

**To:** City of West Palm Beach Engineering Division  
401 Clematis Street, Fourth Floor  
West Palm Beach, Florida 33401

**Date:** February 10, 2011

**Attention:** Mr. Jeff Halverson, Senior Project Engineer

**Project:** 500, 400, 300 & 200 Blocks Of Clematis Street  
City of West Palm Beach, Florida

**Project No.:** WPB-07-6988

**Delivery By:**

<input type="checkbox"/> Hand	<input checked="" type="checkbox"/> Regular Mail	<input type="checkbox"/> DHL
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<input type="checkbox"/> Letters	<input checked="" type="checkbox"/> Reports	<input type="checkbox"/> Contract
<input type="checkbox"/> Invoice	<input type="checkbox"/> Maps	

Please find the items listed below for the above-referenced project:

Qty	Unit	Description
4	Ea	Pavement Evaluation Report – Clematis Street

If you did not receive the items listed above or if you have any questions, please do not hesitate to contact us.

**Message:** Enclosed please find four copies of our pavement evaluation report. Should you have any questions, please do not hesitate to call.

Signed:

  
Jason DuBois

FEB 14 2011



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**Geotechnical ~ Materials Testing ~ Inspection ~ Environmental**

City of West Palm Beach  
Engineering Services Division  
401 Clematis Street, Fourth Floor  
West Palm Beach, Florida 33401

February 3, 2011  
Project No. WPB-07-6988  
Bill Group 21.11

Attention: Mr. Jeff Halverson, Senior Project Engineer

Subject: ***Pavement Evaluation***  
**500, 400, 300 And 200 Blocks Of**  
**Clematis Street**  
**City of West Palm Beach, Florida**  
**Work Authorization No. 25**

Gentlemen:

**INTRODUCTION**

Pursuant to our continuing services contract with the City of West Palm Beach Work, and Authorization No. 25, Dunkelberger Engineering & Testing, Inc. (Dunkelberger) has completed a pavement evaluation for the 500, 400, 300 and 200 blocks of Clematis Street located in the City of West Palm Beach, Florida. We understand that the City of West Palm Beach desires the exploration of the pavement section within the above-mentioned city blocks. The scope of our work involved pavement coring at specific locations within the project limits, laboratory examination of samples collected from the field and preparation of this data report of our findings. Presented hereafter are the results of the exploratory work.

**PAVEMENT CORING**

**Methodology**

Pavement section conditions along Clematis Street were explored at one location per city block. At each location three pavement cores were cut. The cores were taken south of the centerline of Clematis Street, at the approximate centerline and north of the centerline of the roadway. The locations were selected through collaborative efforts between Dunkelberger and City personnel. We enlisted Testing Lab Of The Palm Beaches, Inc. to cut the pavement cores. The locations of the pavement cores are depicted on Sheets 1A through 1D. More specific locations of pavement core locations are shown in the table below.

Core Number	City Block	Location
PC-1	500	5 feet south of the north curb
PC-2		18 feet north of south curb
PC-3		3 feet north of south curb
PC-4	400	7 feet south of north curb
PC-5		20 feet south of north curb
PC-6		4 feet north of south curb

Core Number	City Block	Location
PC-7	300	3 feet south of north curb
PC-8		19 feet south of north curb
PC-9		7 feet north of south curb
PC-10	200	3.5 feet south of north curb
PC-11		19 feet north of south curb
PC-12		9 feet north of south curb

Samples of the pavement and base course were obtained by machine-coring a 4-inch diameter hole. The pavement core locations were advanced through the subgrade soils using a hand-held, 3-inch diameter bucket auger to depths between 2 and 3 feet below the pavement surface. Samples of the pavement components were retrieved, placed in sealed containers and transported to the laboratory for examination.

Upon completion of each core location, the pavement section was restored using a combination of Sakrete (for the base course) and cold-patch asphalt for the surface layer. These materials were compacted in the core holes using a hand-held tamper.

### **Pavement Section Components**

The pavement components generally consist of structural asphaltic concrete (Type S) over concrete pavement followed by clean sands. At the location of pavement core PC-2 a base course material was found beneath the structural asphaltic concrete. The concrete pavement was absent at this location. Descriptions of each of these components follow.

The asphalt layers were determined by visual examination to be Structural Course (Type S). Measurements for structural asphalt thickness for each core were recorded by Testing Lab Of The Palm Beaches, Inc. The total thickness of structural asphalt measured in the cores ranged between 2.5 and 6.7 inches. The thickness of the concrete pavement underlying the structural asphaltic concrete ranged between 6 and 23.4 inches

The base material at pavement core location PC-2 has a thickness of 14 inches and consists of limerock. Based upon visual observation of the limerock, we expect the base course material possesses a Limerock Bearing Ratio (LBR) of 100. The subsurface components underlying the concrete pavement and base course consist of clean fine sand. No free water was found in any of the pavement cores.

The measured thicknesses of the pavement components were utilized to estimate the structural number  $SN_c$  of the pavement section at each pavement core location. Layer coefficients for this procedure included 0.44 for Type S Asphaltic Concrete, 0.50 for concrete pavement and 0.18 for limerock base course materials. The layer coefficients were reduced based upon the existing condition of the pavements in accordance with Table 6.1 of the Flexible Pavement Design Manual published by the Florida Department of Transportation Pavement Management Office (dated March 2008). The layer coefficient of the clean sand subgrade was assigned to be 0. The structural numbers for the pavement cores are shown in the table on the following page.

Core Number	Layer	Thickness (Inches)	Layer Coefficient	Structural Number $SN_c$
PC-1	Type S Asphalt	4.3	0.25	1.08
	Concrete Pavement	8.6	0.50	4.30
	Clean Sand	13.1	0	0
			<b>Total</b>	<b>5.38</b>
PC-2	Type S Asphalt	5.0	0.25	1.25
	Limerock	14.0	0.18	2.52
	Clean Sand	12.0	0	0
			<b>Total</b>	<b>3.77</b>
PC-3	Type S Asphalt	2.5	0.25	0.63
	Concrete Pavement	8.3	0.50	4.15
	Clean Sand	13.2	0	0
			<b>Total</b>	<b>4.78</b>
PC-4	Type S Asphalt	2.5	0.25	0.63
	Concrete Pavement	16.7	0.50	8.35
	Clean Sand	16.0	0	0
			<b>Total</b>	<b>8.98</b>
PC-5	Type S Asphalt	3.4	0.25	0.85
	Concrete Pavement	7.0	0.50	3.50
	Clean Sand	20.9	0	0
			<b>Total</b>	<b>4.35</b>
PC-6	Type S Asphalt	3.5	0.25	0.88
	Concrete Pavement	7.3	0.50	3.65
	Clean Sand	24.0	0	0
			<b>Total</b>	<b>4.53</b>
PC-7	Type S Asphalt	3.5	0.25	0.88
	Concrete Pavement	19.3	0.50	9.65
	Clean Sand	14.4	0	0
			<b>Total</b>	<b>10.53</b>
PC-8	Type S Asphalt	6.7	0.25	1.68
	Concrete Pavement	10.3	0.50	5.15
	Clean Sand	13.9	0	0
			<b>Total</b>	<b>6.83</b>
PC-9	Type S Asphalt	3.5	0.25	0.88
	Concrete Pavement	6.0	0.50	3.00
	Clean Sand	19.3	0	0
			<b>Total</b>	<b>3.88</b>
PC-10	Type S Asphalt	3.0	0.25	0.75
	Concrete Pavement	15.4	0.50	7.70
	Lean Concrete with brick fragments	8.0	0.00	0.00
	Clean Sand	12.0	0	0
			<b>Total</b>	<b>8.45</b>

Core Number	Layer	Thickness (Inches)	Layer Coefficient	Structural Number $SN_c$
PC-11	Type S Asphalt	6.5	0.25	1.63
	Concrete Pavement	8.0	0.50	4.00
	Clean Sand	9.5	0	0
			<b>Total</b>	<b>5.63</b>
PC-12	Type S Asphalt	3.2	0.25	0.80
	Concrete Pavement	8.3	0.50	4.15
	Clean Sand	17.3	0	0
			<b>Total</b>	<b>4.95</b>

Notes: Layer Coefficients for asphalt and base course materials were obtained from the Flexible Pavement Design Manual published by the Florida Department of Transportation Pavement Management Office (dated March 2008).

### CONCLUSIONS

The results of the pavement evaluation show that asphaltic concrete pavement was applied over an existing concrete pavement section that was likely the original surface layer of Clematis Street. The concrete pavement at the core locations has thicknesses that range between 6 and 19 inches. The presence of the concrete pavement will need to be considered during any infrastructure improvements (i.e. utility installations) conducted throughout Clematis Street as it will be difficult, slow and expensive to remove portions of the concrete pavement.

### LIMITATIONS

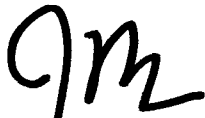
The geotechnical information in this report has been prepared for the City of West Palm Beach Engineering Services Department to provide the existing pavement section conditions along the 200, 300, 400 and 500 blocks of Clematis Street located in the City of West Palm Beach, Florida. Dunkelberger Engineering & Testing, Inc. warrants that the recommendations in this report are based on recognized geotechnical engineering practices. No other warranties are expressed or implied.

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We trust that the information presented in this report is sufficient for your present needs. If you have any questions, please feel free to contact us.

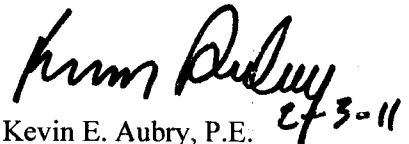
Very truly yours,

**DUNKELBERGER ENGINEERING & TESTING, INC.**



Jason DuBois  
Project Manager

6988rpt.jd



Kevin E. Aubry, P.E.  
Geotechnical Services Manager  
FL Registration No. 38175

Attachment: Sheets 1A through 1D – Pavement Core Location Plan

cc: Addressee (4) ... *via email and hand delivery*