GEOTECHNICAL INVESTIGATION

LAFAYETTE STREET DRAINAGE IMPROVEMENTS
LEON COUNTY, FLORIDA

Prepared For:

GENESIS GROUP, INC.
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Prepared By:

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18-100-08-A

EGS

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

August 4, 2008

EGS File Number: 18-100-08-A

Genesis Group, Inc.
2507 Callaway Road
Suite 100
Tallahassee, FL 32303

ATTN: Jeff Sprouse, P.E.
Project Manager

SUBJECT: Results of Geotechnical Investigation
Lafayette Street Drainage Improvements
Leon County, Florida

Dear Jeff.:

Environmental and Geotechnical Specialists, Inc. (**EGS**) has completed the geotechnical investigation, as authorized by **Genesis Group, Inc.**, for the proposed drainage improvements of the Lafayette Street Project in Leon County, Florida.

Project Area

The Project Area is located along East Lafayette Street from West of South Magnolia Drive to South Franklin Boulevard. A Site Location Map has been provided as **Figure 1**.

The Lafayette Street Drainage Improvement Project involves updating and replacing a number of storm system structures along Lafayette Street. The soil boring and pavement core locations are shown in **Figures 2** through **4**.

Photographs of roadway conditions and soil boring and pavement core locations have been included as **Figures 5** through **22**. As can be seen in these **Figures** the existing pavement is in fair to poor condition, with patching, transverse cracking, longitudinal cracking, and pavement reflective cracking found at various locations throughout the project limits. The area along this project is comprised of a mixture of multi-family residential dwellings and commercial businesses.

Scope of Services

The Scope of Services authorized by **Genesis Group, Inc.** for this project consisted of the following:

- installation of thirteen (13) pavement cores as shown on plans provided by **Genesis Group, Inc.**;
- installation of thirteen (13) soil borings to the depths determined by **Genesis Group, Inc.**;
- determination of the pavement type and thickness, and the base material type and thickness at each of the soil boring locations;
- testing representative samples of the subsoils for uniformity and classification purposes;
- bituminous extraction and gradation testing on pavement cores for uniformity and classification purposes;
- measurement of the depth to groundwater and estimating the seasonal high groundwater;
- evaluation of the subsoils for reuse as pipe backfill; and
- preparation of this Report

Subsurface Investigation

The geotechnical investigation outlined in this Report was conducted in July of 2008 under the supervision of Thomas Hayden, P.E.. The soil borings and pavement core locations were determined by **Genesis Group, Inc.**

EGS installed Soil Borings **LS-4** and **LS-5** using a truck mounted BK 51HD rotary drill rig with Standard Penetration Tests (**SPT**) "**N**" values conducted on two and one-half (2 ½) feet centers in accordance with the American Society for Testing and Materials (**ASTM**) Procedure D1586-99. The **SPT** values were performed using a one hundred and forty (140) pound hydraulic auto-hammer.

EGS installed the remaining Soil Borings (**LS-1** through **LS-3** and **LS-6** through **LS-13**) using a hand auger coupled with Static Cone Penetrometer Index (**CPI**) tests conducted on two and one-half (2 ½) feet intervals in the top five (5) feet of the soil boring. The Static Cone Penetration Index (**CPI**) test results presented in this Report have been converted to equivalent **SPT** "**N**" values using the correlation of **SPT** "**N**" = **CPI** "**C**"/4.

Representative soil samples were collected on one (1) foot intervals throughout the top six and one-half (6 ½) feet, and on two and one-half (2 ½) feet intervals thereafter. The soil samples were classified in the field by **EGS** personnel and then sealed and transported to **EGS**'s laboratory for additional testing. The laboratory tests performed included water contents, grain-size distribution, Atterberg limits, and organic contents. The soil samples were classified in respect to the Unified Soil Classification (**UNIFIED**) system and the American Association of State Highway and Transportation Officials (**AASHTO**) soil classification system. Global Positioning Satellite (**GPS**) coordinates of each boring location have been provided in **TABLE 1**.

The subsurface conditions and laboratory test results are shown on the Report of Core Borings provided in **APPENDIX A**. The Soil Boring Logs are provided in **APPENDIX B** and the Soil Data Classification Sheets are provided in **APPENDIX C**.

Subsurface Conditions

Soils

Based on the pavement cores and soil borings installed for this study, the following subsurface conditions were encountered:

Boring LS-1

- 0.0 – 0.8 feet – Asphalt Paving (10.0-inches)
- 0.8 – 2.0 feet – Medium Dense Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 2.0 – 7.0 feet – Loose Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 7.0 – 11.5 feet – Firm Highly Plastic Clay (**CH/A-7-6**, **STRATUM 5**)

Boring LS-2

- 0.0 – 1.0 feet – Dense Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 1.0 – 2.0 feet – Loose Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 2.0 – 6.0 feet – Firm Highly Plastic Clay (**CH/A-7-6**, **STRATUM 5**)
- 6.0 – 9.0 feet – Loose Clayey Fine Sand (**SC/A-2-6**, **STRATUM 3**)
- 9.0 – 15.5 feet – Firm Highly Plastic Clay (**CH/A-7-6**, **STRATUM 5**)

Boring LS-3

- 0.0 – 1.0 feet – Medium Dense Silty Fine Sand with Organics (**SM/A-2-4, STRATUM 2**)
- 1.0 – 2.0 feet – Medium Dense Silty Fine Sand (**SM/A-2-4, STRATUM 2**)
- 2.0 – 6.0 feet – Soft Highly Plastic Clay (**CH/A-7-6, STRATUM 5**)
- 6.0 – 7.0 feet – Loose Clayey Sand (**SC/A-6, STRATUM 4**)
- 7.0 – 15.5 feet – Firm Highly Plastic Clay (**CH/A-7-6, STRATUM 5**)

Boring LS-4

- 0.0 – 0.1 feet – Asphalt Paving (1.6-inches)
- 0.1 – 0.7 feet – Concrete Paving (6.8-inches)
- 0.7 – 3.0 feet – Dense Silty Fine Sand (**SM/A-2-4, STRATUM 1**)
- 3.0 – 12.5 feet – Firm Highly Plastic Clay (**CH/A-7-6, STRATUM 5**)
- 12.5 – 17.5 feet – Loose Clayey Fine Sand (**SC/A-2-6, STRATUM 3**)
- 17.5 – 20.0 feet – Medium Dense Clayey Fine Sand (**SC/A-2-6, STRATUM 3**)
- 20.0 – 23.0 feet – Hard Limestone (**STRATUM 7**)
- 23.0 – 25.0 feet – Soft Highly Weathered Limestone (**STRATUM 6**)

Boring LS-5

- 0.0 – 0.1 feet – Asphalt Paving (1.9-inches)
- 0.1 – 0.7 feet – Concrete Paving (6.8-inches)
- 0.7 – 3.0 feet – Medium Dense Silty Fine Sand (**SM/A-2-4, STRATUM 1**)
- 3.0 – 10.0 feet – Firm Highly Plastic Clay (**CH/A-7-6, STRATUM 5**)
- 10.0 – 12.5 feet – Stiff Highly Plastic Clay (**CH/A-7-6, STRATUM 5**)
- 12.5 – 20.0 feet – Firm Highly Plastic Clay (**CH/A-7-6, STRATUM 5**)
- 20.0 – 25.0 feet – Soft Highly Weathered Limestone (**STRATUM 6**)

Boring LS-6

- 0.0 – 5.5 feet – Medium Dense Clayey Sand (**SC/A-6, STRATUM 4**)

Boring LS-7

- 0.0 – 4.0 feet – Medium Dense Clayey Sand (**SC/A-6, STRATUM 4**)
- 4.0 – 5.5 feet – Firm Highly Plastic Clay (**CH/A-7-6, STRATUM 5**)

Boring LS-8

- 0.0 – 1.0 feet – Medium Dense Clayey Fine Sand with Organics (**SC/A-2-6**, **STRATUM 3**)
- 1.0 – 2.0 feet – Medium Dense Clayey Fine Sand (**SC/A-2-6**, **STRATUM 3**)
- 2.0 – 3.0 feet – Loose Clayey Fine Sand (**SC/A-2-6**, **STRATUM 3**)
- 3.0 – 5.5 feet – Loose Silty Fine Sand (**SM/A-2-4**, **STRATUM 2**)

Boring LS-9

- 0.0 – 4.0 feet – Medium Dense Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 4.0 – 5.5 feet – Medium Dense Silty Fine Sand (**SM/A-2-4**, **STRATUM 2**)

Boring LS-10

- 0.0 – 1.0 feet – Medium Dense Silty Fine Sand with Organics (**SM/A-2-4**, **STRATUM 2**)
- 1.0 – 2.0 feet – Medium Dense Clayey Fine Sand (**SC/A-2-6**, **STRATUM 3**)
- 2.0 – 5.5 feet – Very Loose Clayey Fine Sand (**SC/A-2-6**, **STRATUM 3**)

Boring LS-11

- 0.0 – 1.0 feet – Medium Dense Silty Fine Sand with Organics (**SM/A-2-4**, **STRATUM 2**)
- 1.0 – 2.0 feet – Medium Dense Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 2.0 – 5.5 feet – Very Loose Clayey Sand (**SC/A-6**, **STRATUM 4**)

Boring LS-12

- 0.0 – 0.1 feet – Asphalt Paving (1.5-inches)
- 0.1 – 0.7 feet – Concrete Paving (7.0-inches)
- 0.7 – 1.0 feet – Medium Dense Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 1.0 – 3.0 feet – Medium Dense Silty Fine Sand (**SM/A-2-4**, **STRATUM 2**)
- 3.0 – 5.5 feet – Very Loose Clayey Sand (**SC/A-6**, **STRATUM 4**)

Boring LS-13

- 0.0 – 0.1 feet – Asphalt Paving (1.3-inches)
- 0.1 – 0.7 feet – Concrete Paving (7.0-inches)
- 0.7 – 1.0 feet – Medium Dense Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 1.0 – 3.0 feet – Loose Clayey Sand (**SC/A-6**, **STRATUM 4**)
- 3.0 – 5.5 feet – Firm Highly Plastic Clay (**CH/A-7-6**, **STRATUM 5**)

Groundwater

Groundwater was encountered at different depths throughout the project limits. The depths and corresponding elevations of the estimated "normal" seasonal high groundwater are provided in **TABLE 2**.

USDA Soil Survey

According to the United States Department of Agriculture's (**USDA**) Soil Survey, the site is comprised of Orangeburg Fine Sandy Loam, Orangeburg Sandy Clay Loam, and Urban Land. The **USDA** estimates that the seasonal high groundwater is at a depth greater than six (6) feet for the Orangeburg classification. The **USDA** does not provide material descriptions or characteristics for Urban Land. The **USDA** soil survey data sheet has been provided in **TABLE 3**, and the detailed **USDA** Soil Survey information has been provided in **APPENDIX D**.

Pavement Core Data

Thirteen (13) pavement cores were installed within the project limits for this study. The pavement core numbers, lengths, and locations are summarized in the Pavement Condition and Core Data Survey provided in **TABLE 4**. In addition to estimated pavement layer data, the type of base material, visual observations, crack depths, rut depths and measured cross slopes have been included. The detailed pavement core data sheets have also been provided in **APPENDIX E**.

A Dynamic Cone Penetration (**DCP**) test was performed at three (3) different depths, where applicable. The **DCP** test results were performed on the base material (assumed directly below the asphalt layer), the subgrade material (assumed at a depth of twelve (12) inches below the asphalt layer), and the embankment (natural) material (assumed at a depth of thirty-six (36) inches below the asphalt layer). The results of these tests have been provided in **TABLE 5**.

Laboratory tests were performed to determine the bulk density, aggregate gradation, asphalt content, bulk specific gravity, and theoretical maximum specific gravity of representative pavement cores that were collected. These laboratory tests were performed in accordance with **FDOT** Standard Specifications (Florida Methods). Results of these tests have been provided in **TABLE 6**. The detailed laboratory test results have been provided in **APPENDIX F**.

Pavement Condition

Asphalt Pavement

In general, the **westbound and eastbound travel lanes of Lafayette Street were found to be in fair to poor condition**, with moderate patching, longitudinal cracking, transverse cracking, and pavement reflective cracking. Severe block cracking was also found at locations throughout the project, as can be seen in **Figure 8**. Moderate pavement reflective cracking was also encountered throughout the project limits, as can be seen in **Figure 21**. This cracking is probably the result of the underlying concrete pavement discovered below the asphalt.

Concrete Pavement

Concrete was encountered below the asphalt layer throughout the project limits, therefore it was considered as the base material. It should be noted that this concrete displayed **an average depth of seven (7) inches**, and is part of the old concrete pavement roadway. It should also be noted that this concrete layer displayed very dense characteristics; therefore **EGS recommends** this condition be considered as a construction concern.

Subgrade Material

The subgrade material was found to be either silty fine sand, clayey fine sand, or clayey sand. **DCP** tests conducted on the material twelve (12) inches below the pavement at core location **LS-1**, **LS-3**, **LS-4**, **LS-5**, **LS-6**, **LS-7**, **LS-8**, **LS-9**, **LS-10**, **LS-11**, and **LS-12** indicate that the material has an **LBR** value of over forty (40). **DCP** tests conducted on the material twelve (12) inches below the pavement at core location **LS-2** and **LS-13** indicate that the **LBR** values are less than forty (40). The **DCP** test results and **LBR** correlations performed on the subgrade material are shown in **TABLE 5**.

Embankment Material

The embankment (natural) material was found to be either silty fine sand, clayey fine sand, clayey sand, or highly plastic clay. **DCP** tests conducted on the material thirty-six (36) inches below the pavement at core location **LS-4**, **LS-5**, **LS-6**, **LS-7**, and **LS-9** indicate that the material has an **LBR** value of over forty (40). **DCP** tests conducted on the material thirty-six (36) inches below the pavement at core location **LS-1**, **LS-2**, **LS-3**, **LS-8**, **LS-10**, **LS-11**, **LS-12**, and **LS-13** indicate that the **LBR** values are less than forty (40). The **DCP** test results and **LBR** correlations performed on the embankment (natural) material are shown in **TABLE 5**.

Recommendations

Backfill Soils

The silty fine sands (**STRATUM 1** and **STRATUM 2**) encountered would be suitable for use as pipe backfill. However, due to the fines content in **STRATUM 2**, this material may be difficult to compact when wet.

The clayey fine sands (**STRATUM 3**) is a "PLASTIC" soil; however, this material may be used as pipe backfill, although it should be noted that the fines content may make the material difficult to compact when wet.

The clayey sands (**STRATUM 4**) are "PLASTIC" soils and are not suitable for use as pipe backfill. The highly plastic clays (**STRATUM 5**) are "HIGHLY PLASTIC" soils and are also not suitable for use as backfill.

Temporary Sheet Piles

Based on the alignment and depth of the proposed stormwater drainage lines for this project, **EGS believes** that temporary sheet pile walls will be needed to properly construct portions of the drainage system. It should be noted that **EGS** encountered relatively hard limestone at a depth of twenty (20) feet in Soil Boring **LS-4**, which would limit the driving depth of the sheet piles. If excavations greater than nine (9) feet are needed bracing and/or anchors will be needed.

Assuming a maximum excavation depth of nine (9) feet and using the Geotechnical Design Parameters provided in **TABLE 7**, **EGS** developed the follow minimum design recommendations for a cantilevered steel sheet pile wall:

- Minimum Section Modulus — 18.0 in^3 per foot of sheet pile wall
- Minimum Embedment Depth — 9.0 ft below bottom of excavation based on an excavation depth of 9.0 feet

The above recommendations do not include the affects of the existing CSX Railroad Overpass or embankment fill. The provided Minimum Section Modulus and Embedment depth can be used to within eighteen (18) feet of the existing railroad overpass and abutment walls. Sample calculations used to develop the above minimum design parameters are included as **APPENDIX G**.

Special design considerations will have to be made for any excavation within eighteen (18) feet of the CSX Railroad Overpass or embankment fill, which should include the following:

- The influence of the existing railroad bridge and embankment needs to be included in the lateral loads on the proposed shoring;
- The low overhead clearance below the bridge will prohibit the driving of sheet piles; and,
- At the locations where sheet piles will need to be driven deeper than eighteen (18) feet below the surrounding ground surface, the relatively shallow depth to limestone (20 feet) will likely require that the sheet piles be anchored since adequate penetration of the sheet pile can not be obtained.

Construction Concerns

Based on the geotechnical investigation and analysis conducted for this study, **EGS recommends** that the following construction concerns be addressed:

- The dense concrete base material should be considered when performing the drainage/pavement design;
- underground utility conflicts may exist within the right of way of the CSX Railroad Overpass
- concrete curb and gutter was encountered throughout the project limits, which might cause a construction conflict as it relates to milling;

- the existing asphalt is reported to contain a geogrid that was placed to control cracking and reduce rutting, this geogrid may impact the milling of the existing asphalt and a note should be noted on the plans that it may exist;
- the height clearance and lane width at the CSX Railroad Overpass might cause a construction conflict as it relates to construction equipment; and,
- excavations made within eighteen (18) feet of the existing CSX Railroad Overpass and embankment fill will need to consider the railroad and embankment loading.

Closure

The data and results presented in this Report are intended for the use of **Genesis Group, Inc.** and the **Leon County Department of Public Works** for the Lafayette Street Drainage Improvements Project, described herein. This Report is not intended for any other use and will likely not be applicable. The data and recommendations presented in this Report are based on the borings made at the specific locations and depths noted. Subsurface conditions at other locations may vary significantly from those presented herein. Should data become available which is different from the data presented herein, Environmental and Geotechnical Specialists, Inc. requests the opportunity to review the data and make any modifications to the design recommendations which may be appropriate.

If you have any questions concerning the information contained in this Report, please do no not hesitate to contact either Myron Hayden, P.E. or myself at (850) 386-1253.

Very truly yours
Environmental and Geotechnical Specialists, Inc.
Florida Certificate of Engineering Authorization Number 6222

8-4-08
Thomas H. Hayden, P.E.
Project Engineer
FL P.E. Number 67492

TABLES

TABLE 1
SOIL BORING LOCATION DATA
LAFAYETTE STREET DRAINAGE STUDY
GENESIS GROUP
LEON COUNTY, FLORIDA

BORING NUMBER	DEPTH [1] (FEET)	ELEVATION [2] (FEET)	GLOBAL POSITIONING SATELLITE (GPS) COORDINATES[3]				LOCATION
			LATITUDE		LONGITUDE		
			DEG (°)	MIN (')	DEG (°)	MIN (')	
LS-1	12.0	104.0	30	26.273	84	16.543	BORING LOCATED 150 FEET WEST OF THE SUWANNEE STREET INTERSECTION CENTERLINE IN THE WEST BOUND LANE
LS-2	15.0	105.0	30	26.264	84	16.489	BORING LOCATED 105 FEET EAST OF THE SUWANNEE STREET INTERSECTION CENTERLINE IN THE EAST BOUND LANE
LS-3	15.0	105.0	30	26.260	84	16.445	BORING LOCATED 220 FEET WEST OF THE CSX RAILROAD OVERPASS CENTERLINE IN THE WEST BOUND LANE
LS-4	25.0	107.0	30	26.254	84	16.407	BORING IS LOCATED 40 FEET WEST OF THE CSX RAILROAD OVERPASS CENTERLINE IN THE EAST BOUND LANE
LS-5	25.0	107.0	30	26.251	84	16.397	BORING IS LOCATED 40 FEET EAST OF THE CSX RAILROAD OVERPASS CENTERLINE IN THE EAST BOUND LANE
LS-6	5.0	120.0	30	26.244	84	16.346	BORING IS LOCATED 60 FEET EAST OF THE MARVIN STREET INTERSECTION CENTERLINE IN THE WEST BOUND LANE
LS-7	5.0	145.0	30	26.230	84	16.270	BORING IS LOCATED 60 FEET EAST OF THE MEYERS PARK DRIVE INTERSECTION CENTERLINE IN THE EAST BOUND LANE
LS-8	5.0	169.0	30	26.221	84	16.198	BORING IS LOCATED 420 FEET EAST OF THE MEYERS PARK DRIVE INTERSECTION CENTERLINE IN THE WEST BOUND LANE
LS-9	5.0	182.0	30	26.213	84	16.148	BORING IS LOCATED 165 FEET WEST OF THE DESOTO PARK DRIVE INTERSECTION CENTERLINE IN THE EAST BOUND LANE
LS-10	5.0	192.0	30	26.199	84	16.084	BORING IS LOCATED 45 FEET EAST OF THE GOODBODY LANE INTERSECTION IN THE WEST BOUND LANE
LS-11	5.0	195.0	30	26.188	84	16.034	BORING IS LOCATED 50 FEET WEST OF THE HOLLAND DRIVE INTERSECTION IN THE EAST BOUND LANE
LS-12	5.0	200.0	30	26.180	84	15.969	BORING IS LOCATED 150 FEET EAST OF THE SEMINOLE DRIVE INTERSECTION IN THE WEST BOUND LANE
LS-13	5.0	208.0	30	26.166	84	15.898	BORING IS LOCATED 540 FEET EAST OF THE SEMINOLE DRIVE INTERSECTION IN THE EAST BOUND LANE

NOTES: 1. DEPTH IS BELOW EXISTING GROUND SURFACE
2. ELEVATIONS ESTIMATED FROM DRAWINGS PROVIDED BY GENESIS INC.
3. GPS COORDINATES ARE ACCURATE TO WITHIN 10 FEET

TABLE 2
GROUNDWATER DATA
LAFAYETTE STREET DRAINAGE STUDY
GENESIS GROUP
LEON COUNTY, FLORIDA

BORING NUMBER	DEPTH [1] (FEET)	ELEVATION [2] (FEET)	GROUNDWATER DATA			
			MEASURED GROUNDWATER		ESTIMATED SEASONAL HIGH GROUNDWATER	
			DEPTH [1] (FEET)	ELEVATION [2] (FEET)	DEPTH [1] (FEET)	ELEVATION [2] (FEET)
LS-1	11.5	104.0	> 11.5	< 92.5	1.0	103.0
LS-2	15.5	105.0	10.5	94.5	2.0	103.0
LS-3	15.5	105.0	8.5	96.5	2.0	103.0
LS-4	25.0	107.0	5.0	102.0	3.0	104.0
LS-5	25.0	107.0	5.0	102.0	3.0	104.0
LS-6	5.5	120.0	> 5.5	< 114.5	> 5.5	< 114.5
LS-7	5.5	145.0	> 5.5	< 139.5	> 5.5	< 139.5
LS-8	5.5	169.0	> 5.5	< 163.5	> 5.5	< 163.5
LS-9	5.5	182.0	> 5.5	< 176.5	> 5.5	< 176.5
LS-10	5.5	192.0	> 5.5	< 186.5	> 5.5	< 186.5
LS-11	5.5	195.0	> 5.5	< 189.5	> 5.5	< 189.5
LS-12	5.5	200.0	> 5.5	< 194.5	> 5.5	< 194.5
LS-13	5.5	208.0	> 5.5	< 202.5	> 5.5	< 202.5

NOTES: 1. DEPTH IS BELOW EXISTING GROUND SURFACE
2. ELEVATIONS ESTIMATED FROM DRAWINGS PROVIDED BY GENESIS, INC.

TABLE 3
USDA SOIL SURVEY DATA
LAFAYETTE STREET DRAINAGE STUDY
GENESIS GROUP
LEON COUNTY, FLORIDA

BORING NUMBER	MATERIAL REFERENCE [1]	DEPTH (INCHES)	MATERIAL DESCRIPTION	MATERIAL CLASSIFICATION	DEPTH TO SEASONAL HIGH GROUNDWATER (FEET)	RISK OF CORROSION	
						UNCOATED STEEL	CONCRETE
LS-1	49	-	URBAN LAND [2]	-	-	-	-
LS-2	49	-	URBAN LAND [2]	-	-	-	-
LS-3	49	-	URBAN LAND [2]	-	-	-	-
LS-4	49	-	URBAN LAND [2]	-	-	-	-
LS-5	49	-	URBAN LAND [2]	-	-	-	-
LS-6	36	0-10	ORANGEBURG FINE SANDY LOAM	SM	> 6.0	MODERATE	MODERATE
		10-80	ORANGEBURG SANDY CLAY LOAM	SC, CL			
LS-7	36	0-10	ORANGEBURG FINE SANDY LOAM	SM	> 6.0	MODERATE	MODERATE
		10-80	ORANGEBURG SANDY CLAY LOAM	SC, CL			
LS-8	36	0-10	ORANGEBURG FINE SANDY LOAM	SM	> 6.0	MODERATE	MODERATE
		10-80	ORANGEBURG SANDY CLAY LOAM	SC, CL			
LS-9	36	0-10	ORANGEBURG FINE SANDY LOAM	SM	> 6.0	MODERATE	MODERATE
		10-80	ORANGEBURG SANDY CLAY LOAM	SC, CL			
LS-10	49	-	URBAN LAND [2]	-	-	-	-
LS-11	49	-	URBAN LAND [2]	-	-	-	-
LS-12	49	-	URBAN LAND [2]	-	-	-	-
LS-13	49	-	URBAN LAND [2]	-	-	-	-

NOTES: 1 BASED ON THE USDA SOIL SURVEY REPORT FOR LEON COUNTY, FLORIDA

2) USDA SOIL SURVEY FOR LEON COUNTY DOES NOT PROVIDE A DESCRIPTION FOR URBAN LAND (MATERIAL REFERENCE NUMBER 49)

TABLE 4
PAVEMENT CONDITION AND CORE SURVEY SHEET
LAFAYETTE STREET DRAINAGE STUDY
LEON COUNTY, FLORIDA

Cored By: R. MARTIN Date: 7/10/2008 Page: 1 OF 1 Typical Section No:

W.P.I. No:	Name: Lafayette Street Drainage Study		Lanes: 2 and 3 / See Notes
Fin. Proj. ID:	From: West of Suwannee Street		Shoulder Type / Condition: C&G
F.A. Proj. No.:	To: West of Magnolia Street		Inside: N/A
County: Leon SR No:	Beg MP:	End MP: Length:	Outside: Curbed and Guttered
Median Curbed: [ ] Paved: [ ]	Lawn: [ ]	Other:	Curb & Gutter: [X]

Core No.	Mile Post or Sta No.	Lane	Wheel Path	Pavement Layers (in.)							Base		Crack				Pvt Condt	Rut Depth (in)	Cross Slope (%)	Comments
				Friction Course	Structural Course					Core Length	Concrete		Depth (in)	Type	Class	Extent				
LS-1	--	WB	CO	2.50	7.50					10.00	X		0.000	B	II	M	F	0.000	3.1	1, 2, 3, 4, 5, 6, 7
LS-2	--	EB	CO	1.00	2.00					3.00	X		0.000	C	III	S	P	0.375	2.3	1, 2, 4, 6, 8, 9, 10
LS-3	--	WB	CO	1.00	1.00					2.00	X		0.000	B	II	M	F	0.000	1.4	1, 6, 9, 11, 12, 13
LS-4	--	EB	CO	1.63						1.63	6.75		1.625	C	III	S	P	0.062	0.8	1, 5, 6, 8, 11, 14, 15, 16
LS-5	--	EB	CO	1.88						1.88	6.75		0.000	C	II	M	F	0.000	1.8	1, 3, 5, 6, 12, 14, 17
LS-6	--	WB	CO	1.00	1.00					2.00	X		0.000	B	II	M	F	0.000	1.9	1, 6, 9, 11, 12, 14, 18, 19
LS-7	--	EB	CO	1.63						1.63	X		1.625	B	II	M	F	0.000	2.6	1, 6, 9, 11, 12, 20
LS-8	--	WB	CO	1.63						1.63	X		0.000	B	II	M	F	0.062	1.1	1, 4, 6, 9, 11, 12, 21
LS-9	--	EB	WP	1.63						1.63	X		1.625	B	II	M	F	0.000	0.9	1, 4, 6, 9, 11, 12, 22
LS-10	--	WB	CO	3.75						3.75	X		3.750	C	II	M	F	0.062	1.8	1, 3, 4, 6, 9, 11, 12, 23
LS-11	--	EB	WP	1.38	0.50					1.88	X		0.000	B	II	M	F	0.000	0.8	1, 6, 9, 11, 12, 24
LS-12	--	WB	CO	1.50						1.50	7.00		0.000	B	II	M	F	0.125	1.8	1, 6, 9, 11, 12, 25
LS-13	--	EB	WP	1.25						1.25	7.00		0.000	B	II	M	F	0.000	1.4	1, 6, 11, 12, 26

Remarks:

WB: West Bound Lane
EB: East Bound Lane
EBITL: East Bound Inside Turn Lane
CO: Located Outside Wheel Path
WP: Located in Wheel Path
TYPE B: 6% To 25% Cracking Encountered
TYPE C: 26% to 50% Cracking Encountered
CLASS II: Cracking Found From 1/8 - 1/4"
CLASS III: Cracking Found Greater Than 1/4"
M: Medium Cracking Encountered
S: Severe Cracking Encountered
G: Good Condition
F: Fair Condition
P: Poor Condition

Comments:

1) Sidewalk Located on the Southbound Side of the Road
2) 3 Lanes at Core Location (1 WB, 1 EBITL, 1 EB)
3) Moderate Longitudinal Cracking Present at Core Location
4) Moderate Transverse Cracking Present at Core Location
5) Sewer Manholes Present Near Core Location
6) Underlying Concrete Layer is Considered as Base
7) Core Installed 150 Feet West of Suwannee Street
8) Severe Block Cracking Present at Core Location
9) Soil Boring was Offset from Pavement Core Location
10) Core Installed 105 Feet East of Suwannee Street
11) Moderate Pavement Reflective Cracking Present
12) 2 Lanes at Core Location
13) Core Installed 220 Feet West of the CSX Railroad Overpass
14) Moderate Patching Present at Core Location
15) Located Near CSX Railroad Overpass
16) Core Installed 40 Feet West of the CSX Railroad Overpass
17) Core Installed 40 Feet East of the CSX Railroad Overpass
18) Core Located Near Marvin Street Intersection
19) Core Installed 60 Feet East of Marvin Street
20) Core Installed 60 Feet East of Meyers Park Drive
21) Core Installed 420 Feet East of Meyers Park Drive
22) Core Installed 165 Feet West of De Soto Park Drive
23) Core Installed 45 Feet East of Goodbody Lane
24) Core Installed 50 Feet East of Holland Drive
25) Core Installed 150 Feet East of Seminole Drive
26) Core Installed 540 Feet East of Seminole Drive

TABLE 5
ROADWAY DCP-LBR CORRELATIONS
LAFAYETTE STREET DRAINAGE STUDY
LEON COUNTY, FLORIDA

PAVEMENT CORE NUMBER	BASE MATERIAL [1]		SUBGRADE MATERIAL [4]		EMBANKMENT MATERIAL [5]	
	DCP BLOW COUNT [2]	EQUIVALENT LBR VALUE [3]	DCP BLOW COUNT [2]	EQUIVALENT LBR VALUE [3]	DCP BLOW COUNT [2]	EQUIVALENT LBR VALUE [3]
LS-1	N/A	N/A	8	44	6	32
LS-2	N/A	N/A	5	26	5	26
LS-3	N/A	N/A	8	44	5	26
LS-4	N/A	N/A	18	>100	8	44
LS-5	N/A	N/A	14	83	10	57
LS-6	N/A	N/A	10	57	11	63
LS-7	N/A	N/A	9	50	10	57
LS-8	N/A	N/A	8	44	6	32
LS-9	N/A	N/A	8	44	10	57
LS-10	N/A	N/A	8	44	3	15
LS-11	N/A	N/A	8	44	3	15
LS-12	N/A	N/A	12	70	2	9
LS-13	N/A	N/A	7	38	5	26

NOTES:

1. CONCRETE ENCOUNTERED BELOW ASPHALT LAYER
2. DYNAMIC CONE PENETRATION (DCP) VALUE (BLOW COUNTS PER 2.00-INCH)
3. CORRELATION BASED ON THE ASPHALT HANDBOOK, MS-4 (7^{th} EDITION)

   CORRELATION:

$$LBR = \frac{292}{DCP^{1.12}} \times 1.20$$

4. SUBGRADE MATERIAL IS ASSUMED AS THE MATERIAL ENCOUNTERED 12-INCHES BELOW THE BOTTOM OF THE ASPHALT LAYER.
5. EMBANKMENT MATERIAL IS ASSUMED AS THE MATERIAL ENCOUNTERED 36-INCHES BELOW THE BOTTOM OF THE ASPHALT LAYER.

TABLE 6
ASPHALT GRADATION SUMMARY
LAFAYETTE STREET DRAINAGE STUDY
LEON COUNTY, FLORIDA

CORE NUMBER	EXTRACTION LENGTH (INCH)	CORE DENSITY (LB/FT^3)	ASPHALT CONTENT (%)	BULK SPECIFIC GRAVITY G_{mb}	THEORETICAL MAXIMUM SPECIFIC GRAVITY G_{mm}	% MATERIAL PASSING								
						1" SIEVE (25.0 mm)	3/4" SIEVE (19.0 mm)	1/2" SIEVE (12.5 mm)	3/8" SIEVE (9.5 mm)	NO. 4 SIEVE (4.75 mm)	NO. 10 SIEVE (2.00 mm)	NO. 40 SIEVE (0.425 mm)	NO. 80 SIEVE (0.180 mm)	NO. 200 SIEVE (0.075 mm)
LS-1	2.50	127.3	8.3	2.040	2.235	100.0	100.0	99.5	98.3	82.6	65.3	38.9	20.7	10.7
LS-5	1.75	137.1	7.5	2.197	2.330	100.0	100.0	100.0	100.0	89.1	60.1	34.9	15.9	6.9
LS-9	2.00	136.3	7.7	2.185	2.366	100.0	100.0	100.0	100.0	81.6	49.8	32.0	17.0	8.3
LS-13	1.25	143.2	7.5	2.295	2.318	100.0	100.0	100.0	100.0	76.0	44.9	29.9	16.7	8.8
AVERAGE	-	**136.0**	**7.7**	**2.179**	**2.313**	**100.0**	**100.0**	**99.9**	**99.6**	**82.3**	**55.0**	**33.9**	**17.6**	**8.7**

TABLE 7
GEOTECHNICAL DESIGN PARAMETERS - TEMPORARY SHEET PILE WALLS
LAFAYETTE STREET DRAINAGE STUDY
GENESIS GROUP
LEON COUNTY, FLORIDA

DEPTH (FEET)	ANGLE OF INTERNAL FRICTION (ϕ) (DEGREES)	ANGLE OF WALL FRICTION (ϕ) (DEGREES)	COHESION (c) (LB/FT^2)	ADHESION COEFFICIENT (a)	TOTAL SOIL UNIT WEIGHT (γ') (LB/FT^3)	ACTIVE EARTH PRESSURE COEFFICIENT (K_a)	AT REST EARTH PRESSURE COEFFICIENT (K_o)	PASSIVE EARTH PRESSURE COEFFICIENT (K_p)	SOIL DESCRIPTION
0.0 - 5.0	28	18	0	0.00	110	0.36	0.53	2.77	LOOSE SILTY TO CLAYEY SAND (SM TO SC)
5.0 - 20.0	0	0	800	0.90	115	1.00	1.00	1.00	FIRM HIGHLY PLASTIC CLAY (CH)
20.0 - 25.0	0	0	2000	0.10	120	1.00	1.00	1.00	WEATHERED LIMESTONE