length (in): 3.8


C-2


GEOSOL, INC.
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
GEOSOL Project No.: 211151
County: MIAMI-DADE
Core No.: C-2
Wheel Path: YES
Total Core Length (in): 3.0


C-3 1P-2

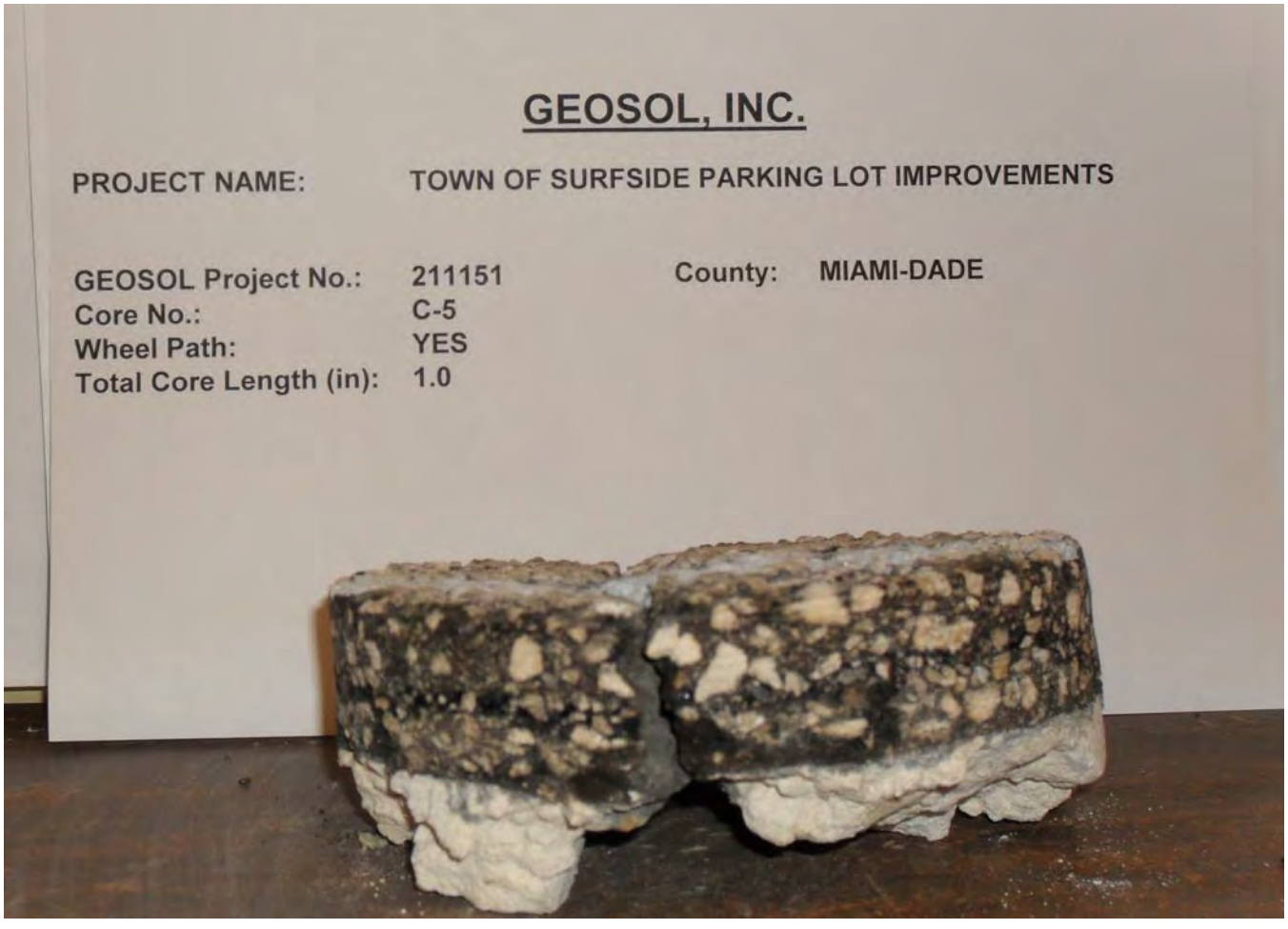

GEOSOL, INC.
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
GEOSOL Project No.: 211151
County: MIAMI-DADE
Core No.: C-3
Wheel Path: YES
Total Core Length (in): 1.5

GEOSOL, INC.

PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS

GEOSOL Project No.: 211151
County: MIAMI-DADE
Core No.: C-4
Wheel Path: YES
Total Core Length (in): 1.8


C-5/R3


GEOSOL, INC.
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
GEOSOL Project No.: 211151
Core No.: C-5
Wheel Path: YES
Total Core Length (in): 1.0
County: MIAMI-DADE

GEOSOL, INC.

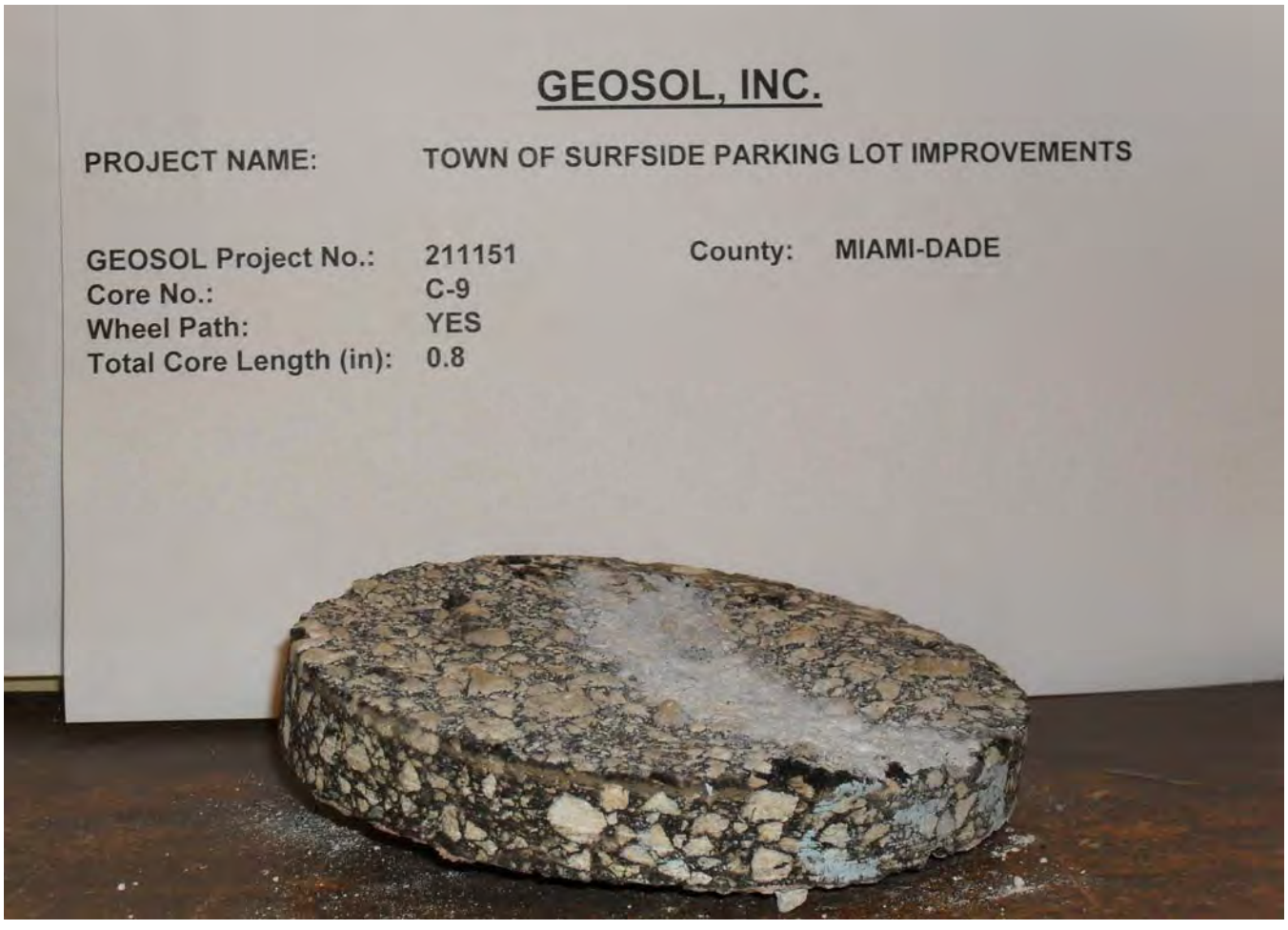
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS

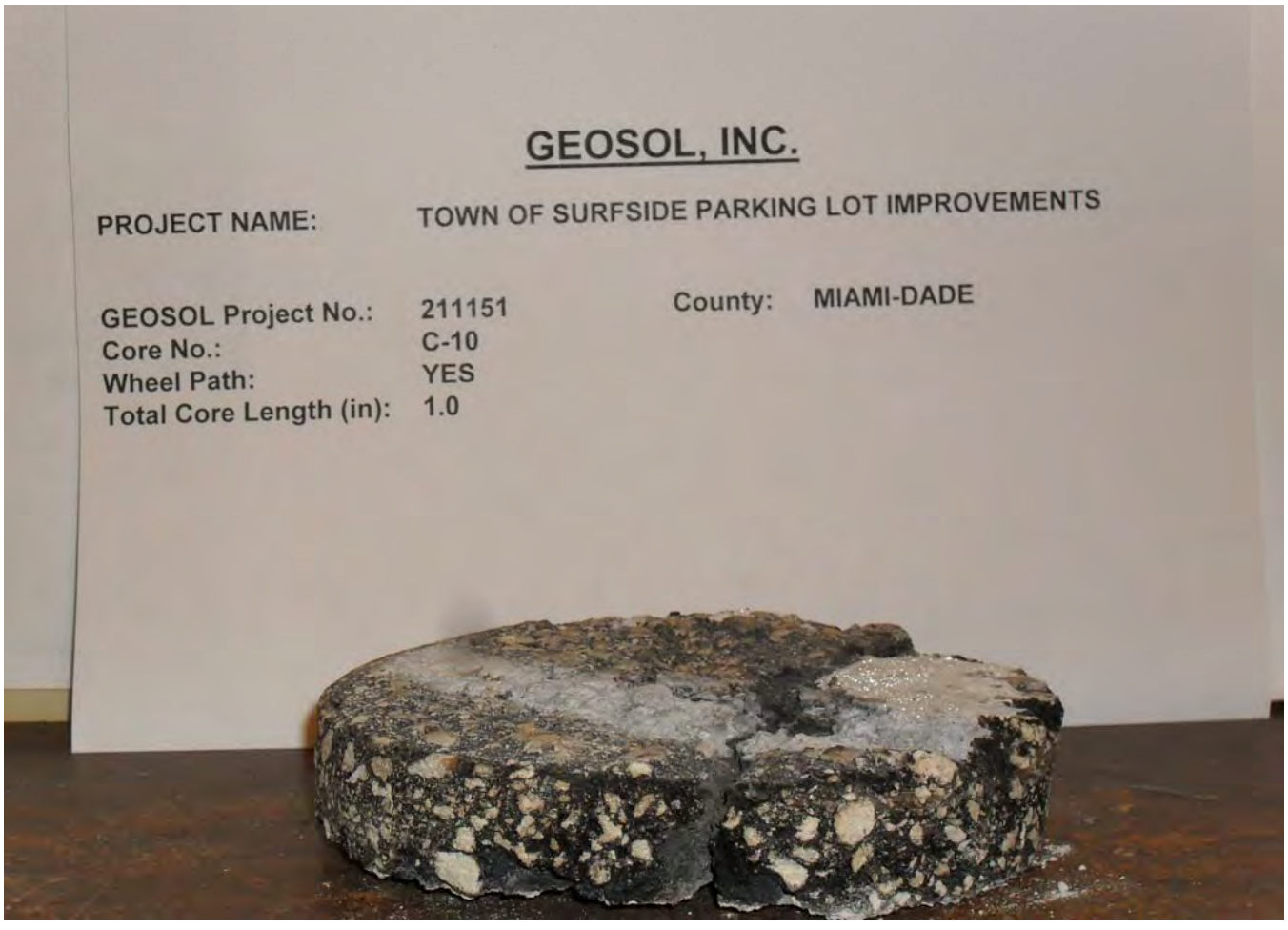
GEOSOL Project No.: 211151
County: MIAMI-DADE
Core No.: C-6
Wheel Path: YES
Total Core Length (in): 1.3


C-8


GEOSOL, INC.
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
GEOSOL Project No.: 211151
County: MIAMI-DADE
Core No.: C-8
Wheel Path: YES
Total Core Length (in): 2.6


C-9


GEOSOL, INC.
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
GEOSOL Project No.: 211151
Core No.: C-9
Wheel Path: YES
Total Core Length (in): 0.8
County: MIAMI-DADE

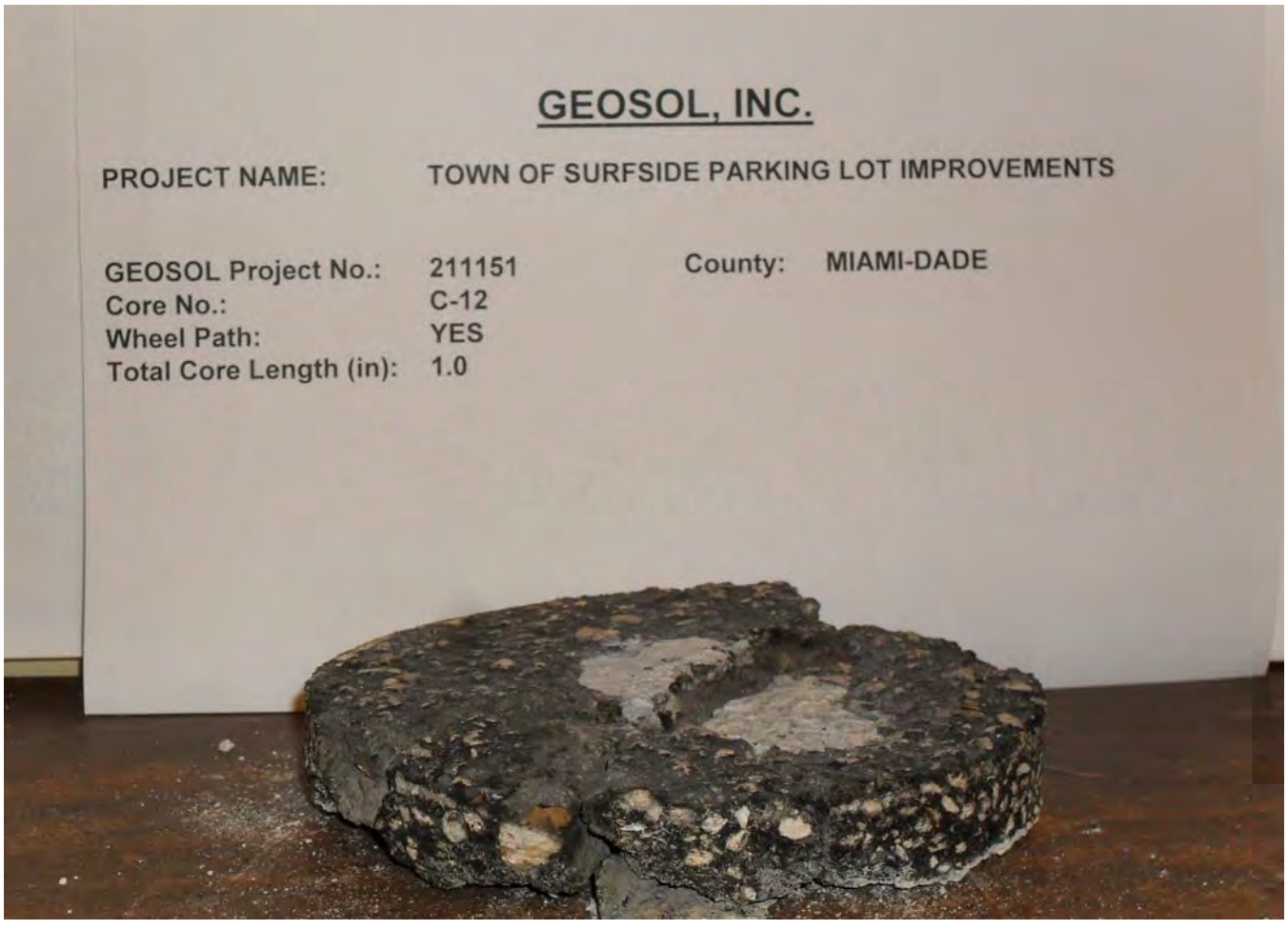

GEOSOL, INC.
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
GEOSOL Project No.: 211151
Core No.: C-10
Wheel Path: YES
Total Core Length (in): 1.0
County: MIAMI-DADE

GEOSOL, INC.

PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS

GEOSOL Project No.:	211151	**County:**	MIAMI-DADE
Core No.:	C-11		
Wheel Path:	YES		
Total Core Length (in):	0.8		


C-12


GEOSOL, INC.
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
GEOSOL Project No.: 211151
Core No.: C-12
Wheel Path: YES
Total Core Length (in): 1.0
County: MIAMI-DADE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-1
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A				CASING	SAMPLE	CORE	TUBE		
DATE	TIME	DEPTH (ft)	CASING	TYPE	NW	SS			DATUM (ft): N/A
			L (ft)	DIA.(in)	3	1 - 3/8 ID			DATE START: 8/12/2011
				WT.(lbs)		140			DATE FINISH: 8/12/2011
				FALL(in)		30			DRILLER: R. Morales
									EQUIP./HAMMER: B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 3.8": Asphalt Pavement	
1			12	16		3.8" to 1': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
2			9 7 5			1' to 2.32': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.32 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
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9							
10							
11							
12							
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14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-2
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A				CASING	SAMPLE	CORE	TUBE
DATE	TIME	DEPTH (ft)	CASING L (ft)	TYPE	NW	SS	
				DIA.(in)	3	1 - 3/8 ID	
				WT.(lbs)		140	
				FALL(in)		30	

DATUM (ft):	N/A
DATE START:	8/12/2011
DATE FINISH:	8/12/2011
DRILLER:	R. Morales
EQUIP./HAMMER:	B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 3": Asphalt Pavement	
1			10	13		3" to 1': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
			7				
2			6			1' to 2.25': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.25 ft.
			4				BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-3
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A				CASING	SAMPLE	CORE	TUBE
DATE	TIME	DEPTH (ft)	CASING L (ft)	TYPE	NW	SS	
				DIA.(in)	3	1 - 3/8 ID	
				WT.(lbs)		140	
				FALL(in)		30	

DATUM (ft):	N/A
DATE START:	8/12/2011
DATE FINISH:	8/12/2011
DRILLER:	R. Morales
EQUIP./HAMMER:	B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 1.5": Asphalt Pavement	
1			14	21		1.5" to 1': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
2			9 12 10			1' to 2.13': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.13 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
10							
11							
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14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT.	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-4
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A				CASING	SAMPLE	CORE	TUBE		
DATE	TIME	DEPTH (ft)	CASING L (ft)	TYPE	NW	SS			DATUM (ft): N/A
				DIA.(in)	3	1 - 3/8 ID			DATE START: 8/13/2011
				WT.(lbs)		140			DATE FINISH: 8/13/2011
				FALL(in)		30			DRILLER: R. Morales
									EQUIP./HAMMER: B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
1			-			0 to 1.8": Asphalt Pavement	
			9			1.8" to 1': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
			5	9			
2			4			1' to 2.15': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.15 ft.
			3				BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc.	TEST BORING RECORD	BORING No. C-5
MIAMI LAKES, FL	(ASTM D-1586)	

PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS — SHEET No. 1 OF 1

CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.) — GEOSOL PROJECT No. 211151

BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):

GROUNDWATER (FEET): N/A

DATE	TIME	DEPTH (ft)	CASING L (ft)

	CASING	SAMPLE	CORE	TUBE
TYPE	NW	SS		
DIA.(in)	3	1 - 3/8 ID		
WT.(lbs)		140		
FALL(in)		30		

DATUM (ft):	N/A
DATE START:	8/13/2011
DATE FINISH:	8/13/2011
DRILLER:	R. Morales
EQUIP./HAMMER:	B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 1": Asphalt Pavement	
1			10	12		1" to 1': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
2			7 5 4			1' to 2.08': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.08 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-6
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A				CASING	SAMPLE	CORE	TUBE	DATUM (ft):	N/A
DATE	TIME	DEPTH (ft)	CASING	TYPE	NW	SS			DATE START:	8/13/2011
			L (ft)	DIA.(in)	3	1 - 3/8 ID			DATE FINISH:	8/13/2011
				WT.(lbs)		140			DRILLER:	R. Morales
				FALL(in)		30			EQUIP./HAMMER:	B-53/ AUTO.

DEPTH, ft.	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 1.3": Asphalt Pavement	
1			8	10		1.3" to 1': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
2			6 4 3			1' to 2.11': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.11 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
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15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT.	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT.	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-8
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A				CASING	SAMPLE	CORE	TUBE
DATE	TIME	DEPTH (ft)	CASING	TYPE	NW	SS		
			L (ft)	DIA.(in)	3	1 - 3/8 ID		
				WT.(lbs)		140		
				FALL(in)		30		

DATUM (ft):	N/A
DATE START:	8/13/2011
DATE FINISH:	8/13/2011
DRILLER:	R. Morales
EQUIP./HAMMER:	B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 2.6": Asphalt Pavement	
1			14 9	15		2.6" to 1.3': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
2			6 5			1.3' to 2.22': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.22 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
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15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-9
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A				CASING	SAMPLE	CORE	TUBE		
DATE	TIME	DEPTH (ft)	CASING	TYPE	NW	SS			DATUM (ft): N/A
			L (ft)	DIA.(in)	3	1 - 3/8 ID			DATE START: 8/15/2011
				WT.(lbs)		140			DATE FINISH: 8/15/2011
				FALL(in)		30			DRILLER: R. Morales
									EQUIP./HAMMER: B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 0.8": Asphalt Pavement	
1			10 7	11		0.8" to 1.2': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
2			4 3			1.2' to 2.07': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.07 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
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14							
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16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT.	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT.	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-10
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A

DATE	TIME	DEPTH (ft)	CASING L (ft)	TYPE	CASING	SAMPLE	CORE	TUBE
				DIA.(in)	NW	SS		
				WT.(lbs)	3	1 - 3/8 ID		
				FALL(in)		140		
						30		

DATUM (ft):	N/A
DATE START:	8/16/2011
DATE FINISH:	8/16/2011
DRILLER:	R. Morales
EQUIP./HAMMER:	B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
1			- 9	10		0 to 1": Asphalt Pavement 1" to 1': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
2			6 4 4			1' to 2.08': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.08 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
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18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT.	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT.	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-11
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A

DATE	TIME	DEPTH (ft)	CASING L (ft)

	CASING	SAMPLE	CORE	TUBE
TYPE	NW	SS		
DIA.(in)	3	1 - 3/8 ID		
WT.(lbs)		140		
FALL(in)		30		

DATUM (ft):	N/A
DATE START:	8/17/2011
DATE FINISH:	8/17/2011
DRILLER:	R. Morales
EQUIP./HAMMER:	B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 0.8": Asphalt Pavement	
1			13	10		0.8" to 1': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE, A-1-b)	
2			6 4 3			1' to 2.07': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.07 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Piston
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

GEOSOL, Inc. MIAMI LAKES, FL	TEST BORING RECORD (ASTM D-1586)	BORING No. C-12
PROJECT NAME: TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS		SHEET No. 1 OF 1
CLIENT: FLORIDA TRANSPORTATION ENGINEERING, INC. STATION (ft.) OFFSET (ft.)		GEOSOL PROJECT No. 211151
BORING LOCATION: NORTHING: EASTING: ELEVATION (ft):		

GROUNDWATER (FEET): N/A

DATE	TIME	DEPTH (ft)	CASING L (ft)

	CASING	SAMPLE	CORE	TUBE
TYPE	NW	SS		
DIA.(in)	3	1 - 3/8 ID		
WT.(lbs)		140		
FALL(in)		30		

DATUM (ft):	N/A
DATE START:	8/13/2011
DATE FINISH:	8/13/2011
DRILLER:	R. Morales
EQUIP./HAMMER:	B-53/ AUTO.

DEPTH, ft	SAMPLE No.	STRATUM No.	BLOWS / 6"	N Value (bpf)	SYMBOL	MATERIAL DESCRIPTION	REMARKS
			-			0 to 1": Asphalt Pavement	
1			14 10	17		1" to 1.5': Brown Slightly Silty Fine to Medium SAND with Some Limerock Fragments (BASE; A-1-b)	
2			7 5			1.5' to 2.08': Brown Fine to Medium SAND with Shell Fragments (SUBBASE; A-3)	BORING TERMINATED AT DEPTH OF 2.08 ft. BOREHOLE GROUTED
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

BLOWS/FT	DENSITY
0-3	Very Loose
3-8	Loose
8-24	Medium Dense
24-40	Dense
> 40	Very Dense

BLOWS/FT	CONSISTENCY
0-1	Very Soft
1-3	Soft
3-6	Medium Stiff
6-12	Stiff
12-24	Very Stiff
> 24	Hard

SAMPLE IDENTIFICATION

- H - Hand Auger
- S - Split Spoon
- T - Thin Wall Tube
- U - Undisturbed Pistan
- C - Diamond Core
- W - Wash Sample

- FILL
- SAND
- ORGANIC SOILS / MUCK
- SILT
- CLAY
- LIMESTONE
- SANDSTONE

TABLE 2 - SUMMARY OF CONSTANT HEAD PERCOLATION TEST RESULTS

TOWN OF SURFSIDE PARKING LOT IMPROVEMENTS
MIAMI-DADE COUNTY, FLORIDA
GEOSOL PROJECT No. 211151

Test No.	Date Performed	Diameter		Depth of Hole (Feet)	Depth to Groundwater Level Below Ground Surface (Feet)		SATURATED HOLE DEPTH Ds (Feet)	Corrected Depth of Hole (Feet)	Average Flow Rate (gpm)	K, Hydraulic Conductivity (cfs/ft^2-Ft Head)
		Casing (Inches)	Hole (Inches)		Prior to Test	During Test				
P-1	08/12/11	4	4.75	15	7.9	0.00	7.10	15.00	0.5	1.21E-05
P-2	08/12/11	4	4.75	15	3.9	0.00	11.10	15.00	0.5	2.08E-05
P-3	08/13/11	4	4.75	15	4.7	0.00	10.30	15.00	0.5	1.78E-05
P-5	08/16/11	4	4.75	15	4.9	0.00	10.10	15.00	0.5	1.72E-05
P-6	08/17/11	4	4.75	15	3.8	0.00	11.20	15.00	0.5	2.12E-05

NOTES:

(1) The above hydraulic conductivity values are for French drains installed to the same depths as the borehole tests. The values represent an ultimate value. The designer should decide on the required factor of safety.

(2) The hydraulic conductivity values were calculated based on the South Florida Water Management Districts's USUAL OPEN HOLE CONSTANT HEAD percolation test procedure as shown on the following page.

(3) The diameter of the CASING was used in the computation of the hydraulic conductivity values presented in the above table.

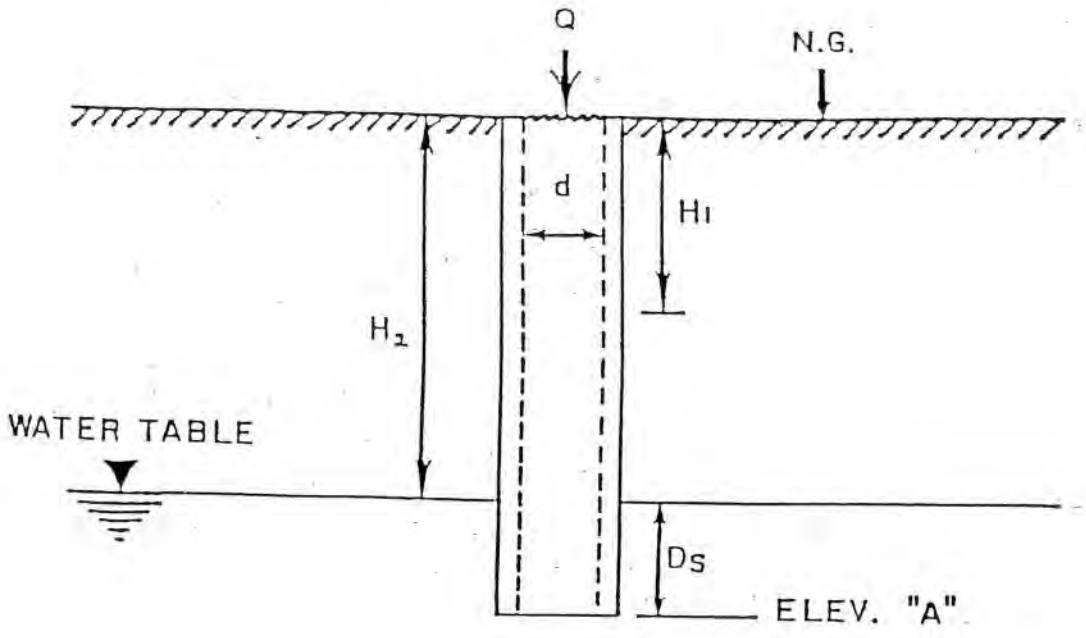
(4) No loss of circulation was encountered during the performance of the borehole percolation tests.

(5) Test location P-4 was eliminated from this project.

SUMMARY OF SUBSURFACE STRATIFICATION

Test No.	DEPTH (FEET)		GENERAL MATERIAL DESCRIPTION
	FROM	TO	
P-1	0.00	0.32	Asphalt Pavement
	0.32	1.00	Brown Slightly Silty Fine to Medium SAND with Limerock Fragments (FILL)
	1.00	15.00	Brown Fine to Medium SAND with Shell Fragments
P-2	0.00	0.13	Asphalt Pavement
	0.13	2.90	Brown Slightly Silty Fine to Medium SAND with Limerock Fragments (FILL)
	2.90	15.00	Brown Fine to Medium SAND with Shell Fragments
P-3	0.00	0.08	Asphalt Pavement
	0.08	0.83	Brown Slightly Silty Fine to Medium SAND with Limerock Fragments (FILL)
	0.83	15.00	Brown Fine to Medium SAND with Shell Fragments
P-5	0.00	0.08	Asphalt Pavement
	0.08	1.00	Brown Slightly Silty Fine to Medium SAND with Limerock Fragments (FILL)
	1.00	15.00	Brown Fine to Medium SAND with Shell Fragments
P-6	0.00	0.07	Asphalt Pavement
	0.07	4.00	Brown Slightly Silty Fine to Medium SAND with Limerock Fragments (FILL)
	4.00	15.00	Brown Fine to Medium SAND with Shell Fragments

USUAL OPEN - HOLE TEST



$$K = \frac{4Q}{\pi d(2H_2^2 + 4H_2 D_S + H_2 d)}$$

K = HYDRAULIC CONDUCTIVITY (CFS/FT.^{2} - FT. HEAD)

Q = "STABILIZED" FLOW RATE (CFS)

d = DIAMETER OF TEST HOLE (FEET)

H_2 = DEPTH TO WATER TABLE (FEET)

D_S = SATURATED HOLE DEPTH (FEET)

ELEV. "A" = PROPOSED TRENCH BOTTOM ELEV.

H_1 = AVERAGE HEAD ON UNSATURATED HOLE SURFACE (FT. HEAD)

Reference: SFWMD Management and Storage of Surface Waters
Permit Information Manual Vol. IV, Figure 3, Page 12.