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Progress Report Pavement and Geotechnical Engineering Services Barwick Street, Saint Clair Street and Huey Street Wildwood, Sumter County, Florida



Project Number: 07572626 April 5, 2022

Professional Service Industries, Inc. 1748 33rd Street, Orlando, FL 32839 Phone: (407) 304-5560 Fax: (407) 304-5561

Mr. Nicholas J. Mora, P.E. **Kimley-Horn** 101 E Silver Springs Boulevard, Suite 400, Ocala, FL, 34470

RE: Progress Report Pavement and Geotechnical Engineering Services Barwick Street, Saint Clair Street and Huey Street Wildwood, Sumter County, Florida

Dear Mr. Mora:

In general accordance with PSI Proposal No. 0757-326465 dated November 5, 2020 and your authorization, **Professional Service Industries, Inc. (PSI), an Intertek company,** has completed pavement and geotechnical engineering evaluations at the site of the referenced project. The subsurface exploration was conducted to develop design-level geotechnical engineering recommendations for the rehabilitation of subject roadways.

PROJECT INFORMATION

The project involves the existing flexible pavement of Barwick Street, Saint Clair Street and Huey Street in Wildwood, Sumter County, Florida. More specifically, the limits of Barwick Street are from North Warfield Avenue to North Saint Clair Street, approximately 1,800 linear feet. The limits of North Saint Clair Street are from Huey Street to Barwick Street, approximately 1,600 linear feet. The limits of Huey Street are from South Gamble Street to North Saint Clair Street, approximately 3,550 linear feet.

The referenced roadways are rural roadways with no drainage or curb/gutter. Roadway drainage improvements are outside of the scope of our services. We understand the proposed improvements include rehabilitation of the existing distressed pavements while maintaining the existing width of the roadways.

The noted information/assumptions have been used for the purpose of preparing this report. If any of the stated information/assumptions are incorrect or have been changed, PSI should be notified so appropriate changes to our recommendations can be incorporated in this report.





REVIEW OF PUBLISHED DATA

USGS Topographic Map

The topographic survey map published by the USGS entitled "Wildwood, Florida" was reviewed for ground surface features in the vicinity of the proposed roadway improvements. Based on this review, the natural ground surface elevations within the subject roadways are on the order of +60 to +80 feet National Geodetic Vertical Datum (NGVD) of 1929. **Figure 1** of **Appendix A** contains an excerpt of the USGS topographic map for the site.

At the time of preparing this report, a site-specific topographic survey was not made available for PSI's review.

SCS Soil Survey

The "Soil Survey of Sumter County, Florida," published by the USDA SCS, was reviewed for general near-surface soil information within the general project vicinity. This information indicates that there are five soil groups within the vicinity of the proposed project. The general information provided by the SCS for the mapped soil units are summarized in the following table.

Soil Series	Depth	AASHTO	Unified	USDA Seasonal High Groundwater Table
	(inches)	Classification	Classification	Depth (feet)
6 – Kendrick fine sand, 0 to 5 percent slopes	0 to 80	A-3, A-2-4, A-2-6, A-6	SP-SM, SM, SM-SC, SC	>6
11 – Millhopper sand, 0 to 5 percent slopes	0 to 80	A-3, A-2-4, A-2-6, A-4, A-6	SP-SM, SM	3.5 to 6.0
16 – Apopka sand, 0 to 5 percent slopes	0 to 98	A-3, A-2-4, A-2-6, A-4, A-6	SP, SP-SM, SM-SC, SC	> 6
33 – Sparr fine sand, boulder subsurface, 0 to 5 percent slopes	0 to 80	A-3, A-2-4, A-2-6, A-4, A-6	SP-SM, SM, SC, SM-SC	1.5 to 3.5
62 – Urban Land, 0 to 2 percent slopes	-	-	-	-

Note: No specific information is provided by the SCS due for Urban Land to the altered nature of developed land.

Figure 2 of the Appendix A contains an excerpt of the USDA SCS soils map for the site.





FIELD EXPLORATION

<u>General</u>

PSI executed a program of limited pavement coring and subsurface exploration. As requested, PSI cut nine (9) cores from the existing pavement of Huey Street, five (5) cores from flexible pavement of Barwick Street and four (4) cores from the limits of Saint Clair Street and measured the asphalt and base thickness and identified the type of the pavement materials. The asphalt pavement and underlying base material were cored with a 6-inch diameter core barrel. The core holes were backfilled with cold-patch asphalt prior to leaving the site. PSI also performed shallow manual auger boring through the subgrade in an attempt to measure the existing groundwater level and evaluate the subgrade materials. The approximate core and boring locations are presented on **Sheet 1** in **Appendix A**. The soil types encountered at the specific pavement core locations are presented in the form of soil profiles on **Sheet 2** of **Appendix A**. Included with the boring profiles is a legend describing the encountered soils in AASHTO format and the results of PSI's laboratory testing.

Soil Conditions

Based on the pavement borings PSI completed for the project, subsurface conditions are relatively consistent along the limits of the roadways. In general, the upper 3 to 6 feet of the borings revealed a series of fine sands grading relatively clean to slightly silty in composition (i.e. A-3 material). The upper sands were underlain by a series of silty fine sand and clayey soils ranging from clayey fine sand to sandy clay (i.e. A-2-4, A-2-6, A-4 and A-6 materials). A couple of borings revealed a thin layer of silty fine sand to clayey fine sand (i.e. A-2-4 and A-2-6 materials) immediately below the base layer. A detailed description of the individual pavement borings are shown as soil profiles on **Sheets 2** of the **Appendix A**.

The stratification presented is based on visual observation of the recovered soil samples, laboratory testing and interpretation of field logs by a geotechnical engineer. It should be noted that variations in the subsurface conditions are expected and may be encountered between and away from PSI's borings. Also, whereas the individual boring logs indicate distinct strata breaks, the actual transition between the soil layers may be more gradual than shown on the soil profiles.

Groundwater Conditions

At the time of our fieldwork (June 23, 2021), groundwater was not encountered in PSI's borings. The estimated normal seasonal high groundwater levels presented herein are based on the observed soil stratigraphy, conditions observed in the borings, USDA Soil Survey information, and our past experience in the project vicinity. In this regard, we estimate the normal seasonal high groundwater table will occur in the form of perched groundwater above the shallow confining layer soils at an approximate depth of 5 feet below the existing grades at Huey Street and Saint Clair Street, and an approximate depth of 3 feet below the existing grades at Barwick Street. More detailed groundwater estimates can be provided once topographic survey data is provided to PSI.

In general, the estimated normal seasonal high groundwater level is not intended to define a limit or ensure that future seasonal fluctuations in groundwater levels will not exceed the estimated levels. Groundwater conditions will vary with environmental changes and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as swales, ponds, drainage systems, underdrains and areas of covered soil (buildings, paved parking lots, sidewalks, etc.).





Pavement Cores

A list of asphalt and base thicknesses encountered in PSI's pavement cores/borings, are summarized in the table below:

Core	Core	Asphalt	Base	Type of
NO.	Name	Ihickness	Thickness	Base Material
		(inches)	(inches)	
1	BA-1	1.25	6.5	Limerock
2	BA -2	1.5	7.5	Limerock
3	BA -3	1.5	7.5	Limerock
4	BA -4	2.5	6.5	Clay stabilized silty sand
5	BA -5	2.25	10.5	Clay stabilized silty sand
6	HU-1	4.5	6.5	Clay stabilized silty sand
7	HU-2	2.5	10.5	Limerock
8	HU-3	2.75	8.5	Limerock
9	HU-4	3.5	8	Clay stabilized silty sand
10	HU-5	3	8	Limerock
11	HU-6	4	6	Limerock
12	HU-7	3.5	8	Limerock
13	HU-8	3.5	4.5	Clay stabilized silty sand
14	HU-9	3.75	4	Limerock
15	SC-1	2.5	8	Limerock
16	SC-2	1.25	7.5	Limerock
17	SC-3	3	8.5	Limerock
18	SC-4	0.75	8	Limerock

Table 1: Pavement Core Data

Photographs of the pavement cores, as well as photographs of the core locations, are included in **Appendix B**.

PAVEMENT EVALUATIONS

Based on the PSI's pavement survey, severe pavement distresses were observed along the limits of the subject roadway alignments. The distresses include longitudinal and transverse cracking, block cracking, alligator cracking and potholes.

Based on our core data, it appears the base materials in most of the westbound travel lanes of Huey Street and the western 700 feet of Barwick Street are composed of clayey stabilized silty sand. The rest of the borings revealed limerock base material.

Based on our limited field exploration and the data collected during our pavement coring program, inadequate asphalt and base thickness, as well as unsuitable base materials, appear to have caused the observed pavement distresses.





DESIGN RECOMMENDATIONS

Pavement Support

We were not provided with any traffic information for the referenced roadway alignments; however, based on our past experience with similar projects, data obtained during this study, our pavement survey, and provided positive drainage outside of the pavement areas is provided, the following geotechnical engineering recommendations are provided for reconstruction/rehabilitation of the noted roadways.

The following reconstruction/rehabilitation options are based on the order of cost-performance:

Option 1 - Total Reconstruction:

Remove full depth of the existing asphalt, base and subgrade layer. Any unsuitable materials (i.e. peat/organic soils/clayey soils) below the exposed excavated grade shall be removed to their full depth and hauled off the site. The resulting excavation shall be backfilled with compacted clean sands (A-3 soils). Compact the exposed subgrade soils to at least 98 percent of the material's modified Proctor (ASTM D-1557) maximum dry density. Construct the new flexible pavement following the below recommendations:

- 2.5 inches Type SP Asphaltic Concrete (1.5 inches of SP-12.5 followed by 1.0 inch of SP-9.5 on top with minimum PG 67-22 or higher).
- 8.0 inches limerock (LBR=100) or crushed concrete (LBR = 150) base course, compacted to at least 98 percent of the material's modified Proctor (ASTM D-1557) maximum dry density.
- 12.0 inches stabilized subgrade, Type B Stabilization (LBR = 40), compacted to at least 98 percent of the material's modified Proctor (ASTM D-1557) maximum dry density.

Option 2- Full Depth Reclamation (FDR)

Construct a minimum 8.0 inches of reclaimed base materials by pulverizing, mixing and reusing the existing asphalt, base and subgrade materials and adding additives (Portland cement and emulsion asphalt) at the designed ratios and placing/compacting the reclaimed materials. This process will provide an improved pavement base layer for support of the new asphaltic concrete pavement surface.

It should be noted that where the base material is composed of "clay stabilized silty sand" due to the presence of plastic soils, the addition of emulsion asphalt to the FDR mix is not recommended. However, the omission of emulsion asphalt in the mix increases the risk of the formation of reflective cracks from the base layer to the asphalt surface.

Following the construction of the reclaimed base layer, a minimum of 2.5 inches of asphalt concrete (1.5-inch lift of SP-12.5 followed by 1.0-inch lift of SP-9.5 on top, with minimum PG 67-22 or higher) should be placed as the finished pavement surface.





Option 3- Milling and Resurfacing

Milling and resurfacing is only recommended for the limits of Saint Clair Street due to the site conditions and existing roadway base condition/thickness. Remove the full depth of the existing asphalt and a portion of the limerock base material to a total depth of 3 inches below the existing asphalt grade elevation. Compact the exposed disturbed base layer to at least 98 percent of the material's modified Proctor (ASTM D-1557) maximum dry density. Place 3 inches of asphaltic concrete (2.0-inch lift of SP-12.5 followed by 1.0-inch lift of SP-9.5 on top, with minimum PG 67-22 or higher) as the finished pavement surface.

All materials used for pavement construction should meet the more stringent criteria of FDOT and Sumter County standards.

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.

The scope of our exploration was intended to evaluate soil conditions within the influence of the proposed roadways and does not include an evaluation of potential deep soil problems such as sinkholes. The analysis and recommendations submitted in this report are based on the data obtained from the soil borings and pavement cores performed at the locations indicated. If any subsoil variations become evident during the course of this project, a reevaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered.

The scope of our geotechnical services presented herein 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.





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CLOSURE

PSI appreciates the opportunity to provide our services to you on this project. If you have any questions regarding the information provided in this report, or if we may be of further service, please contact the undersigned.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC. Certificate of Authorization No. 3684

Behnam Golestani, Ph.D., P.E. Principal Consultant/Senior Geotechnical Engineer FL License No. 84787

Robert A. Trompke, P.E. Florida Geotechnical Practice Leader FL License No. 55456

07572626 (Barwick Street - St. Clair Street - Huey Street)

Appendix A:

- Figure 1 USGS Topographic Map
- Figure 2 USDA Soils Map
- Sheet 1 Boring Location Plan
- Sheets 2 & 3 Boring Profiles

Appendix B:

• Pavement Core & Site Photographs



APPENDIX A









<u>LEGEND</u>

- Р Pavement
- Gray-brown to dark brown fine SAND to slightly 1 silty fine sand, (A-3)
- 2 Dark brown to gray-brown silty fine SAND, (A-2-4)
- 3 Gray-brown to brown clayey fine SAND, (A-2-6)
- 4 Orange-gray sandy CLAY, (A-4), (A-6)
- Orange-brown silty fine SAND, (A-2-4) 5
- Groundwater not evident in upper 7 feet GNE of boring
- (A-3) A.A.S.H.T.O soils classification group symbol

W =	
-200=	
LL =	
PI=	

Natural moisture content (%) (FM 1-T 265) Percent passing no. 200 U.S. standard sieve Liquid limit (FM 1-T 089) Plasticity index (FM 1-T 090)

SHEET: 2 DJW CHECKED: LC

APPENDIX B





- Asphalt: 1.25 inches
- Pavement Base: 6.5 inches limerock

SHEET NO.:	
DRAWN BY:	L.C.
CHECKED BY:	B.G.

GEOTECHNICAL ENGINEERING SERVICES BARWICK STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA PSI PROJECT NO.: 07572626 DATE: 8/27/2021







- Asphalt: 1.5 inches
- Pavement Base: 7.5 inches limerock

SHEET NO.:		
DRAWN BY:	L.C.]
CHECKED BY:	B.G.	

GEOTECHNICAL ENGINEERING SERVICES BARWICK STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA PSI PROJECT NO.: 07572626 DATE: 8/27/2021







- Asphalt: 1.5 inches
- Pavement Base: 7.5 inches of limerock

SHEET NO.:	
DRAWN BY:	L.C.
CHECKED BY:	B.G.

GEOTECHNICAL ENGINEERING SERVICES BARWICK STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA PSI PROJECT NO.: 07572626 DATE: 8/27/2021







- Asphalt: 2.5 inches
- <u>Pavement Base:</u> 6.5 inches of Clay stabilized silty sand

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	BARWICK STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	DSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 2.25 inches
- <u>Pavement Base:</u> 10.5 inches of Clay stabilized silty sand

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	BARWICK STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	DSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 4.5 inches
- <u>Pavement Base:</u> 6.5 inches of Clay stabilized silty sand

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	DSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 2.5 inches
- Pavement Base: 10.5 inches of limerock

SHEET NO.:		
DRAWN BY:	L.C.	
CHECKED BY:	B.G.	

GEOTECHNICAL ENGINEERING SERVICES HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA PSI PROJECT NO.: 07572626 DATE: 8/27/2021







- Asphalt: 2.75 inches
- Pavement Base: 8.5 inches of limerock

SHEET NO.:	
DRAWN BY:	L.C.
CHECKED BY:	B.G.

GEOTECHNICAL ENGINEERING SERVICES HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA PSI PROJECT NO.: 07572626 DATE: 8/27/2021







- Asphalt: 3.5 inch
- Pavement Base: 8 inches of Clay stabilized silty sand

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	DSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 3 inches
- <u>Pavement Base:</u> 8 inches of limerock

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	DSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 4 inches
- Pavement Base: 6 inches of limerock

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	DSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 3.5 inches
- Pavement Base: 8 inches of limerock

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	NSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 3.5 inches
- <u>Pavement Base:</u> 4.5 inches of Clay stabilized silty sand

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA DSI PROJECT NO : 07572626	DSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 3.75 inches
- <u>Pavement Base:</u> 4 inches of Sandy Limerock

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	HUEY STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	NSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 2.5 inches
- Pavement Base: 8 inches of limerock

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	ST. CLAIR STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	NSI
CHECKED BY:	B.G.	DATE: 8/27/2021	





- Asphalt: 1.25 inches
- Pavement Base: 7.5 inches of limerock

SHEET NO.:	
DRAWN BY:	L.C.
CHECKED BY:	B.G.

GEOTECHNICAL ENGINEERING SERVICES ST. CLAIR STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA PSI PROJECT NO.: 07572626 DATE: 8/27/2021







- Asphalt: 3 inches
- Pavement Base: 8.5 inches of limerock

CHECKED BY:	B.G.
DRAWN BY:	L.C.
SHEET NO.:	

GEOTECHNICAL ENGINEERING SERVICES ST. CLAIR STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA PSI PROJECT NO.: 07572626 DATE: 8/27/2021







- Asphalt: 0.75 inches
- Pavement Base: 8.0 inches of limerock

SHEET NO.:		GEOTECHNICAL ENGINEERING SERVICES	intertek 🖕
DRAWN BY:	L.C.	ST. CLAIR STREET – PROPOSED PAVEMENT IMPROVEMENTS SUMTER COUNTY, FLORIDA	
CHECKED BY:	B.G.	DATE: 8/27/2021	