

GEOTECHNICAL INVESTIGATION
**BANNERMAN ROAD AND BULL HEADLEY
ROAD INTERSECTION IMPROVEMENTS
LEON COUNTY, FLORIDA**

Prepared For:

PBS&J
2639 NORTH MONROE STREET
BUILDING C
TALLAHASSEE, FL 32303

Prepared By:

ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.
3154 ELIZA ROAD
TALLAHASSEE, FLORIDA 32308
(850) 386-1253

July 2009
22-31-09-03



ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.

July 10, 2009

EGS File Number: 22-31-09-03

PBS&J
2639 North Monroe Street
Building C
Tallahassee, FL 32303

ATTN: Dan Bracken
Project Manager

SUBJECT: Geotechnical Investigation
Bannerman Road and Bull Headley Road
Intersection Improvements
Leon County, Florida

Dear Dan:

Environmental and Geotechnical Specialists, Inc. (**EGS**) has completed the Geotechnical Investigation, as authorized by **PBS&J**, for the proposed turn lanes at the intersection of Bannerman Road and Bull Headley Road in Tallahassee Florida. A Site Location Map has been provided as **Figure 1** and the Soil Boring Location Map has been provided as **Figure 2**. Site Photographs of the project limits and site conditions have been provided as **Figures 3** through **8**.

As can be seen in **Figure 2**, the Geotechnical Investigation performed for this study was for the proposed east bound travel lane and the proposed west bound merge lane on Bannerman Road. The proposed east bound travel lane is to be constructed from STA. 89+31.81 to STA. 100+28.96 on the south side of Bannerman Road, and the proposed west bound merge lane is to be constructed on Bannerman Road from STA. 94+83.58 to STA. 96+77.70.

Subsurface Investigation

EGS installed seven (7) soil borings in the proposed east bound turn lane and one (1) soil boring in the proposed west bound merge lane (**BH-1** through **BH-8**). The soil borings were installed using a hand auger coupled with Cone Penetration Index (**CPI**) tests to evaluate the subsoils relative stiffness.

CPI tests were performed at a depth of two and one-half (2 ½) and five (5) feet below the ground surface. In this Report, the CPI test values have been converted to equivalent Standard Penetration Test (SPT) "N" values using the CPI/SPT correlation of $SPT\ "N" = CPI/4$.

EGS conducted a Dynamic Cone Penetration (DCP) test on the base, subgrade, and embankment material to evaluate its relative stiffness at three (3) locations (BH-2, BH-5, BH-8) throughout the project. The recorded DCP tests were then correlated to equivalent Limerock Bearing Ratio (LBR) values, based on equations provided in the Asphalt Handbook, MS-4 (7th edition). It should be noted that these correlations **may not** reflect the actual LBR value of the subsoils and have only been included to provide "estimations" of the field density of that material.

Representative samples were collected on one (1) foot intervals to a depth of five and one-half (5 ½) feet and ten and one-half (10 ½) feet for the proposed turn lane. These samples were classified in the field, then sealed and sent to EGS's Geotechnical Laboratory, where tests were performed on the soils to determine each material's physical properties. These laboratory tests included the following; moisture contents, grain-size distributions, Atterberg limits, modified Proctor compaction analysis, and limerock bearing ratio (LBR) tests. The soil samples were classified with respect to the Unified Soil Classification (UNIFIED) System and the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System. The boring locations with stationing and offsets have been provided in **TABLE 1**.

The results of the laboratory tests are summarized in the Soil Survey provided in **APPENDIX A**. The Soil Boring Logs have been provided in **APPENDIX B** and the Soil Classification Data Sheets have been provided in **APPENDIX C**.

Subsurface Conditions

Groundwater

Groundwater was encountered at various elevations throughout the project. Based on the subsoils encountered and a review of the United States Geographic Survey's (USGS) Topographic Survey Map of the project area, **EGS believes** the "normal" seasonal high groundwater is at a depth greater than ten and one-half (10 ½) feet below the ground surface throughout the project limits. However, **EGS cautions** that during periods of rainfall, groundwater may temporarily "perch" on the plastic subsoils throughout the project. This would account for the variability observed in the measured groundwater results shown in **TABLE 1**. A copy of USGS Topographic Survey Map of the project area has been provided as **Figure 9**.

It should also be noted that **EGS** encountered a leaking water main within the project limits, which can be seen in **Figure 6**. **EGS believes** that, due to the continuous leaking of the water main, the groundwater levels measured in this Study and those shown in **TABLE 1** may not reflect the true groundwater conditions.

USDA Soil Survey

Based on a review of the United States Department of Agriculture's (**USDA**) Soil Survey for Leon County, the surrounding soils consists of **Orangeburg Fine Sandy Loam** and **Orangeburg Sandy Clay Loam**. Based on the Geotechnical Investigation performed for this study, **EGS** encountered soils of similar properties to the **USDA** estimates. The detailed **USDA** Soil Survey Tables have been provided in **APPENDIX D**.

Soils

A copy of the Roadway Soil Survey and the Report of Core Borings has been provided in **APPENDIX A**. The Soil Boring Logs have been provided in **APPENDIX B**, and the Soil Classification Data Sheets have been provided in **APPENDIX C**.

Limerock Bearing Ratio (LBR) Value

Four (4) Limerock Bearing Ratio (**LBR**) tests were performed on the **STRATA** encountered for this project. One (1) **LBR** test was performed on **STRATUM 1 (SM A-2-4)**, two (2) **LBR** tests were performed on **STRATUM 2 (SC A-6)**, and one (1) **LBR** tests was performed on **STRATUM 3 (CL A-6)**. The **LBR** test results have been provided in **APPENDIX E** and are summarized in **TABLE 2**.

Subgrade Material

The **subgrade material** was found to be **silty fine sand to highly plastic clay**. Dynamic Cone Penetration (**DCP**) tests conducted on the subgrade indicates that some of the existing compaction equals or exceeds the required Limerock Bearing Ratio (**LBR**) value of forty (40); however, **EGS believes** there are areas within the project limits where the existing subgrade compaction is likely deficient. The **DCP** test results and **LBR** correlations performed on the subgrade material are shown in **TABLE 3**.

Embankment Material

The embankment material was found to vary from clayey sand to highly plastic clay. Dynamic Cone Penetration (DCP) tests conducted on the embankment indicates that while some of the existing compaction appears adequate, there are areas throughout the project limits where compaction of the existing embankment soils is likely deficient. The DCP test results and LBR correlations performed on the subgrade material are shown in **TABLE 3**.

Existing Soils

Based on a review of the soils encountered throughout the project, the following Florida Department of Transportation's (FDOT) **STRATA** descriptions apply:

- **STRATUM 1** is a "SELECT" soil, as defined in FDOT's Standard Design Index 500; however, because of the fines content this Material will be difficult to compact when wet;
- **STRATA 2** and **3** are "PLASTIC" soils, as defined in FDOT's Standard Design Index 500; and,
- **STRATUM 4** is a "HIGHLY PLASTIC" soil as defined in FDOT's Standard Design Index 500.

Reuse of these Materials should be in accordance with FDOT's Standard Design Index 505.

Design Concerns

Based on a review of the soils and the proposed roadway alignment, the following concerns have been noted:

- Since groundwater currently "perches" on plastic subsoils during periods of heavy rainfall, water will likely become trapped beneath the roadway next to the base material which will result in premature rutting and distress of the pavement; and,
- The existence of utilities buried beneath the proposed new Bannerman Road Travel Lane (See **Figure 6**) means that the area beneath the new roadway will need to be accessed in the future for utility maintenance without expensive roadway reconstruction.

Design Recommendations

Based on the existing design concerns, **EGS offers** the following three (3) Design Options for the Travel and Merge Lanes to strengthen the subgrade and/or drain the trapped water:

Option 1 - Overexcavation and Installation of an Underdrain

- Overexcavate two (2) feet below the base layer throughout the proposed Travel and Merge Lane because of unsuitable material; and,
- Install an underdrain in accordance with **FDOT's** Standard Design Index 286 throughout the proposed Travel Lane to eliminate the likelihood of water becoming trapped below the pavement.

Option 2 – Overexcavation and Installation of Geogrid

- Overexcavate one (1) foot below the base layer throughout the proposed Travel and Merge Lane because of unsuitable material;
- Install a single layer of biaxial Geogrid (**Tensar BX 1200**) in accordance with the procedure for reinforcement of foundations over soft soils, as outlined in **FDOT's** Standard Design Index 500 and Section 145 of the Standard Specifications for Road and Bridge Construction; and,
- The overexcavated zone should be “daylighted” to the side of the adjacent roadway swale to facilitate drainage of any trapped groundwater.

Option 3 – Overexcavation and Backfill with Recycle Asphalt Product

- Overexcavate two (2) feet below the base layer throughout the proposed Travel and Merge Lane because of unsuitable material;
- Backfill with eighteen (18) inches of recycled asphalt product (**RAP**); and
- Compact the **RAP** to create a stable “working platform”. Place the roadway base using roller with a static weigh of at least eight (8) tons.

EGS cautions that the “Working Platform” created by the **RAP** does not provide for a “Structural Number” which can be used in the design of the asphalt pavement.

PBS&J
Bannerman and Bull Headley
Intersection Improvements
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July 10, 2009

EGS Recommends that because of the high groundwater conditions, Asphalt Base Course (**ABC**) Type B-12.5 should be used for the base course.

Because of the high volume of traffic and the two (2) design concerns previously described, **EGS recommends** the use of Option 3 at this location.

Closure

The data and results presented in the Geotechnical Investigation are intended for the use of **PBS&J** and **Leon County Department of Public Works** for the intersection improvements 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 Geotechnical Investigation, please do not hesitate to contact either Myron Hayden or myself at (850) 386-1253.

Very truly yours

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



Thomas H. Hayden, P.E.
Geotechnical Engineer II
FL P.E. Number 67492

TABLES

TABLE 1
BORING LOCATION AND GROUNDWATER DATA
BANNERMAN ROAD & BULL HEADLEY ROAD
INTERSECTION IMPROVEMENTS
LEON COUNTY, FLORIDA

BORING NUMBER	DEPTH ¹ (FEET)	ELEVATION ² (FEET)	STATIONING ³ (FEET)	OFFSET FROM CONSTRUCTION CENTERLINE (FEET)	GROUNDWATER DATA				
					MEASURED GROUNDWATER		ESTIMATED SEASONAL HIGH GROUNDWATER		
					DEPTH ¹ (FEET)	ELEVATION ² (FEET)	DEPTH ¹ (FEET)	ELEVATION ² (FEET)	
PROPOSED EAST BOUND TRAVEL LANE									
BH-1	5.0	185.5	91+00	7.0	RIGHT	> 5.5	< 178.9	3.0 ⁵	182.5
BH-2	10.0	193.3	93+00	7.0	RIGHT	>10.5	< 182.8	6.0 ⁵	187.3
BH-3	5.0	197.0	94+00	7.0	RIGHT	3.0 ⁴	194.0	2.0 ⁵	195.0
BH-4	5.0	202.3	95+00	7.0	RIGHT	> 5.5	< 196.8	5.0 ⁵	197.3
BH-6	5.0	213.1	97+00	7.0	RIGHT	3.0 ⁴	210.1	1.0 ⁵	212.1
BH-7	5.0	218.5	98+00	7.0	RIGHT	> 5.5	< 213.0	5.0 ⁵	213.5
BH-8	10.0	223.8	99+00	7.0	RIGHT	5.0 ⁴	218.8	1.0 ⁵	222.8
PROPOSED WEST BOUND MERGE LANE									
BH-5	10.0	207.3	96+00	5.0	LEFT	5.0 ⁴	202.3	4.0 ⁵	203.3

NOTES: 1. DEPTH IS BELOW EXISTING GROUND SURFACE

2. ELEVATIONS DETERMINED FROM PLANS PROVIDED BY PBS&J.

3. STATIONING DETERMINED FROM PLANS PROVIDED BY PBS&J.

4. EGS BELIEVES GROUNDWATER IS "PERCHED" ON PLASTIC SUBSOILS.

5. EGS BELIEVES THE SEASONAL HIGH GROUNDWATER EXISTS IN A "PERCHED" STATE

TABLE 2
"LBR" SUMMARY
BANNERMAN ROAD AND BULL HEADLEY ROAD
INTERSECTION IMPROVEMENTS
LEON COUNTY, FLORIDA

STRATUM NUMBERS ¹	MATERIAL TYPE	BORING NUMBER	MAXIMUM LBR VALUES ²	OPTIMUM WATER CONTENT (%)	+/-2% METHOD			DESIGN LBR VALUE
					LBR AT MOISTURE CONTENTS:		AVERAGE LBR VALUE	
					-2%	+2%		
1	SM A-2-4	BH-4	64	10.2	23	10	17	17
2	SC A-6	BH-1	40	12.5	21	15	18	17
		BH-7	47	11.5	4	27	16	
3	CL A-6	BH-6	54	10.8	8	20	14	14

- NOTES:**
1. SEE APPENDIX A FOR STRATUM NUMBERS
 2. SEE APPENDIX E FOR LABORATORY TEST DATA
 3. COMPACTION BASED ON AASHTO T-180 AND FM 5-515

TABLE 3
ROADWAY DCP-LBR CORRELATIONS
BANNERMAN ROAD & BULL HEADLEY ROAD
INTERSECTION IMPROVEMENTS
LEON COUNTY , FLORIDA

BORING NUMBER	SURFACE MATERIAL		SUBGRADE MATERIAL		EMBANKMENT MATERIAL	
	DCP BLOW COUNT ¹	EQUIVALENT LBR VALUE ²	DCP BLOW COUNT ¹	EQUIVALENT LBR VALUE ²	DCP BLOW COUNT ¹	EQUIVALENT LBR VALUE ²
PROPOSED EAST BOUND TRAVEL LANE						
BH-2	4	20	8+	> 40	8+	> 40
BH-8	1	4	2	9	6	32
PROPOSED WEST BOUND MERGE LANE						
BH-5	6	32	7	38	8+	> 40

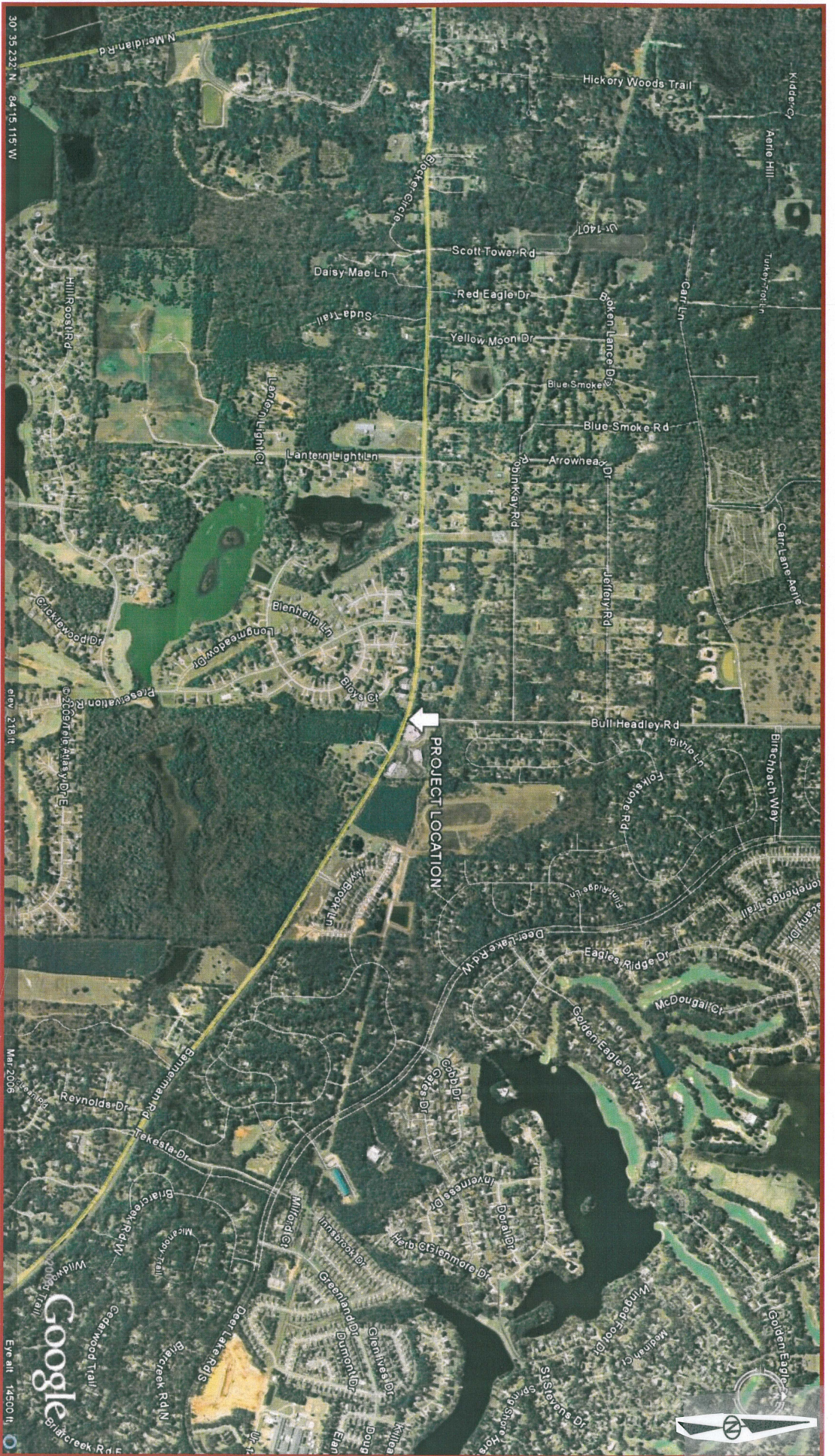
NOTES: 1. DYNAMIC CONE PENETRATION (DCP) VALUE (BLOW COUNTS PER 2.00-INCH)

2. CORRELATION BASED ON THE ASPHALT HANDBOOK, MS-4 (7th EDITION)

CORRELATION:

$$\text{LBR} = \frac{292}{(50.8 / \text{DCP})^{1.12}} \times 1.20$$

FIGURES



DRAWN BY: M. MONTEITH
 ENGINEER: T. HAYDEN, P.E.

CHECKED: M. HAYDEN, P.E.

CLIENT: PBS&J

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 3154 Eliza Road
 Tallahassee, Florida 32308
 Office #: (850) 386-1253
 Fax #: (850) 385-8050

PROJ. NO.: 22-31-09-03

SCALE:

DATE: JULY 2009

TITLE: BANNERMAN ROAD AND BULL HEADLEY ROAD INTERSECTION IMPROVEMENTS LEON COUNTY, FLORIDA

FIGURE NO.: 1





DRAWN BY: M. MONTEITH
 ENGINEER: T. HAYDEN, P.E.

CHECKED: M. HAYDEN, P.E.

CLIENT: PBS&J

PROJ. NO.: 22-31-09-03

SCALE:

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TITLE

SOIL BORING LOCATION MAP
 BANNERMAN ROAD AND BULL HEADLEY ROAD
 INTERSECTION IMPROVEMENTS
 LEON COUNTY, FLORIDA

DATE

JULY 2009

FIGURE NO.:

2



Figure 3: Photograph of Bannerman Road - Near Soil Boring BH-3 (Facing East)



Figure 4: Photograph of Bannerman and Bull Headley Intersection (Facing East)



Figure 5: Photograph of Bull Headley Road (Facing North)



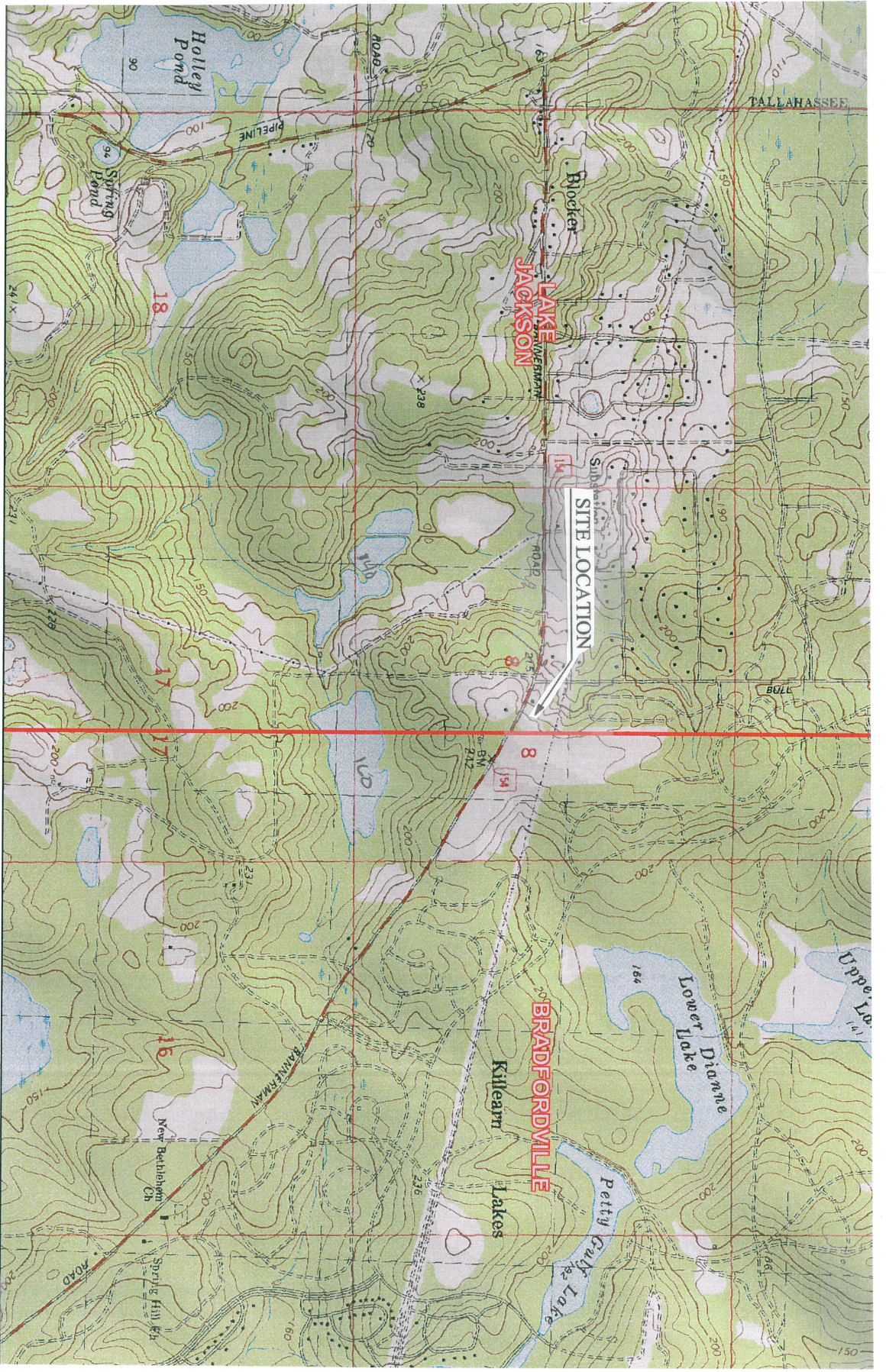
Figure 6: Photograph of Leaking Water Main - Near Soil Boring BH-4



Figure 7: Photograph of Severe Spalling Along Pavement Edges - Bannerman Rd (Facing West)



Figure 8: Photograph of Severe Longitudinal Cracking on Bannerman Road (Facing East)



2001 Delorme, XMap®, Data copyright of content owner.
 Scale: 1 : 25,000 Zoom Level: 13-0 Datum: WGS84 Map Rotation: 0° Magnetic Declination: 3.2°W

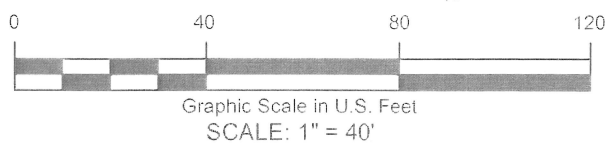
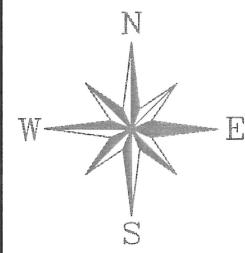
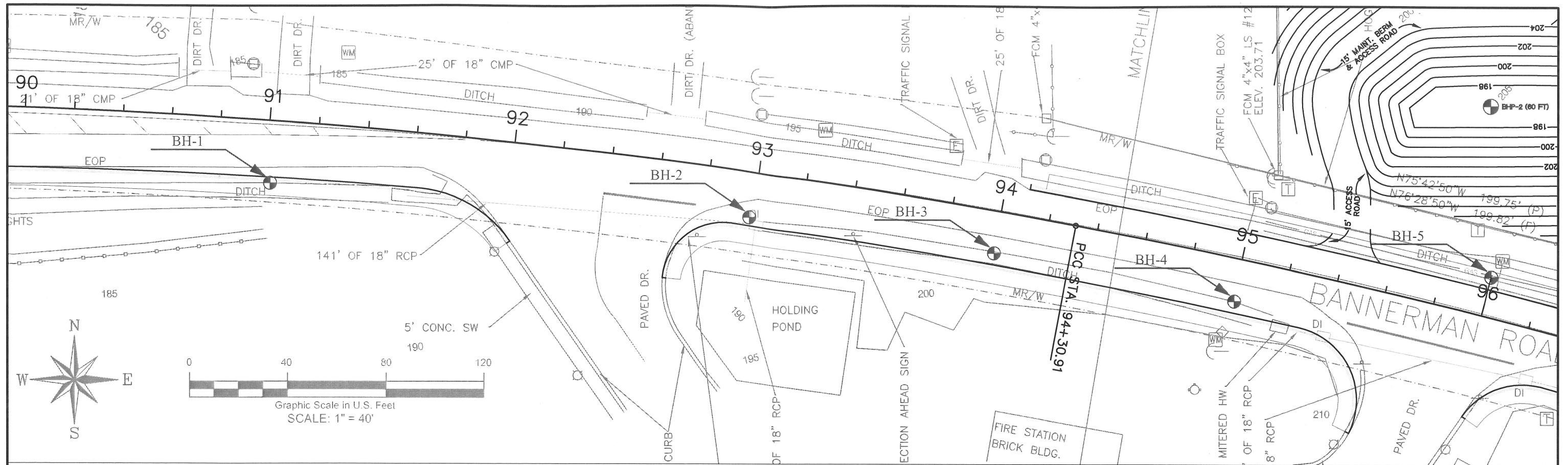


DRAWN BY: M. MONTEITH	CHECKED: M. HAYDEN, P.E.
ENGINEER:	T. HAYDEN, P.E.
CLIENT: PBS&J	
PROJ. NO.: 22-31-09-03	SCALE:

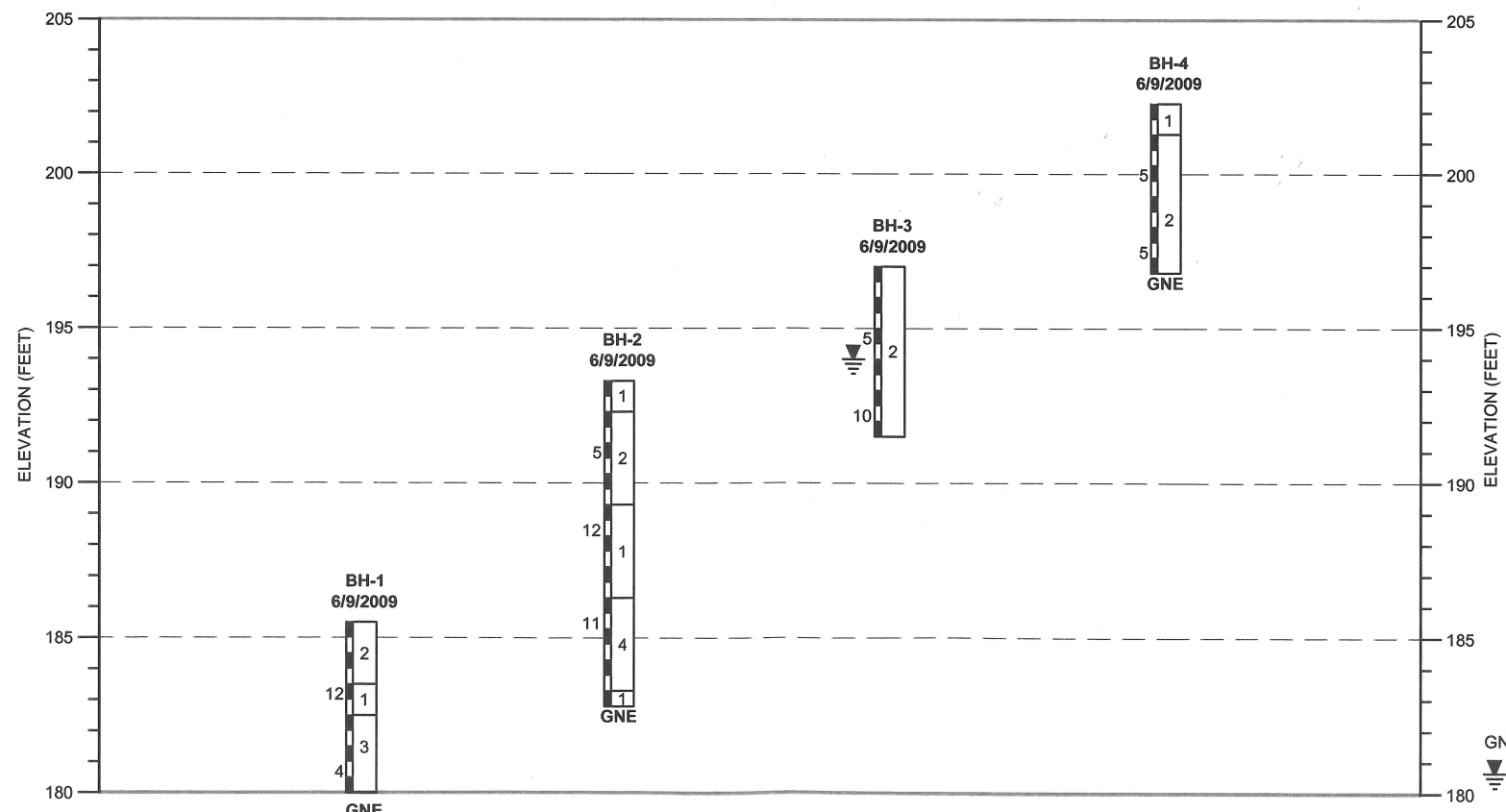
EGS
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TITLE	FIGURE NO.:
USGS TOPOGRAPHIC MAP BANNERMAN ROAD AND BULL HEADLEY ROAD INTERSECTION IMPROVEMENTS LEON COUNTY, FLORIDA	9
DATE	
JUL Y 2009	

APPENDIX A
SOIL SURVEY



BANNERMAN ROAD PROPOSED EAST BOUND TRAVEL LANE



GNE = GROUNDWATER NOT ENCOUNTERED
 = 24 HOUR WATER LEVEL

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

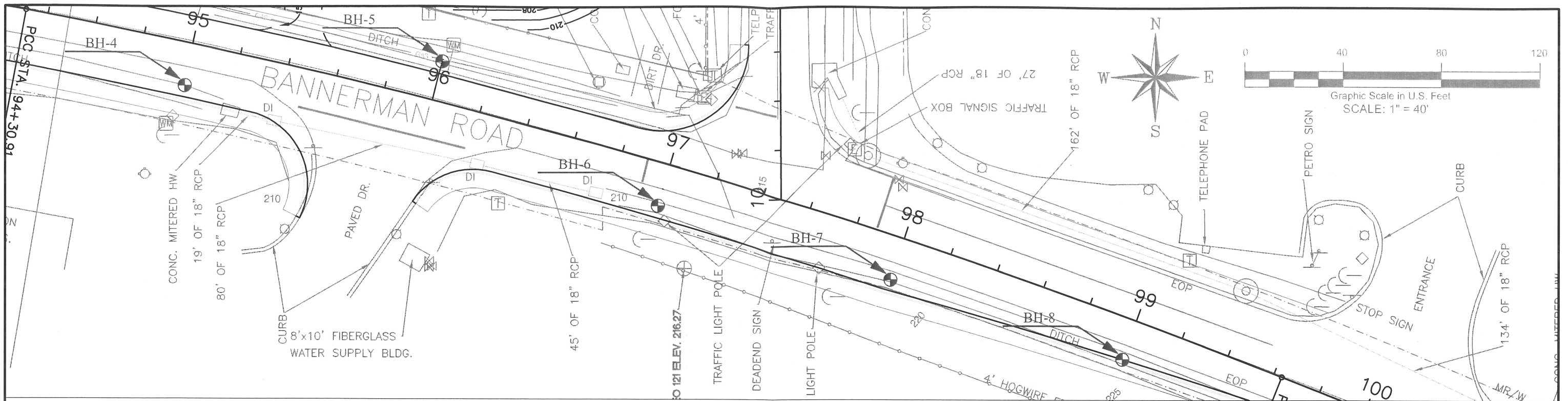
SEAL:
 MYRON L. HAYDEN, P.E.
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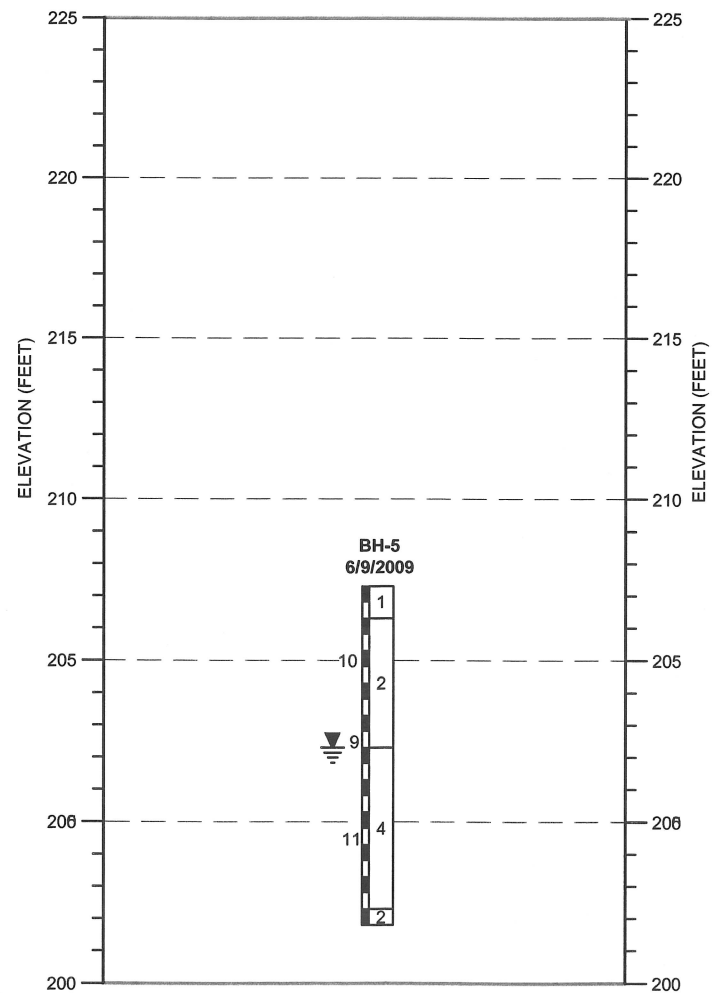
PBS&J
 BANNERMAN ROAD & BULL HEADLEY ROAD
 INTERSECTION IMPROVEMENTS

REPORT OF CORE BORINGS

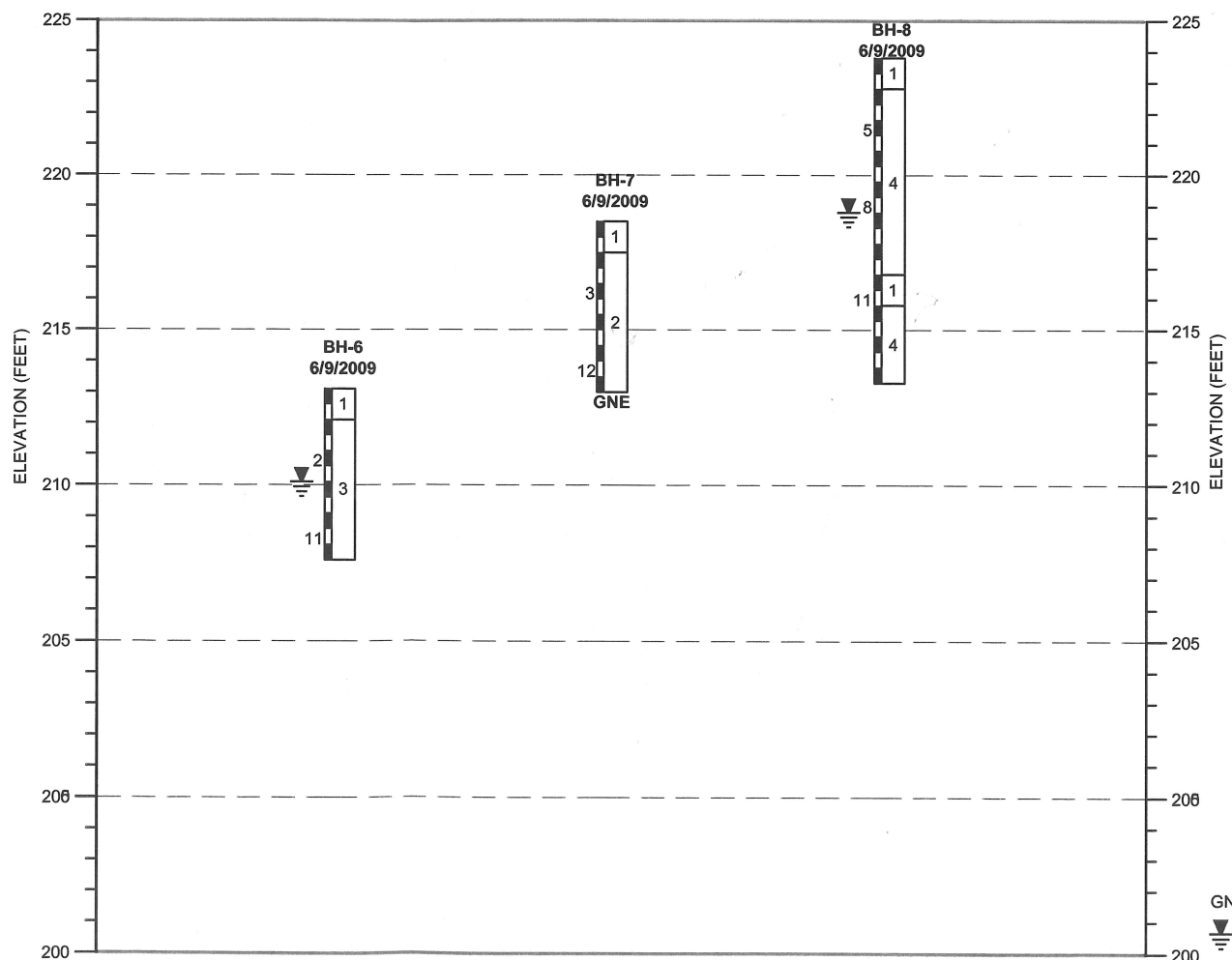
SHEET NO.



**BANNERMAN ROAD
PROPOSED WEST BOUND MERGE LANE**



**BANNERMAN ROAD
PROPOSED EAST BOUND TRAVEL LANE**



GNE = GROUNDWATER NOT ENCOUNTERED
 = 24 HOUR WATER LEVEL

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

SEAL:
 MYRON L. HAYDEN, P.E.
 P.E. NO.: 34067

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PBS&J
 BANNERMAN ROAD & BULL HEADLEY ROAD
 INTERSECTION IMPROVEMENTS

REPORT OF CORE BORINGS

SHEET NO.

SOIL SURVEY

DATE OF SURVEY : 7/1/2009
 SURVEY MADE BY : ENVIRONMENTAL AND GEOTECHNICAL SPECIALISTS, INC.
 SUBMITTED BY : M. HAYDEN, P.E., PH.D.

STRATUM NO.	NO. OF TESTS	ORGANIC CONTENT		LBR	NO. OF TESTS	SIEVE ANALYSIS RESULTS % PASSING							ATTERBERG LIMITS (%)			DESCRIPTION		
		% ORGANIC	MOISTURE CONTENT(%)	MAXIMUM LBR VALUE		4 MESH	10 MESH	20 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTICITY INDEX		UNIFIED GROUP	AASHTO GROUP
1	-	-	-	64	2	100	100	95-98	75-92	64-89	51-65	16-29	1	20	4	SM	A-2-4	SILTY FINE SAND
2	-	-	-	47	7	100	100	99-100	47-99	41-94	39-77	36-49	4	24-36	11-28	SC	A-6	CLAYEY SAND
3	-	-	-	54	3	100	100	99	96-98	89-97	73-95	36-69	2	18-36	11-21	CL	A-6	VERY SANDY CLAY
4	-	-	-	-	4	100	100	91-100	70-99	63-99	62-94	60-80	4	51-58	23-35	CH	A-7-6	HIGHLY PLASTIC CLAY

1. STRATUM 1 is a "SELECT" soil, as defined by the 2008 FDOT Design Standards and may be utilized in accordance with Standard Index 505.
2. STRATA 2 and 3 are "PLASTIC" soils, as defined by the 2008 FDOT Design Standards and should be reused only in accordance with Standard Index 505.
3. STRATUM 4 is a "HIGHLY PLASTIC" soil, as defined by the 2008 FDOT Design Standards and should not be reused as fill within the project limits.

NOTES

1. Numbers left of borings indicate standard penetration test (SPT) N-values for 12 in. penetration (Unless otherwise noted).
2. Numbers within the borings indicate the strata number.
3. Soil descriptions, test data, and standard penetration values shown are for the soil boring only and may not apply to any other locations except at the location of the soil boring. Extrapolation of the soil boring data to other locations is the sole responsibility of the person performing the extrapolation.
4. Borings plotted by depth from existing ground surface.

GENERAL NOTES:

STRATA BOUNDARIES ARE APPROXIMATE. MAKE FINAL CHECK AFTER GRADING.
 - INDICATES UNMEASURED PARAMETERS
 GNE - GROUNDWATER NOT ENCOUNTERED

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

SEAL:

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PBS&J

PROJECT TITLE

INTERSECTION IMPROVEMENTS

SHEET NO.

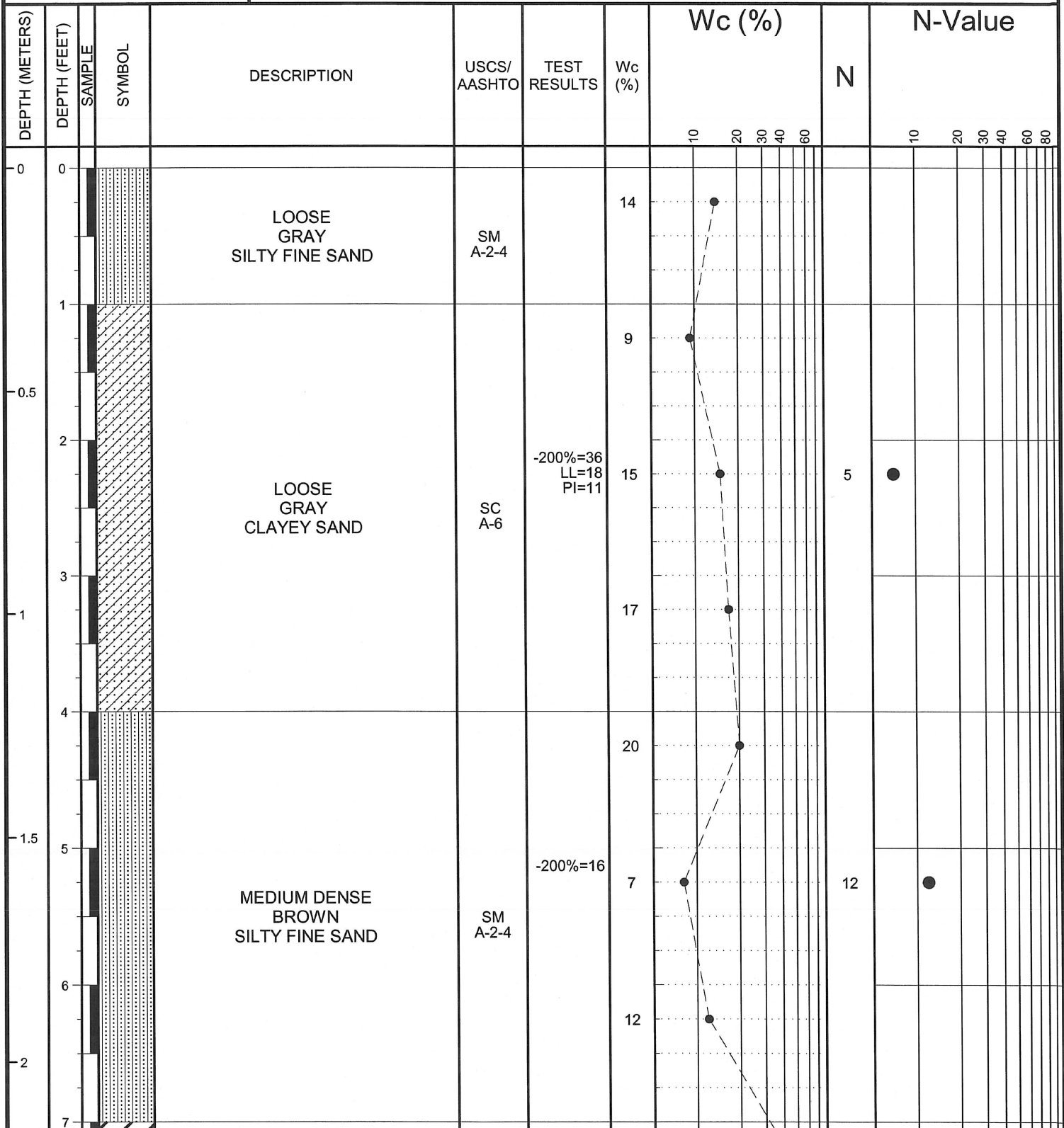
REPORT OF TESTS

APPENDIX B
SOIL BORING LOGS



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
 CLIENT: PBS&J
 PROJECT NO.: 22-31-09-03
 PROJECT LOCATION: LEON COUNTY, FL. ELEVATION (FEET): 193.25
 BORING NO.: BH-2 DATE: 6/9/2009
 DRILLER: W. DUNLAP FLUID LOSS: NONE
 DEPTH TO - WATER > INITIAL: $\nabla > 10.5$ AFTER 24 HOURS: $\nabla > 10.5$ CAVING > \sphericalcap NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.



NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
 CLIENT: PBS&J
 PROJECT NO.: 22-31-09-03
 PROJECT LOCATION: LEON COUNTY, FL. ELEVATION (FEET): 193.25
 BORING NO.: BH-2 DATE: 6/9/2009
 DRILLER: W. DUNLAP FLUID LOSS: NONE
 DEPTH TO - WATER> INITIAL: ∞ > 10.5 AFTER 24 HOURS: ∞ > 10.5 CAVING> ∞ NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.

DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/AASHTO	TEST RESULTS	Wc (%)	Wc (%)		N	N-Value											
								10	20		30	40	60	10	20	30	40	60	80			
							44			11												
	2.5			VERY STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY	CH A-7-6	-200%=60 LL=53 PI=29	41															
	9						35															
	3			MEDIUM DENSE GRAY SILTY FINE SAND	SM A-2-4		15															
	11																					
	3.5																					
	12																					
	13																					
	4																					
	14																					

NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
 CLIENT: PBS&J
 PROJECT NO.: 22-31-09-03
 PROJECT LOCATION: LEON COUNTY, FL. ELEVATION (FEET): 197
 BORING NO.: BH-3 DATE: 6/9/2009
 DRILLER: B. GUERRA FLUID LOSS: NONE
 DEPTH TO - WATER> INITIAL: ▽ > 5.5 AFTER 24 HOURS: ▽ 3.0 CAVING> □ NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.

DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/ AASHTO	TEST RESULTS	Wc (%)	Wc (%)		N	N-Value														
								10	20		30	40	60	10	20	30	40	60	80						
0	0			LOOSE DARK GRAY CLAYEY SAND WITH ORGANICS	SC A-6		22																		
1	1							-200%=36	17																
0.5	2			LOOSE BROWN CLAYEY SAND	SC A-6		17			5															
1	4							-200%=48 LL=29 PI=12	29																
1.5	5								25			10													
	6			MEDIUM DENSE ORANGE AND GRAY CLAYEY SAND	SC A-6																				
	7																								

NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
CLIENT: PBS&J
PROJECT NO.: 22-31-09-03
PROJECT LOCATION: LEON COUNTY, FL. **ELEVATION (FEET):** 202.3
BORING NO.: BH-4 **DATE:** 6/9/2009
DRILLER: A. FAIRCHILD **FLUID LOSS:** NONE
DEPTH TO - WATER> INITIAL: ∞ > 5.5 **AFTER 24 HOURS:** ∞ > 5.5 **CAVING>** ∞ NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.

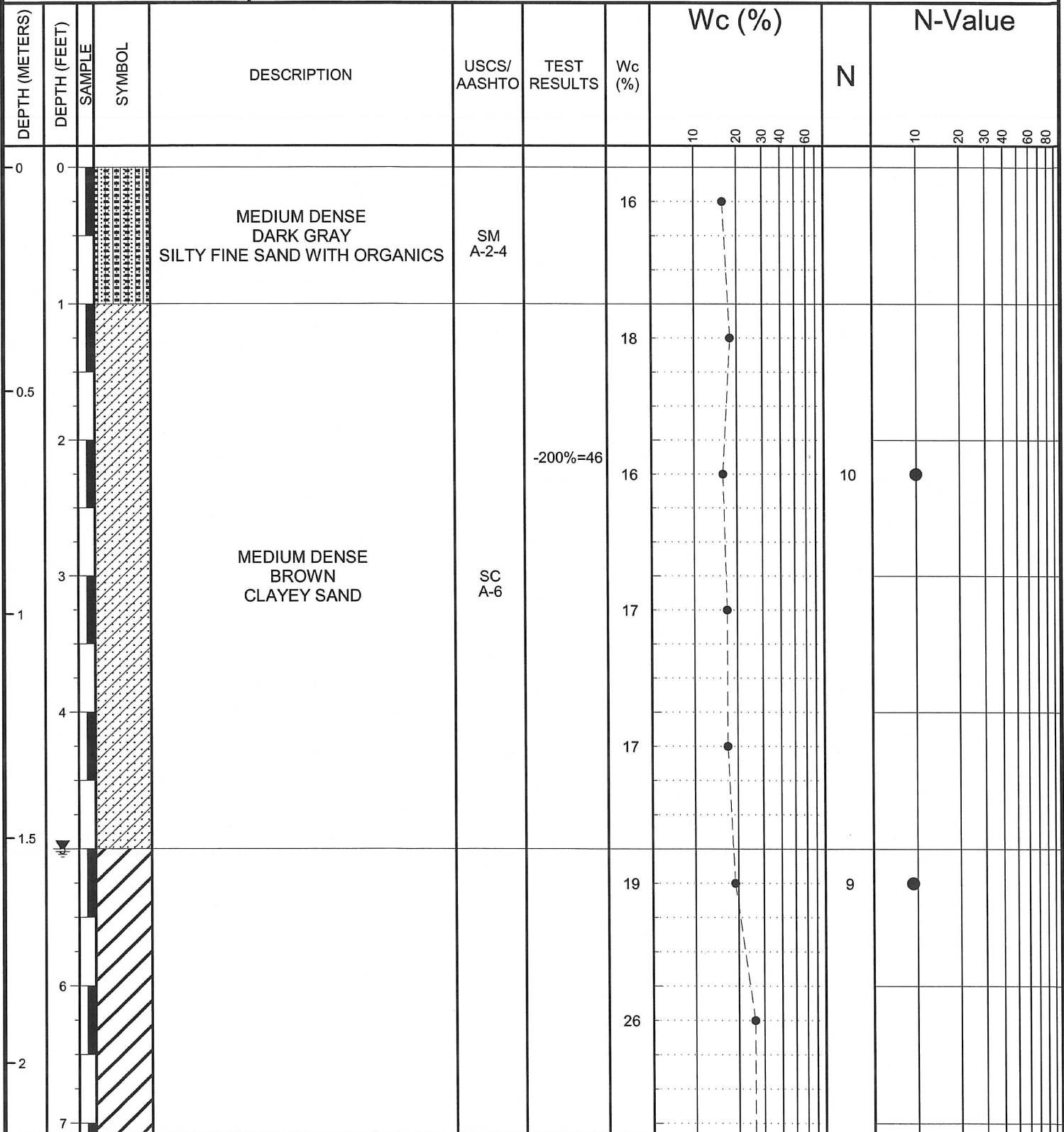
DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/AASHTO	TEST RESULTS	Wc (%)	Wc (%)		N	N-Value										
								10	20		30	40	60	10	20	30	40	60	80		
0	0			LOOSE DARK GRAY SILTY FINE SAND WITH ORGANICS	SM A-2-4	-200%=29 LL=20 PI=4	17														
1	1																				
0.5	2			LOOSE BROWN AND GRAY CLAYEY SAND	SC A-6	-200%=36 LL=36 PI=28	14														
2	2											5									
3	3																				
1	4						12														
1.5	5						12														
	6																				
2	7						15			5											

NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
 CLIENT: PBS&J
 PROJECT NO.: 22-31-09-03
 PROJECT LOCATION: LEON COUNTY, FL. ELEVATION (FEET): 207.3
 BORING NO.: BH-5 DATE: 6/9/2009
 DRILLER: A. FAIRCHILD FLUID LOSS: NONE
 DEPTH TO - WATER> INITIAL: ∞ > 10.5 AFTER 24 HOURS: ∞ 5.0 CAVING> ∞ NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.



NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
 CLIENT: PBS&J
 PROJECT NO.: 22-31-09-03
 PROJECT LOCATION: LEON COUNTY, FL. ELEVATION (FEET): 207.3
 BORING NO.: BH-5 DATE: 6/9/2009
 DRILLER: A. FAIRCHILD FLUID LOSS: NONE
 DEPTH TO - WATER> INITIAL: ∞ > 10.5 AFTER 24 HOURS: ∞ 5.0 CAVING> ∞ NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.

DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/AASHTO	TEST RESULTS	Wc (%)	Wc (%)		N	N-Value								
								10	20		30	40	60	10	20	30	40	60	80
				STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY	CH A-7-6		26			11									
	2.5					-200%=80 LL=58 PI=35	31												
	3						45												
	10			MEDIUM DENSE BROWN CLAYEY SAND	SC A-6		23												
	11																		
	3.5																		
	12																		
	13																		
	4																		
	14																		

NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
CLIENT: PBS&J
PROJECT NO.: 22-31-09-03
PROJECT LOCATION: LEON COUNTY, FL. **ELEVATION (FEET):** 213
BORING NO.: BH-6 **DATE:** 6/9/2009
DRILLER: A. FAIRCHILD **FLUID LOSS:** NONE
DEPTH TO - WATER> INITIAL: > 5.5 **AFTER 24 HOURS:** > 3.0 **CAVING>** ☐ NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.

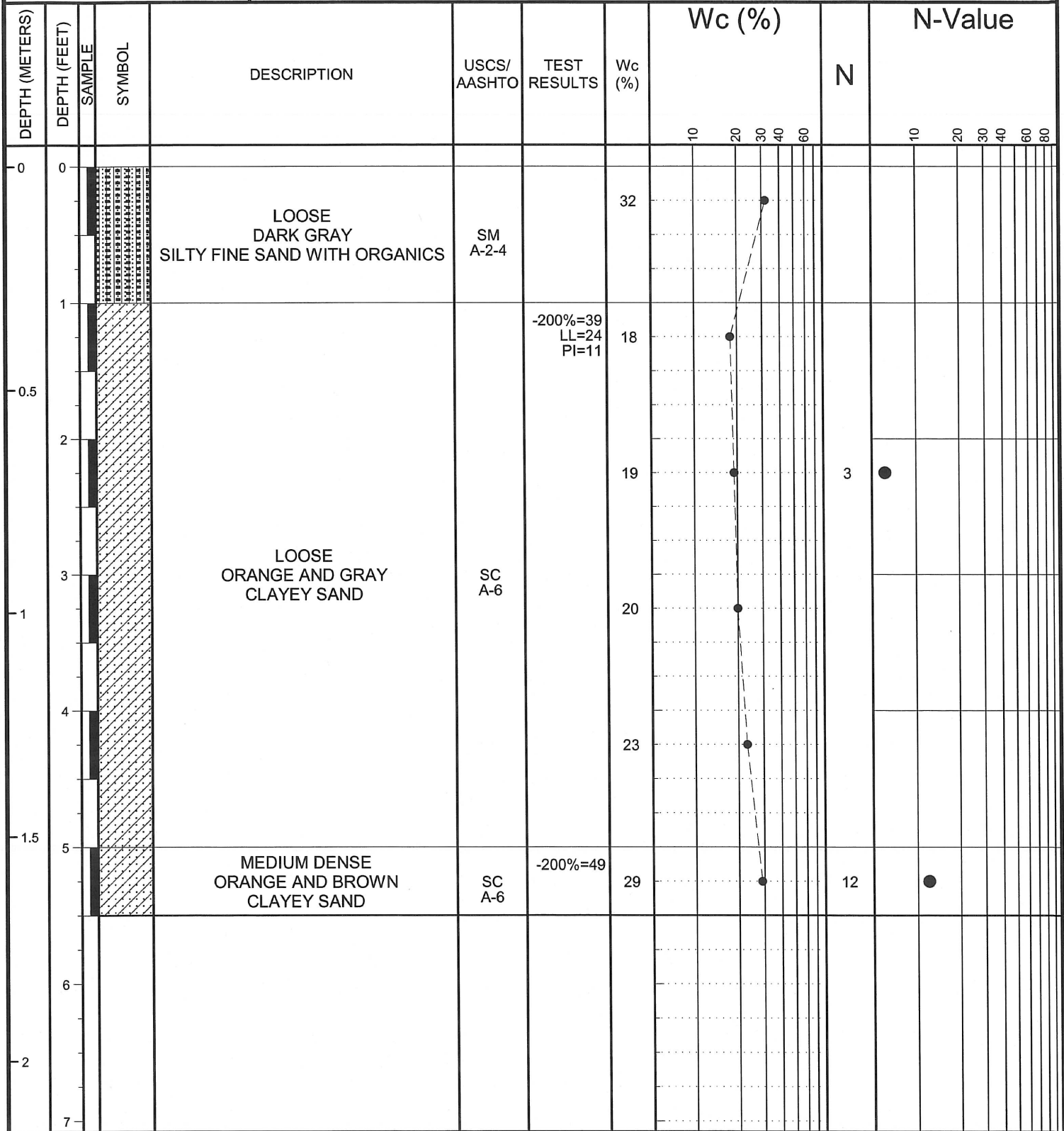
DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/ AASHTO	TEST RESULTS	Wc (%)	Wc (%)		N	N-Value												
								10	20		30	40	60	10	20	30	40	60	80				
0	0			LOOSE DARK GRAY SILTY FINE SAND WITH ORGANICS	SM A-2-4		15																
1	0.5			SOFT BROWN AND GRAY VERY SANDY CLAY	CL A-6	-200%=63 LL=36 PI=21	22			2													
1	4			STIFF BROWN AND GRAY VERY SANDY CLAY	CL A-6		25																
1.5	5						27			11													
6	6																						
2	7																						

NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
 CLIENT: PBS&J
 PROJECT NO.: 22-31-09-03
 PROJECT LOCATION: LEON COUNTY, FL. ELEVATION (FEET): 218.5
 BORING NO.: BH-7 DATE: 6/9/2009
 DRILLER: A. FAIRCHILD FLUID LOSS: NONE
 DEPTH TO - WATER> INITIAL: ∇ > 5.5 AFTER 24 HOURS: ∇ > 5.5 CAVING> \subset NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.



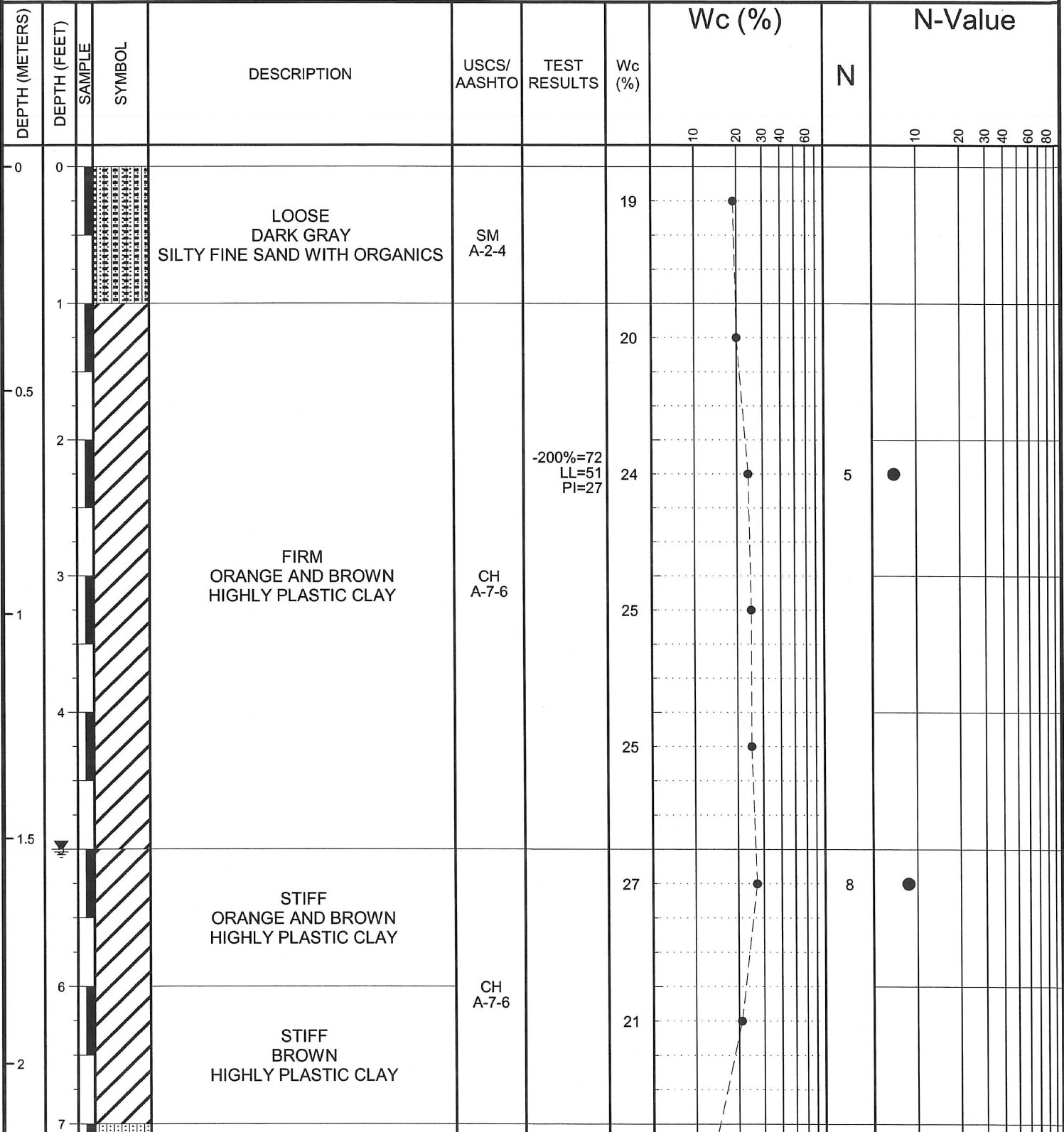
NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE

Figure



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
 CLIENT: PBS&J
 PROJECT NO.: 22-31-09-03
 PROJECT LOCATION: LEON COUNTY, FL. ELEVATION (FEET): 223.8
 BORING NO.: BH-8 DATE: 6/9/2009
 DRILLER: W. DUNLAP FLUID LOSS: NONE
 DEPTH TO - WATER> INITIAL: ∅ >10.5 AFTER 24 HOURS: ∅ 5.0 CAVING> C NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.



NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE



PROJECT: BANNERMAN RD & BULL HEADLEY RD TURN LANES
 CLIENT: PBS&J
 PROJECT NO.: 22-31-09-03
 PROJECT LOCATION: LEON COUNTY, FL. ELEVATION (FEET): 223.8
 BORING NO.: BH-8 DATE: 6/9/2009
 DRILLER: W. DUNLAP FLUID LOSS: NONE
 DEPTH TO - WATER> INITIAL: ∞ >10.5 AFTER 24 HOURS: ∞ 5.0 CAVING> ∅ NONE

This information pertains only to this boring and should not be interpreted as being indicative of the site.

DEPTH (METERS)	DEPTH (FEET)	SAMPLE	SYMBOL	DESCRIPTION	USCS/AASHTO	TEST RESULTS	Wc (%)	Wc (%)		N	N-Value										
								10	20		30	40	60	10	20	30	40	60	80		
				MEDIUM DENSE BROWN SILTY FINE SAND	SM A-2-4		13			11											
	2.5					-200%=66 LL=51 PI=23	23														
	9			STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY	CH A-7-6		17														
	3						19														
	3.5																				
	12																				
	4																				
	13																				
	14																				

NOTE: N VALUES WERE OBTAINED USING A CONE PENETROMETER INDEX TEST (CPI)
 N/T MEANS NOT TAKEN / N/A MEANS NOT APPLICABLE

APPENDIX C
SOIL CLASSIFICATION DATA

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	WC (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-1	0.0 - 0.5	17												SC	A-6	2	MEDIUM DENSE BROWN CLAYEY SAND
	1.0 - 1.5	23	100	100	100	97	89	77	49	32	19			SC	A-6	2	MEDIUM DENSE BROWN CLAYEY SAND
	2.0 - 2.5	8											12	SM	A-2-4	1	MEDIUM DENSE BROWN SILTY FINE SAND
	3.0 - 3.5	22										5.1		CL	A-6	3	LOOSE DARK GRAY VERY SANDY CLAY WITH ORGANICS
	4.0 - 4.5	23												CL	A-6	3	LOOSE BROWN VERY SANDY CLAY
	5.0 - 5.5	24	100	100	99	97	91	83	69				4	CL	A-6	3	LOOSE BROWN VERY SANDY CLAY

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-2	0.0 - 0.5	14												SM	A-2-4	1	LOOSE GRAY SILTY FINE SAND
	1.0 - 1.5	9												SC	A-6	2	LOOSE GRAY CLAYEY SAND
	2.0 - 2.5	15	100	100	99	96	89	73	36	18	11		5	SC	A-6	2	LOOSE GRAY CLAYEY SAND
	3.0 - 3.5	17												SC	A-6	2	LOOSE GRAY CLAYEY SAND
	4.0 - 4.5	20												SM	A-2-4	1	MEDIUM DENSE BROWN SILTY FINE SAND
	5.0 - 5.5	7	100	00	98	92	89	65	16				12	SM	A-2-4	1	MEDIUM DENSE BROWN SILTY FINE SAND
	6.0 - 6.5	12												SM	A-2-4	1	MEDIUM DENSE BROWN SILTY FINE SAND
	7.0 - 7.5	44											11	CH	A-7-6	4	VERY STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	8.0 - 8.5	41	100	100	91	70	63	62	60	53	29			CH	A-7-6	4	VERY STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	9.0 - 9.5	35												CH	A-7-6	4	VERY STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	10.0 - 10.5	15												SM	A-2-4	1	MEDIUM DENSE GRAY

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	WC (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-3	0.0 - 0.5	22												SC	A-6	2	LOOSE DARK GRAY CLAYEY SAND WITH ORGANICS
	1.0 - 1.5	17	100	100	100	96	84	62	36					SC	A-6	2	LOOSE BROWN CLAYEY SAND
	2.0 - 2.5	17											5	SC	A-6	2	LOOSE BROWN CLAYEY SAND
	3.0 - 3.5	20												SC	A-6	2	LOOSE BROWN CLAYEY SAND
	4.0 - 4.5	29	100	100	100	94	80	67	48	29	12			SC	A-6	2	LOOSE BROWN CLAYEY SAND
	5.0 - 5.5	25											10	SC	A-6	2	MEDIUM DENSE ORANGE AND GRAY CLAYEY SAND

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03
 Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-4	0.0 - 0.5	17	100	100	95	75	64	51	29	20	4			SM	A-2-4	1	LOOSE DARK GRAY SILTY FINE SAND WITH ORGANICS
	1.0 - 1.5	14												SC	A-6	2	LOOSE BROWN AND GRAY CLAYEY SAND
	2.0 - 2.5	13											5	SC	A-6	2	LOOSE BROWN AND GRAY CLAYEY SAND
	3.0 - 3.5	12	100	100	99	47	41	38	36	36	28			SC	A-6	2	LOOSE BROWN AND GRAY CLAYEY SAND
	4.0 - 4.5	12												SC	A-6	2	LOOSE BROWN AND GRAY CLAYEY SAND
	5.0 - 5.5	15											5	SC	A-6	2	LOOSE BROWN AND GRAY CLAYEY SAND

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES **Project No.: 22-31-09-03**

Client: PBS&J

Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-5																	
	0.0 - 0.5	16												SM	A-2-4	1	MEDIUM DENSE DARK GRAY SILTY FINE SAND WITH ORGANICS
	1.0 - 1.5	18												SC	A-6	2	MEDIUM DENSE BROWN CLAYEY SAND
	2.0 - 2.5	16	100	100	100	99	93	69	46				10	SC	A-6	2	MEDIUM DENSE BROWN CLAYEY SAND
	3.0 - 3.5	17												SC	A-6	2	MEDIUM DENSE BROWN CLAYEY SAND
	4.0 - 4.5	17												SC	A-6	2	MEDIUM DENSE BROWN CLAYEY SAND
	5.0 - 5.5	19											9	CH	A-7-6	4	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	6.0 - 6.5	26												CH	A-7-6	4	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	7.0 - 7.5	26											11	CH	A-7-6	4	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	8.0 - 8.5	31	100	100	99	96	89	85	80	58	35			CH	A-7-6	4	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	9.0 - 9.5	45												CH	A-7-6	4	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	10.0 - 10.5	23												SC	A-6	2	MEDIUM DENSE BROWN

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03
Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	WC (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-5																	CLAYEY SAND

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	WC (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-6	0.0 - 0.5	15												SM	A-2-4	1	LOOSE DARK GRAY SILTY FINE SAND WITH ORGANICS
	1.0 - 1.5	20												CL	A-6	3	SOFT BROWN AND GRAY VERY SANDY CLAY
	2.0 - 2.5	22	100	100	99	98	97	95	63	36	21		2	CL	A-6	3	SOFT BROWN AND GRAY VERY SANDY CLAY
	3.0 - 3.5	25												CL	A-6	3	SOFT BROWN AND GRAY VERY SANDY CLAY
	4.0 - 4.5	25												CL	A-6	3	STIFF BROWN AND GRAY VERY SANDY CLAY
	5.0 - 5.5	27										11		CL	A-6	3	STIFF BROWN AND GRAY VERY SANDY CLAY

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-7	0.0 - 0.5	32												SM	A-2-4	1	LOOSE DARK GRAY SILTY FINE SAND WITH ORGANICS
	1.0 - 1.5	18	100	100	100	97	91	70	39	24	11			SC	A-6	2	LOOSE ORANGE AND GRAY CLAYEY SAND
	2.0 - 2.5	19											3	SC	A-6	2	LOOSE ORANGE AND GRAY CLAYEY SAND
	3.0 - 3.5	20												SC	A-6	2	LOOSE ORANGE AND GRAY CLAYEY SAND
	4.0 - 4.5	23												SC	A-6	2	LOOSE ORANGE AND GRAY CLAYEY SAND
	5.0 - 5.5	29	100	100	100	98	94	72	49				12	SC	A-6	2	MEDIUM DENSE ORANGE AND BROWN CLAYEY SAND

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-8	0.0 - 0.5	19												SM	A-2-4	1	LOOSE DARK GRAY SILTY FINE SAND WITH ORGANICS
	1.0 - 1.5	20												CH	A-7-6	4	FIRM ORANGE AND BROWN HIGHLY PLASTIC CLAY
	2.0 - 2.5	24	100	100	99	98	95	87	72	51	27		5	CH	A-7-6	4	FIRM ORANGE AND BROWN HIGHLY PLASTIC CLAY
	3.0 - 3.5	25												CH	A-7-6	4	FIRM ORANGE AND BROWN HIGHLY PLASTIC CLAY
	4.0 - 4.5	25												CH	A-7-6	4	FIRM ORANGE AND BROWN HIGHLY PLASTIC CLAY
	5.0 - 5.5	27											8	CH	A-7-6	4	STIFF ORANGE AND BROWN HIGHLY PLASTIC CLAY
	6.0 - 6.5	21												CH	A-7-6	4	STIFF BROWN HIGHLY PLASTIC CLAY
	7.0 - 7.5	13											11	SM	A-2-4	1	MEDIUM DENSE BROWN SILTY FINE SAND
	8.0 - 8.5	23	100	100	100	99	99	94	66	51	23			CH	A-7-6	4	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	9.0 - 9.5	17												CH	A-7-6	4	STIFF BROWN AND GRAY HIGHLY PLASTIC CLAY
	10.0 - 10.5	19												CH	A-7-6	4	STIFF BROWN AND GRAY

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	WC (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BH-8																	HIGHLY PLASTIC CLAY

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BHP-1																	
	0.0 - 0.5	24												CH	A-7-6		VERY STIFF BROWN HIGHLY PLASTIC CLAY
	1.0 - 1.5	30	100	100	98	96	94	92	86	67	37			CH	A-7-6		VERY STIFF BROWN HIGHLY PLASTIC CLAY
	2.0 - 2.5	34											20	CH	A-7-6		VERY STIFF BROWN HIGHLY PLASTIC CLAY
	3.0 - 3.5	30												CH	A-7-6		VERY STIFF BROWN HIGHLY PLASTIC CLAY
	4.0 - 4.5	31												CH	A-7-6		VERY STIFF BROWN HIGHLY PLASTIC CLAY
	5.0 - 5.5	39											15	CH	A-7-6		VERY STIFF BROWN HIGHLY PLASTIC CLAY
	6.0 - 6.5	42												CH	A-7-6		VERY STIFF BROWN HIGHLY PLASTIC CLAY
	7.5 - 9.0	7	100	100	91	39	29	25	22	17	7		22	SM	A-2-4		DENSE BROWN SILTY FINE SAND
	10.0 - 11.5	31											14	CH	A-7-6		VERY STIFF BROWN HIGHLY PLASTIC CLAY
	12.5 - 14.0	18											15	SM	A-2-4		MEDIUM DENSE BROWN SILTY FINE SAND
	15.0 - 16.5	55											12	CH	A-7-6		VERY STIFF BROWN

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BHP-1	20.0 - 21.5	30	100	100	100	100	100	99	76	51	23		11	CH	A-7-6		HIGHLY PLASTIC CLAY
																	VERY STIFF BROWN
	22.5 - 24.0	23											10	SM	A-2-4		HIGHLY PLASTIC CLAY
	25.0 - 26.5	22											9	SM	A-2-4		MEDIUM DENSE BROWN GRAY SILTY FINE SAND
	27.5 - 29.0	19											12	SM	A-2-4		MEDIUM DENSE BROWN GRAY SILTY FINE SAND
	30.0 - 31.5	22	100	100	100	100	100	77	27				10	SM	A-2-4		MEDIUM DENSE BROWN GRAY SILTY FINE SAND
	32.5 - 34.0	23											11	SM	A-2-4		MEDIUM DENSE BROWN GRAY SILTY FINE SAND
	35.0 - 36.5	27											8	SM	A-2-4		MEDIUM DENSE BROWN GRAY SILTY FINE SAND
	37.5 - 39.0	48											12	CL	A-6		VERY STIFF GRAY
																	SANDY CLAY
	40.0 - 41.5	43	100	100	99	96	92	64	54	37	15		12	CL	A-6		VERY STIFF BROWN GRAY SANDY CLAY
	42.5 - 44.0	33											9	CL	A-6		VERY STIFF BROWN GRAY SANDY CLAY
	45.0 - 46.5	29											7	SM	A-2-4		MEDIUM DENSE BROWN GRAY

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03
Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	WC (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description	
BHP-1	47.5 - 49.0	29	100	100	100	99	95	66	30	33	5		9	SM	A-2-4		SILTY FINE SAND	
	50.0 - 51.5	28											9	SM	A-2-4		MEDIUM DENSE BROWN GRAY SILTY FINE SAND	
	52.5 - 54.0	29											18	SM	A-2-4		MEDIUM DENSE BROWN GRAY SILTY FINE SAND	
	55.0 - 56.5	19											23	SM	A-2-4		MEDIUM DENSE BROWN SILTY FINE SAND	
	58.0 - 60.0	29	100	100	100	96	77	27	20				28	SM	A-2-4		DENSE BROWN SILTY FINE SAND	
																		DENSE BROWN SILTY FINE SAND

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	Wc (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BHP-2	0.0 - 0.5	11												SC	A-6		MEDIUM DENSE GRAY
	1.0 - 1.5	15	100	100	99	96	90	73	51	38	20			CL	A-6		CLAYEY SAND WITH ORGANICS
	2.0 - 2.5	14											20	CL	A-6		MEDIUM DENSE RED SANDY CLAY
	3.0 - 3.5	14												CL	A-6		MEDIUM DENSE RED SANDY CLAY
	4.0 - 4.5	15												CL	A-6		MEDIUM DENSE RED SANDY CLAY
	5.0 - 5.5	19											15	CL	A-6		MEDIUM DENSE RED SANDY CLAY
	6.0 - 6.5	45	100	100	96	93	90	87	73	52	30			CH	A-7-6		VERY STIFF BROWN GRAY HIGHLY PLASTIC CLAY
	7.5 - 9.0	40											13	CH	A-7-6		VERY STIFF BROWN GRAY HIGHLY PLASTIC CLAY
	10.0 - 11.5	22											17	SM	A-2-4		MEDIUM DENSE BROWN SILTY FINE SAND
	12.5 - 14.0	20	100	100	100	80	48	28	21				16	SM	A-2-4		MEDIUM DENSE BROWN SILTY FINE SAND
	15.0 - 16.5	32											10	CH	A-7-6		STIFF BROWN

SOIL CLASSIFICATION DATA

Project: BANNERMAN RD & BULL HEADLEY RD TURN LANES Project No.: 22-31-09-03

Client: PBS&J Location: LEON COUNTY, FL.

Boring	DEPTH (FEET)	WC (%)	-4 (%)	-10 (%)	-20 (%)	-40 (%)	-60 (%)	-100 (%)	-200 (%)	LL	PI	Org. (%)	N Value	USCS	AASHTO	Mat. No.	Description
BHP-2																	HIGHLY PLASTIC CLAY
	47.5 - 49.0	31											8	CH	A-7-6		STIFF BROWN GRAY HIGHLY PLASTIC CLAY
	50.0 - 51.5	32											7	CH	A-7-6		STIFF BROWN GRAY HIGHLY PLASTIC CLAY
	52.5 - 54.0	22											10	SM	A-2-4		MEDIUM DENSE ORANGE GRAY SILTY FINE SAND
	55.0 - 56.5	27	100	100	100	100	99	95	59	51	23		17	CH	A-7-6		VERY STIFF BROWN GRAY HIGHLY PLASTIC CLAY
	58.0 - 60.0	31											7	CH	A-7-6		VERY STIFF BROWN GRAY HIGHLY PLASTIC CLAY

APPENDIX D
USDA SOIL SURVEY



DRAWN BY:
M. MONTEITH

ENGINEER:
T. HAYDEN, P.E.

CLIENT:
PBS&J

PROJ. NO.:
22-31-09-03

CHECKED:
M. HAYDEN, P.E.

SCALE:

EGS
Environmental & Geotechnical Specialists, Inc.
3154 Eliza Road
Tallahassee, Florida 32308
Office #: (850) 386-1253
Fax #: (850) 385-8050

TITLE

**USDA SOIL SURVEY
BANNERMAN ROAD AND BULL HEADLEY ROAD
INTERSECTION IMPROVEMENTS
LEON COUNTY, FLORIDA**

DATE JULY 2009

FIGURE NO.:
D-1

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth In	USDA texture	Classification		Frag- ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
12----- Ocilla	0-29	Sand-----	SM, SP-SM	A-2, A-3	0	100	95-100	75-100	3-35	---	NP
	29-80	Sandy loam, sandy clay loam.	SM, CL, SC	A-2, A-4, A-6	0	100	95-100	80-100	30-55	<40	NP-18
13, 34, 35----- Orangeburg	0-10	Fine sandy loam	SM	A-2	0	98-100	95-100	75-95	20-35	---	NP
	10-80	Sandy clay loam	SC, CL	A-6, A-4	0	98-100	95-100	71-91	38-55	22-40	8-19
6: * Orangeburg-----	0-10	Fine sandy loam	SM	A-2	0	98-100	95-100	75-95	20-35	---	NP
	10-80	Sandy clay loam	SC, CL	A-6, A-4	0	98-100	95-100	71-91	38-55	22-40	8-19
Urban land.											
7----- Ortega	0-10	Sand-----	SP, SP-SM	A-3	0	100	100	90-100	3-8	---	NP
	10-99	Fine sand, sand	SP, SP-SM	A-3	0	100	100	90-100	2-7	---	NP
8: * Pamlico-----	0-32	Muck-----	Pt	---	0	---	---	---	---	---	---
	32-80	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	100	70-95	5-20	---	NP
Dorovan-----	0-5	Mucky peat-----	Pt	---	0	---	---	---	---	---	---
	5-65	Muck-----	Pt	---	0	---	---	---	---	---	---
	65-80	Sand, loamy sand, loam.	SP-SM, SM-SC, SM	A-1, A-3, A-4, A-2-4	0	100	100	5-70	5-49	<20	NP-7
9----- Pelham	0-26	Fine sand-----	SM	A-2	0	100	95-100	75-90	15-30	---	NP
	26-80	Sandy clay loam, sandy loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	100	95-100	65-90	30-50	15-30	2-12
0. * Pits											
1----- Plummer	0-61	Fine sand-----	SM, SP-SM	A-2-4, A-3	0	100	100	75-96	5-26	---	NP
	61-80	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC, SM-SC	A-2-4, A-2-6	0	100	97-100	76-96	26-35	<31	NP-14
2----- Plummer	0-60	Mucky fine sand	SM, SP-SM	A-2-4, A-3	0	100	100	75-96	5-26	---	NP
	60-80	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC, SM-SC	A-2-4, A-2-6	0	100	97-100	76-96	26-35	<31	NP-14
3, 44*----- Wetlege	0-23	Loamy fine sand	SM, SP-SM	A-2, A-3	0	95-100	95-100	50-80	5-35	<25	NP
	23-82	Sand, loamy sand, loamy fine sand.	SP-SM, SP, SM	A-2, A-3	0	95-100	95-100	50-80	2-25	<20	NP

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Map symbol and soil name	Depth	Clay <2mm	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cm ³	In/hr	In/in	pH					Pct
20:* Kershaw----- Urban land.	0-80	1-5	1.35-1.55	>20	0.02-0.05	4.5-6.0	Very low-----	0.15	5	1	<.5
21----- Lakeland	0-78 78-91	2-8 2-6	1.35-1.55 1.50-1.60	>20 >20	0.05-0.08 0.03-0.08	4.5-6.0 4.5-6.0	Low----- Low-----	0.17	5	2	>1
22----- Leefield	0-36 36-51 51-80	8-12 15-35 15-35	1.30-1.65 1.40-1.70 1.60-1.70	6.0-20 0.6-2.0 0.2-0.6	0.04-0.07 0.10-0.13 0.08-0.12	4.5-6.0 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.10 0.15 0.10	5	2	2-5
23----- Leon	0-25 25-41 41-80	1-6 2-8 1-6	1.40-1.65 1.50-1.70 1.40-1.65	6.0-20 0.6-6.0 >20	0.02-0.05 0.05-0.10 0.02-0.05	3.6-5.5 3.6-5.5 3.6-5.5	Very low----- Very low----- Very low-----	0.20 0.20 0.17	5	1	.5-1
24, 25----- Lucy	0-30 30-36 36-80	2-12 20-30 20-35	1.35-1.65 1.60-1.70 1.55-1.70	6.0-20 2.0-6.0 0.6-2.0	0.06-0.10 0.10-0.12 0.12-0.14	5.1-5.5 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.20 0.24 0.28	5	1	.5-1
26----- Lutterloh	0-59 59-71 71-80	<5 15-30 30-55	1.35-1.55 1.60-1.70 1.60-1.70	6.0-20 0.6-2.0 <0.2	0.02-0.05 0.10-0.15 0.10-0.15	5.1-6.0 5.1-6.0 5.1-6.0	Low----- Low----- High-----	0.24 0.32 0.37	5	1	<3
27----- Lynchburg	0-18 18-65 65-80	5-20 18-35 ---	1.60-1.70 1.55-1.70 ---	2.0-6.0 0.6-2.0 ---	0.09-0.13 0.12-0.16 ---	4.5-5.5 4.5-5.5 ---	Low----- Low----- ---	0.20 0.20 ---	4	3	2-5
28*----- Meggett	0-12 12-50 50-80	5-20 40-60 25-50	1.25-1.60 1.50-1.70 1.60-1.70	2.0-6.0 0.06-0.2 0.2-2.0	0.10-0.15 0.13-0.18 0.12-0.16	4.5-6.5 4.5-6.5 4.5-6.5	Low----- High----- Moderate-----	0.24 0.32 0.28	4	3	2-8
29, 30----- Norfolk	0-8 8-58 58-80	2-10 18-35 20-40	1.40-1.70 1.30-1.60 1.20-1.70	6.0-20 0.6-2.0 0.6-2.0	0.06-0.10 0.10-0.15 0.10-0.15	4.5-6.0 4.5-5.5 4.5-5.5	Low----- Low----- Low-----	0.17 0.24 0.24	5	2	.5-2
31----- Norfolk	0-7 7-14 14-64 64-80	5-12 10-20 22-35 35-80	1.50-1.60 1.50-1.65 1.62-1.80 1.30-1.65	2.0-6.0 2.0-6.0 0.6-2.0 <0.06	0.05-0.10 0.05-0.10 0.10-0.15 0.10-0.15	5.1-6.5 4.5-5.5 4.5-5.5 3.6-5.5	Low----- Low----- Moderate----- Very high-----	0.17 0.20 0.32 0.37	5	2	.5-2
32----- Ocilla	0-29 29-80	2-7 15-35	1.40-1.50 1.60-1.70	2.0-20 0.6-2.0	0.05-0.08 0.09-0.12	3.6-5.5 4.5-5.5	Low----- Low-----	0.17 0.24	5	1	1-3
33, 34, 35----- Orangeburg	0-10 10-80	5-20 20-35	1.40-1.70 1.50-1.70	2.0-6.0 0.6-2.0	0.07-0.10 0.10-0.13	4.5-6.0 4.5-5.5	Low----- Low-----	0.24 0.24	5	3	1-3
36:* Orangeburg----- Urban land.	0-10 10-80	5-20 20-35	1.40-1.70 1.50-1.70	2.0-6.0 0.6-2.0	0.07-0.10 0.10-0.13	4.5-6.0 4.5-5.5	Low----- Low-----	0.24 0.24	5	3	1-3
37----- Ortega	0-10 10-99	1-3 <3	1.20-1.55 1.35-1.60	6.0-20 6.0-20	0.05-0.08 0.03-0.06	4.5-6.5 4.5-6.5	Low----- Low-----	0.15 0.15	5	2	1-2
38:* Pamlico----- Dorovan-----	0-32 32-80	--- 5-20	0.25-0.40 1.40-1.65	0.6-2.0 6.0-20	0.24-0.26 0.03-0.06	3.6-4.4 3.6-5.5	----- Low-----	----- -----	----- -----	2 2	--- ---
	0-5 5-65 65-80	--- --- 5-20	0.25-0.40 0.35-0.55 1.40-1.65	0.6-2.0 0.6-2.0 6.0-20	0.25-0.50 0.25-0.50 0.05-0.08	4.5-5.5 4.5-5.5 4.5-5.5	----- ----- Low-----	----- ----- -----	----- ----- -----	2	---

See footnote at end of table.

TABLE 16. ---SOIL AND WATER FEATURES---Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Bedrock		Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Initial	Total	Uncoated steel	Concrete
20:* Kershaw Urban land.	A	None	---	---	>6.0	---	In	---	In	---	---	Low	High.
21 Lakeland	A	None	---	---	>6.0	---	>72	---	---	---	---	Low	Moderate.
22 Leaffield	C	None	---	---	1.5-2.5	Apparent	Dec-Mar	>60	---	---	---	Moderate	High.
23 Leon	A/D	None	---	---	0-1.0	Apparent	Jun-Feb	>60	---	---	---	High	High.
24, 25 Lucy	A	None	---	---	>6.0	---	---	>60	---	---	---	Low	High.
26 Lutterloh	C	None	---	---	1.5-2.5	Apparent	Dec-Mar	>60	---	---	---	High	Moderate.
27 Lynchburg	B/D	None	---	---	0.5-1.5	Apparent	Nov-Apr	>60	---	---	---	High	High.
28* Meggett	D	Frequent	Long	Dec-Apr	0-1.0	Apparent	Nov-Apr	>60	---	---	---	High	Moderate.
29, 30 Norfolk	B	None	---	---	4.0-6.0	Perched	Jan-Mar	>60	---	---	---	Moderate	High.
31 Norfolk	B	None	---	---	5.0-6.0	Perched	Jan-Apr	>60	---	---	---	Moderate	High.
32 Ocilla	C	None	---	---	1.0-2.5	Apparent	Dec-Apr	>60	---	---	---	High	Moderate.
33, 34, 35 Orangeburg	B	None	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.
36:* Orangeburg Urban land.	B	None	---	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate.

See footnote at end of table.

APPENDIX E
"LBR" TEST DATA

DATA SHEET

LIMEROCK BEARING RATIO (LBR) FLORIDA TEST METHOD (FM 5-515)

TEST IDENTIFICATION:

PAGE 1 OF 2

DATE: 6/15/2009 SET: CPROJECT NO: 22-31-09-03 BORING NO: BH-1DEPTH: 0.5 - 1.5 FEET TESTED BY: JNSOIL DESCRIPTION SC A-6 / STRATUM 2
BROWN CLAYEY SAND

TEST DATA:

TARE NO.	1	2	3	4	5	
WT. OF TARE (g)	0.45	0.45	0.45	0.45	0.45	
WT. WET SOIL + TARE (g)	29.97	26.51	24.11	32.92	36.30	
WT. DRY SOIL + TARE (g)	27.27	24.44	21.72	29.32	31.64	
WATER CONTENT, w%	10.1	8.6	11.2	12.5	14.9	

MOLD NO.	1C	2C	3C	4C	5C	
WEIGHT OF SOIL AND MOLD (g)	11420.0	11208.0	11762.0	11868.0	11656.0	
WEIGHT OF MOLD (g)	7104.0	7086.0	7184.0	7202.0	7074.0	
WEIGHT OF WET SOIL (g)	4316.0	4122.0	4578.0	4666.0	4582.0	
MOLD VOLUME (ft ³)	0.075	0.075	0.075	0.075	0.075	
WET DENSITY OF SOIL (lb/ft ³)	126.7	121.0	134.4	137.0	134.5	
DRY DENSITY OF SOIL (lb/ft ³)	115.1	111.4	120.8	121.8	117.0	
WATER CONTENT, w%	10.1	8.6	11.2	12.5	14.9	
LBR	5	2	40	34	11	

TEST RESULTS:

MAX. DRY DENSITY: 121.8 (lb/ft³)OPT. MOISTURE CONTENT: 12.5 (%)MAX. LBR VALUE: 40CHECKED BY:  6-29-09

ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.

DATA SHEET

LIMEROCK BEARING RATIO (LBR) FLORIDA TEST METHOD (FM 5-515)

TEST IDENTIFICATION:

PAGE 2 OF 2

DATE: 6/15/2009 SET: C

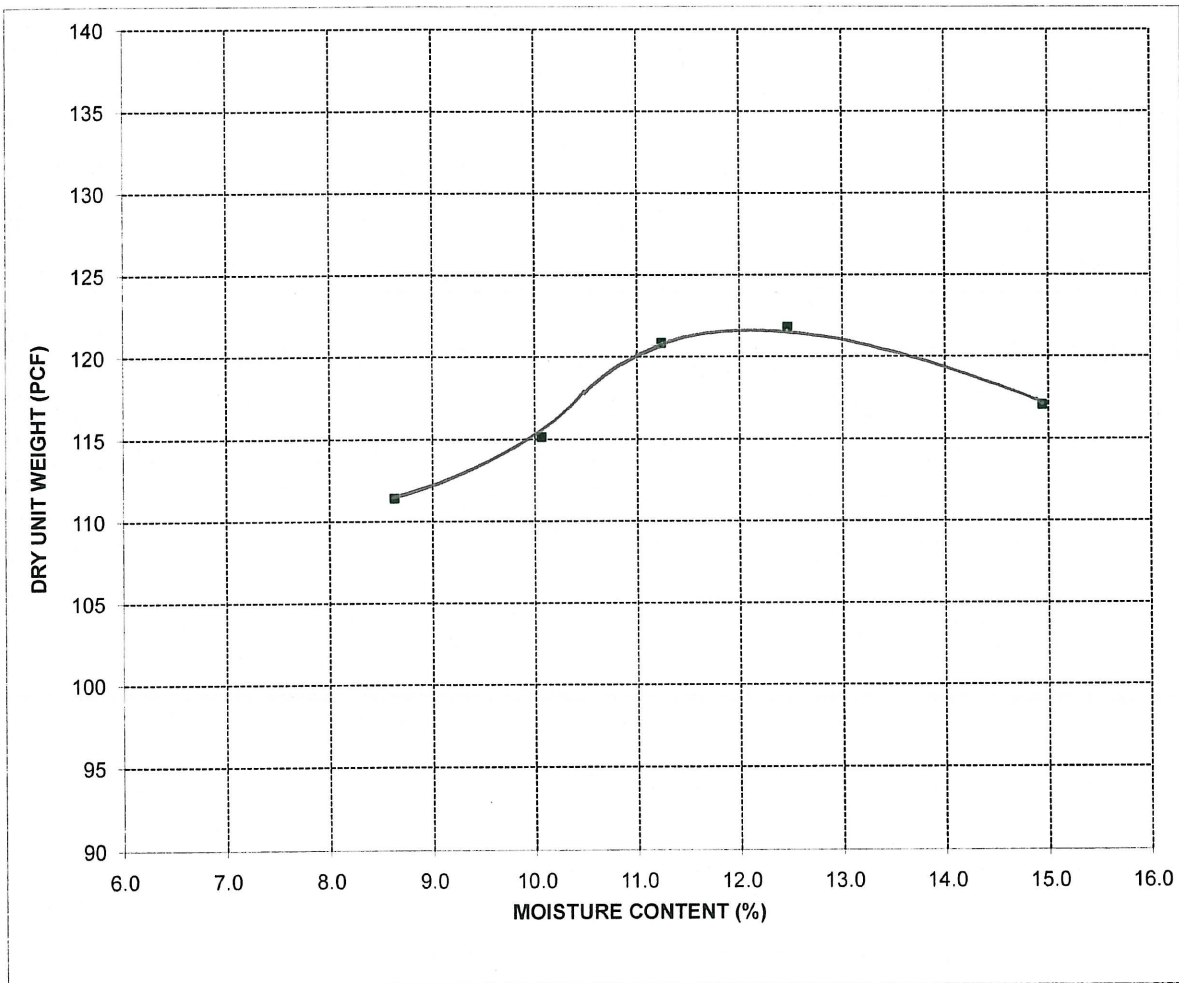
PROJECT NO: 22-31-09-03 BORING NO: BH-1

DEPTH: 0.5 - 1.5 FEET TESTED BY: JN

SOIL DESCRIPTION SC A-6 / STRATUM 2

BROWN CLAYEY SAND

MODIFIED PROCTOR TEST RESULTS:



CHECKED BY: *[Signature]* 6-29-09

ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.

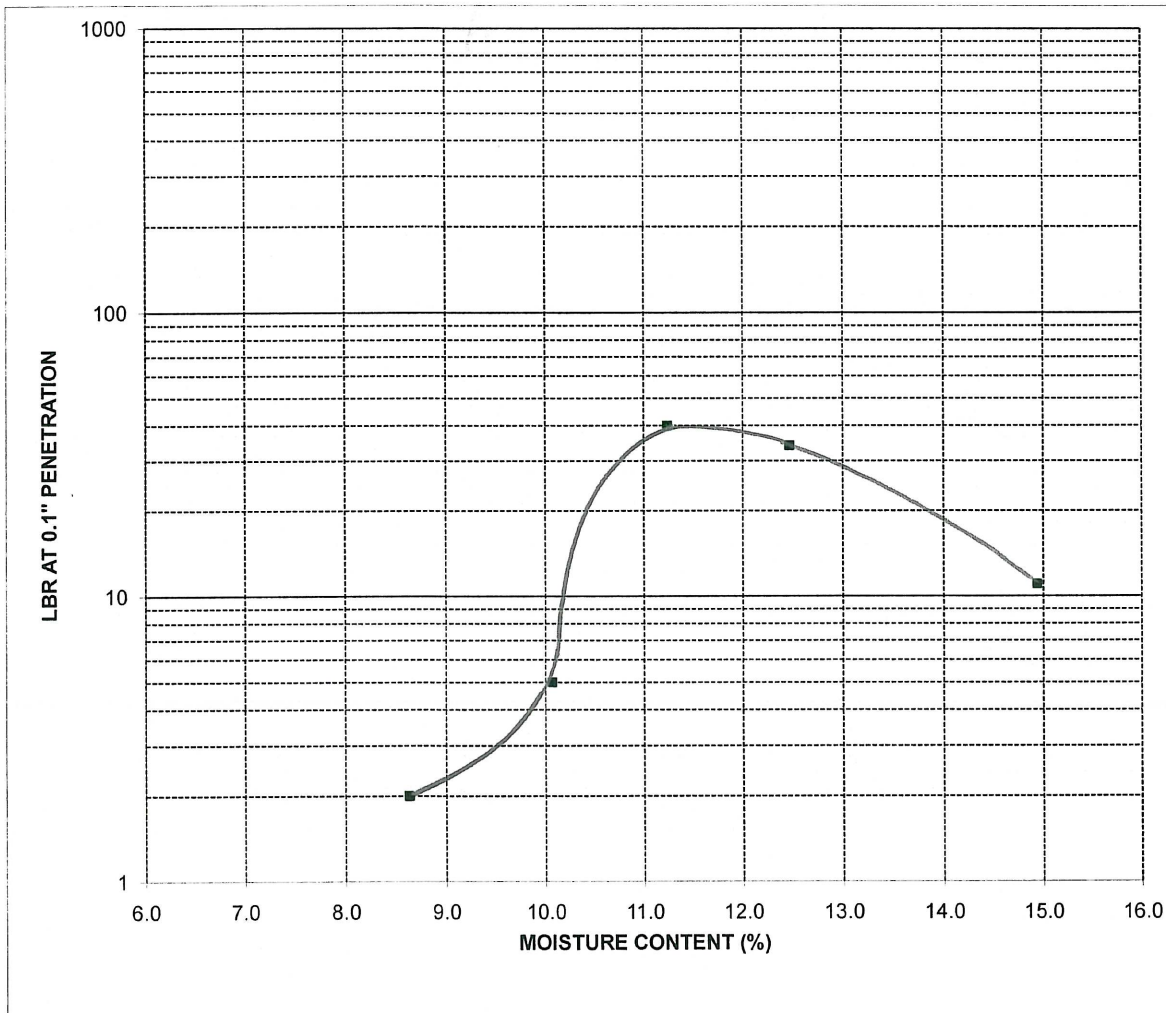
DATA SHEET

LIMEROCK BEARING RATIO (LBR) FLORIDA TEST METHOD (FM 5-515)

TEST IDENTIFICATION:

DATE: 6/15/2009 SET: C
PROJECT NO: 22-31-09-03 BORING NO: BH-1
DEPTH: 0.5 - 1.5 FEET TESTED BY: JN
SOIL DESCRIPTION SC A-6 / STRATUM 2
BROWN CLAYEY SAND

LBR TEST RESULTS:

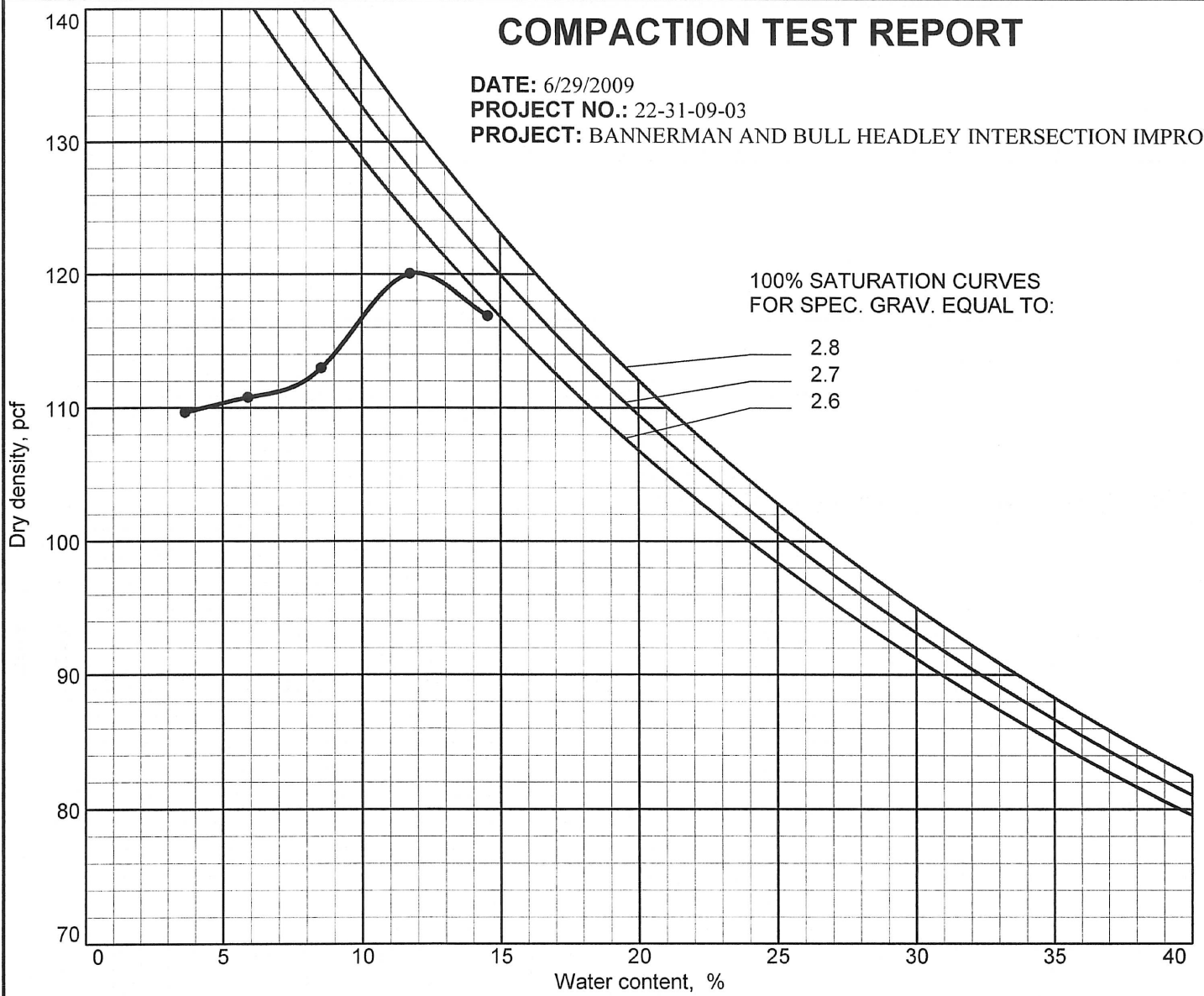


CHECKED BY: *JN* 6-29-09

ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC

COMPACTION TEST REPORT

DATE: 6/29/2009
PROJECT NO.: 22-31-09-03
PROJECT: BANNERMAN AND BULL HEADLEY INTERSECTION IMPROVE



No.	LOCATION AND DESCRIPTION						TEST SPECIFICATION	
●	Source: BH-1 Sample No.: BH-1 Elev./Depth: 0.5 - 1.5 BROWN CLAYEY SAND						AASHTO T 180 Method A Modified	
No.	USCS	LL	PI	NAT. MOIST.	%> No.4	%< No.200	MAX. DRY DEN.	OPT. MOIST.
●	SC	26	11		0 %	48 %	120.1 pcf	12.0 %

Figure

MOISTURE DENSITY TEST DATA

Client: PBS&J
Project: BANNERMAN AND BULL HEADLEY INTERSECTION IMPROVEMENTS
Project Number: 22-31-09-03

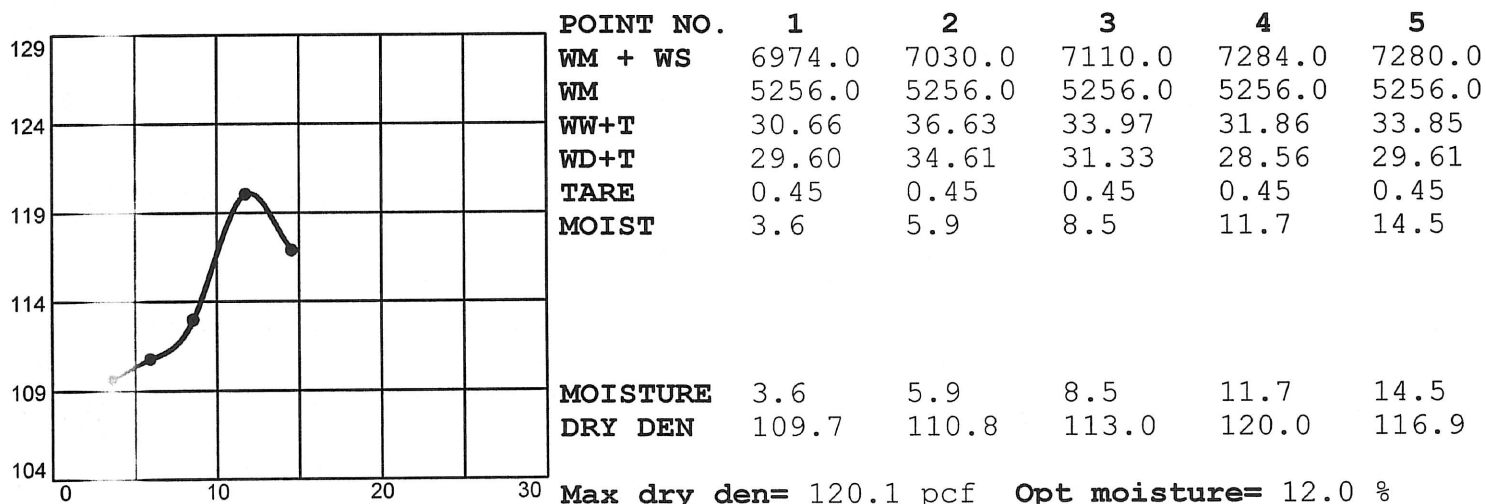
Specimen Data

Source: BH-1
Sample No.: BH-1
Elev. or Depth: 0.5 - 1.5 FEET **Sample Length(in./cm.):** 12 IN
Location:
Description: BROWN CLAYEY SAND
 STRATUM 2

Water Content: **Liquid Limit:** 26 **Plasticity Index:** 11
USCS: SC **AASHTO:** A-6
Percent retained on No.4 sieve: 0
Percent passing No. 200 sieve: 48 **Specific gravity:**

Test Data And Results

Type of test: AASHTO T 180 Method A Modified
Mold Dia.: 4.00 in. **Hammer Wt.:** 10 lb. **Drop:** 18 in.
Layers: five **Blows per Layer:** 25



Max dry den= 120.1 pcf **Opt moisture=** 12.0 %

DATA SHEET

LIMEROCK BEARING RATIO (LBR) FLORIDA TEST METHOD (FM 5-515)

TEST IDENTIFICATION:

PAGE 1 OF 2

DATE: 6/15/2009 SET: E
PROJECT NO: 22-31-09-03 BORING NO: BH-4
DEPTH: 0.0 - 1.0 FEET TESTED BY: JN
SOIL DESCRIPTION SM A-2-4 / STRATUM 1
BROWN SILTY FINE SAND

TEST DATA:

TARE NO.	1	2	3	4	5	
WT. OF TARE (g)	0.45	0.45	0.45	0.45	0.45	
WT. WET SOIL + TARE (g)	22.14	36.51	21.65	30.30	26.21	
WT. DRY SOIL + TARE (g)	20.75	33.61	19.60	27.23	23.27	
WATER CONTENT, w%	6.8	8.7	10.7	11.5	12.9	

MOLD NO.	1E	2E	3E	4E	5E	
WEIGHT OF SOIL AND MOLD (g)	11318.0	11664.0	11788.0	11812.0	11670.0	
WEIGHT OF MOLD (g)	7084.0	7166.0	7120.0	7176.0	7060.0	
WEIGHT OF WET SOIL (g)	4234.0	4498.0	4668.0	4636.0	4610.0	
MOLD VOLUME (ft ³)	0.075	0.075	0.075	0.075	0.075	
WET DENSITY OF SOIL (lb/ft ³)	124.3	132.1	137.1	136.1	135.4	
DRY DENSITY OF SOIL (lb/ft ³)	116.3	121.4	123.8	122.1	119.9	
WATER CONTENT, w%	6.8	8.7	10.7	11.5	12.9	
LBR	7	35	64	18	9	

TEST RESULTS:

MAX. DRY DENSITY: 124.9 (lb/ft³)
OPT. MOISTURE CONTENT: 10.2 (%)
MAX. LBR VALUE: 64

CHECKED BY:  C-29-09

ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.

DATA SHEET
LIMEROCK BEARING RATIO (LBR)
FLORIDA TEST METHOD
(FM 5-515)

TEST IDENTIFICATION:

PAGE 2 OF 2

DATE: 6/15/2009 SET: E

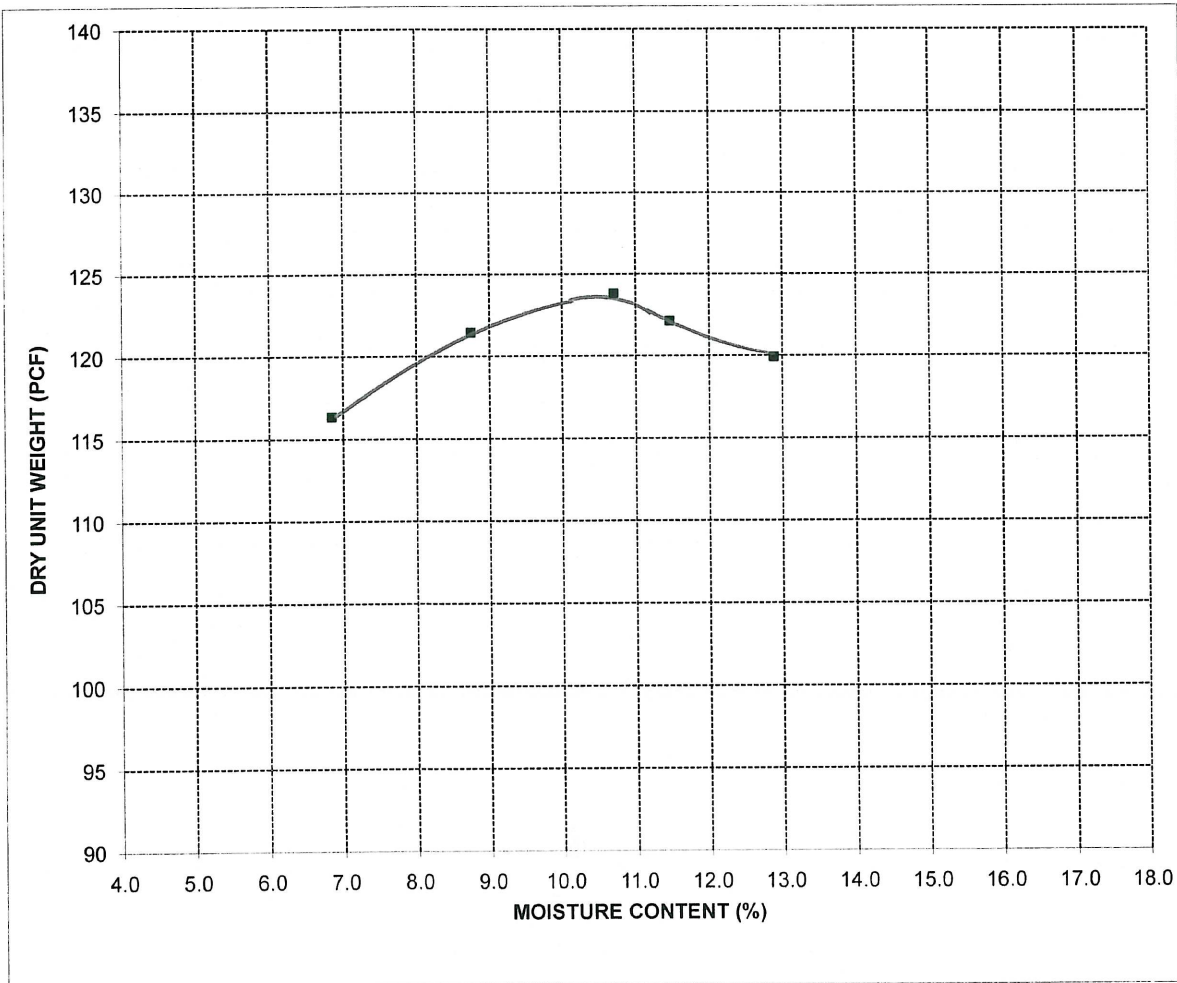
PROJECT NO: 22-31-09-03 BORING NO: BH-4

DEPTH: 0.0 - 1.0 FEET TESTED BY: JN

SOIL DESCRIPTION SM A-2-4 / STRATUM 1

BROWN SILTY FINE SAND

MODIFIED PROCTOR TEST RESULTS:



CHECKED BY: *T. R. [Signature]* 6-29-09

ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.

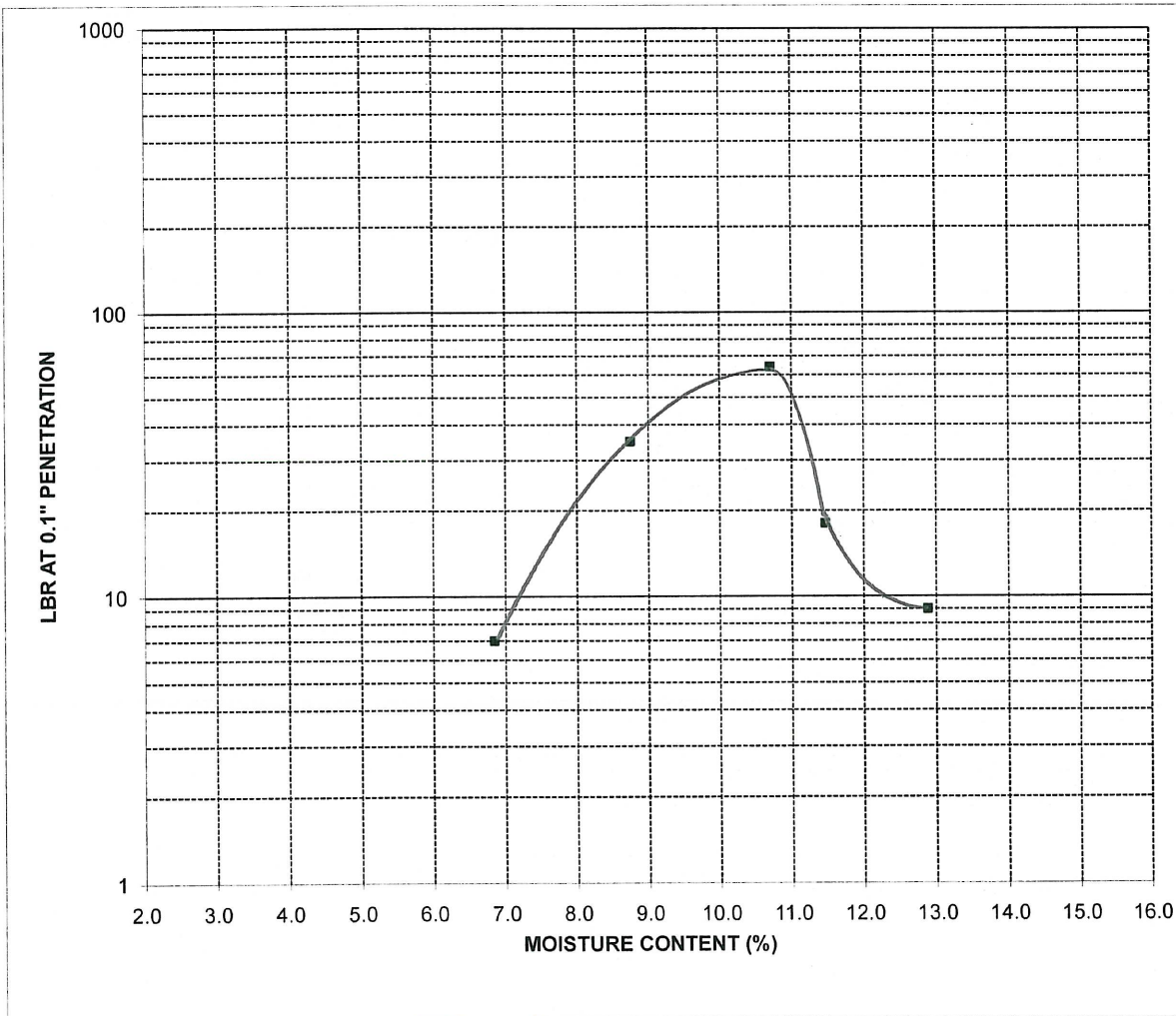
DATA SHEET

LIMEROCK BEARING RATIO (LBR) FLORIDA TEST METHOD (FM 5-515)

TEST IDENTIFICATION:

DATE: 6/15/2009 SET: E
PROJECT NO: 22-31-09-03 BORING NO: BH-4
DEPTH: 0.0 - 1.0 FEET TESTED BY: JN
SOIL DESCRIPTION SM A-2-4 / STRATUM 1
BROWN SILTY FINE SAND

LBR TEST RESULTS:

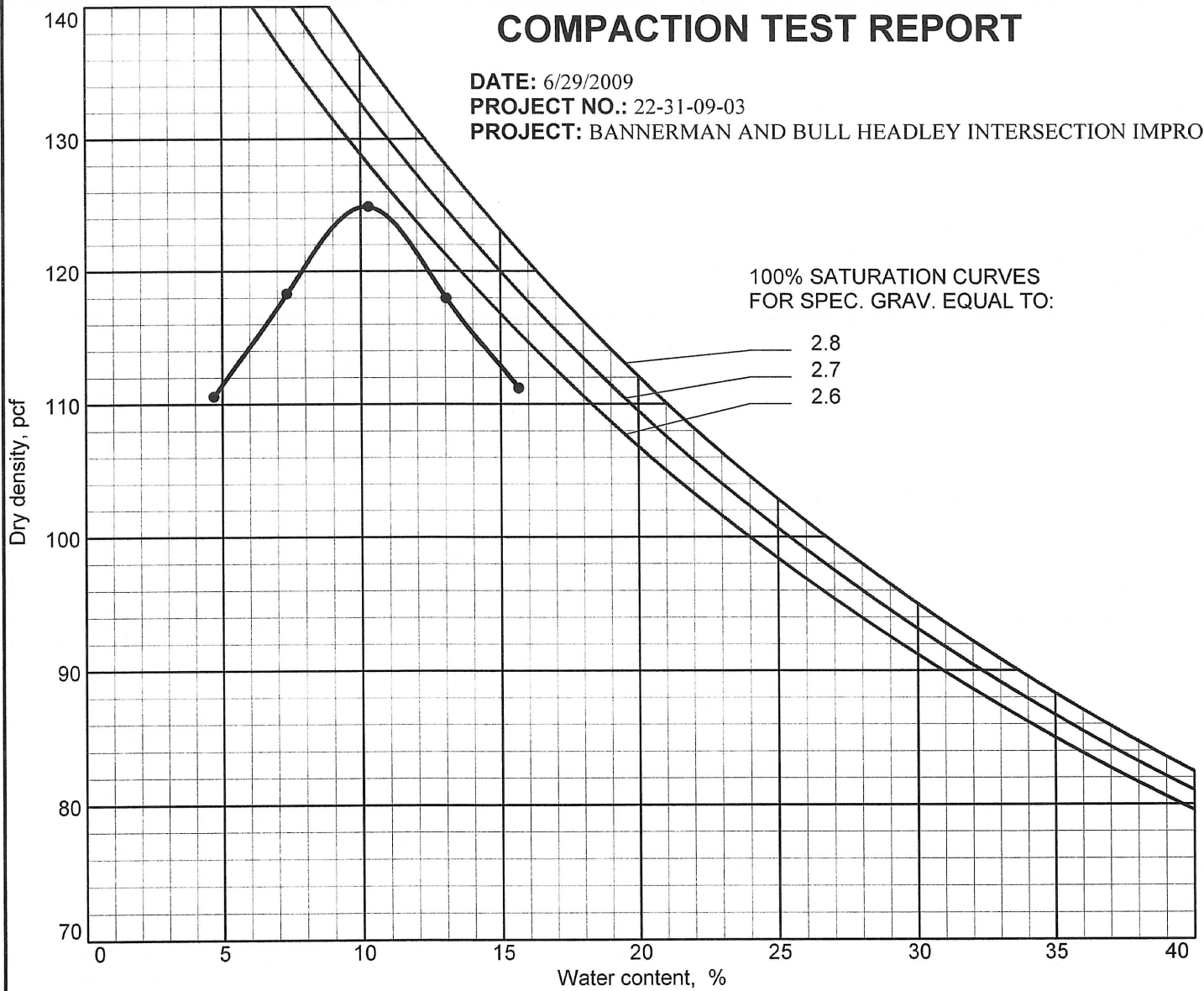


CHECKED BY: *Tom J. H.* 6.29.09

ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC

COMPACTION TEST REPORT

DATE: 6/29/2009
PROJECT NO.: 22-31-09-03
PROJECT: BANNERMAN AND BULL HEADLEY INTERSECTION IMPROVE



No.	LOCATION AND DESCRIPTION	TEST SPECIFICATION						
●	Source: BH-4 Sample No.: BH-4 Elev./Depth: 0.0 - 1.0 BROWN SILTY FINE SAND	AASHTO T 180 Method A Modified						
No.	USCS	LL	PI	NAT. MOIST.	%> No.4	%< No.200	MAX. DRY DEN.	OPT. MOIST.
●	SM	20	4		0 %	29 %	124.9 pcf	10.2 %

MOISTURE DENSITY TEST DATA

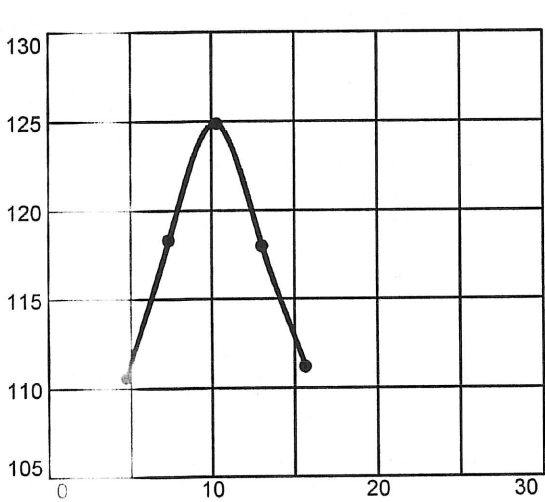
Client: PBS&J
Project: BANNERMAN AND BULL HEADLEY INTERSECTION IMPROVEMENTS
Project Number: 22-31-09-03

Specimen Data

Source: BH-4
Sample No.: BH-4
Elev. or Depth: 0.0 - 1.0 **Sample Length(in./cm.):** 12 IN
Location:
Description: BROWN SILTY FINE SAND
 STRATUM 1
Water Content: **Liquid Limit:** 20 **Plasticity Index:** 4
USCS: SM **AASHTO:** A-2-4
Percent retained on No.4 sieve: 0
Percent passing No. 200 sieve: 29 **Specific gravity:**

Test Data And Results

Type of test: AASHTO T 180 Method A Modified
Mold Dia.: 4.00 in. **Hammer Wt.:** 10 lb. **Drop:** 18 in.
Layers: five **Blows per Layer:** 25



	1	2	3	4	5
POINT NO.					
WM + WS	7006.0	7176.0	7338.0	7272.0	7200.0
WM	5256.0	5256.0	5256.0	5256.0	5256.0
WW+T	31.71	32.28	33.68	19.52	30.30
WD+T	30.31	30.10	30.58	17.32	26.26
TARE	0.45	0.45	0.45	0.45	0.45
MOIST	4.7	7.4	10.3	13.0	15.7
MOISTURE	4.7	7.4	10.3	13.0	15.7
DRY DEN	110.6	118.3	124.9	118.0	111.2

Max dry den= 124.9 pcf **Opt moisture=** 10.2 %

DATA SHEET
LIMEROCK BEARING RATIO (LBR)
FLORIDA TEST METHOD
(FM 5-515)

TEST IDENTIFICATION:

PAGE 1 OF 2

DATE: 6/15/2009 **SET:** D

PROJECT NO: 22-31-09-03 **BORING NO:** BH-6

DEPTH: 0.5 - 1.5 FEET **TESTED BY:** JN

SOIL DESCRIPTION CL A-6 / STRATUM 3

BROWN VERY SANDY CLAY

TEST DATA:

TARE NO.	1	2	3	4	5
WT. OF TARE (g)	0.45	0.45	0.45	0.45	0.45
WT. WET SOIL + TARE (g)	30.45	29.27	29.95	28.23	34.00
WT. DRY SOIL + TARE (g)	28.28	26.90	27.20	25.19	30.60
WATER CONTENT, w%	7.8	9.0	10.3	12.3	11.3

MOLD NO.	1D	2D	3D	4D	5D
WEIGHT OF SOIL AND MOLD (g)	11344.0	11566.0	11712.0	11754.0	11860.0
WEIGHT OF MOLD (g)	7188.0	7158.0	7114.0	7078.0	7106.0
WEIGHT OF WET SOIL (g)	4156.0	4408.0	4598.0	4676.0	4754.0
MOLD VOLUME (ft ³)	0.075	0.075	0.075	0.075	0.075
WET DENSITY OF SOIL (lb/ft ³)	122.0	129.4	135.0	137.3	139.6
DRY DENSITY OF SOIL (lb/ft ³)	113.2	118.8	122.4	122.3	125.4
WATER CONTENT, w%	7.8	9.0	10.3	12.3	11.3
LBR	2	9	54	27	32

TEST RESULTS:

MAX. DRY DENSITY: 126.3 (lb/ft³)

OPT. MOISTURE CONTENT: 10.8 (%)

MAX. LBR VALUE: 54

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DATA SHEET
LIMEROCK BEARING RATIO (LBR)
FLORIDA TEST METHOD
(FM 5-515)

TEST IDENTIFICATION:

PAGE 2 OF 2

DATE: 6/15/2009 SET: D

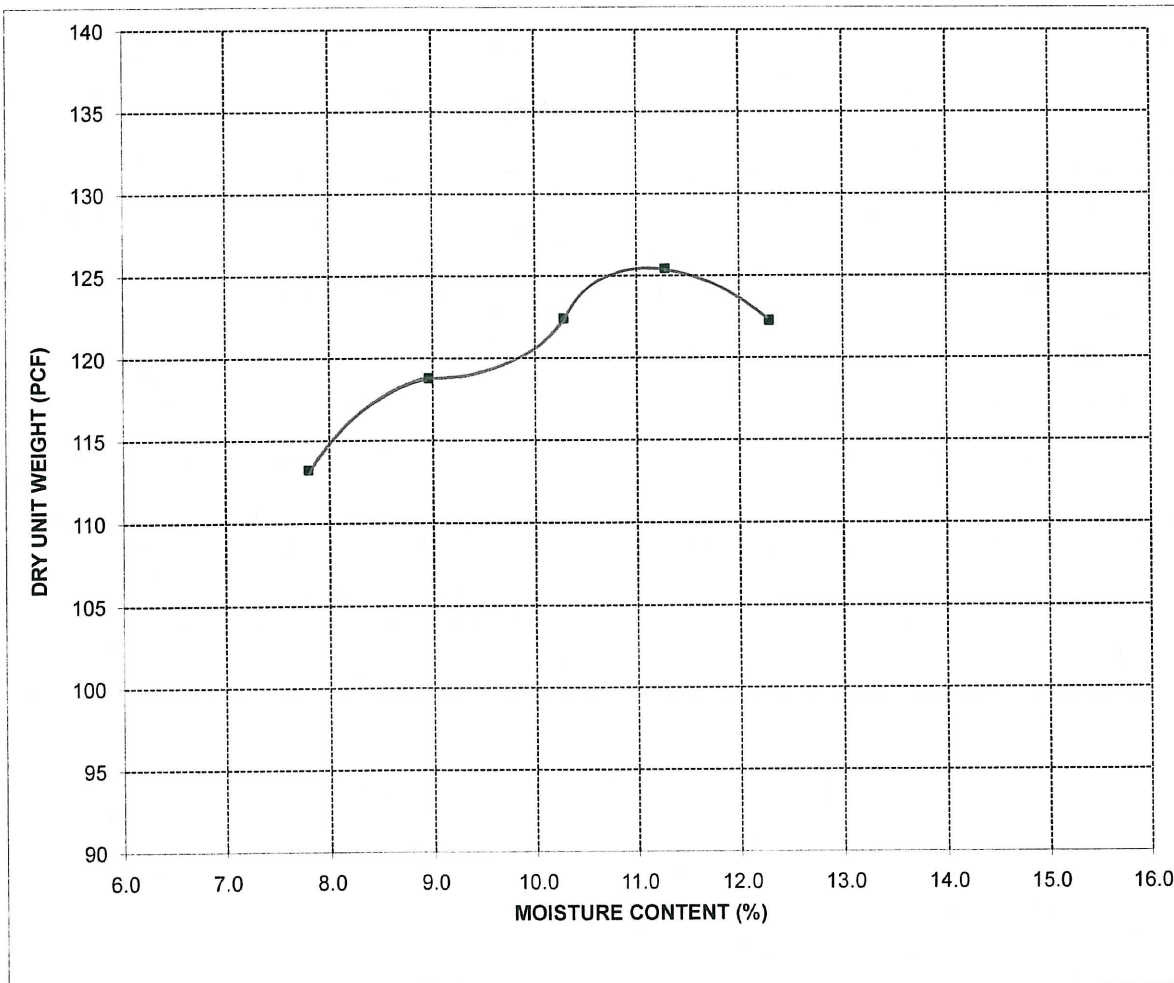
PROJECT NO: 22-31-09-03 BORING NO: BH-6

DEPTH: 0.5 - 1.5 FEET TESTED BY: JN

SOIL DESCRIPTION CL A-6 / STRATUM 3

BROWN VERY SANDY CLAY

MODIFIED PROCTOR TEST RESULTS:



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ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.

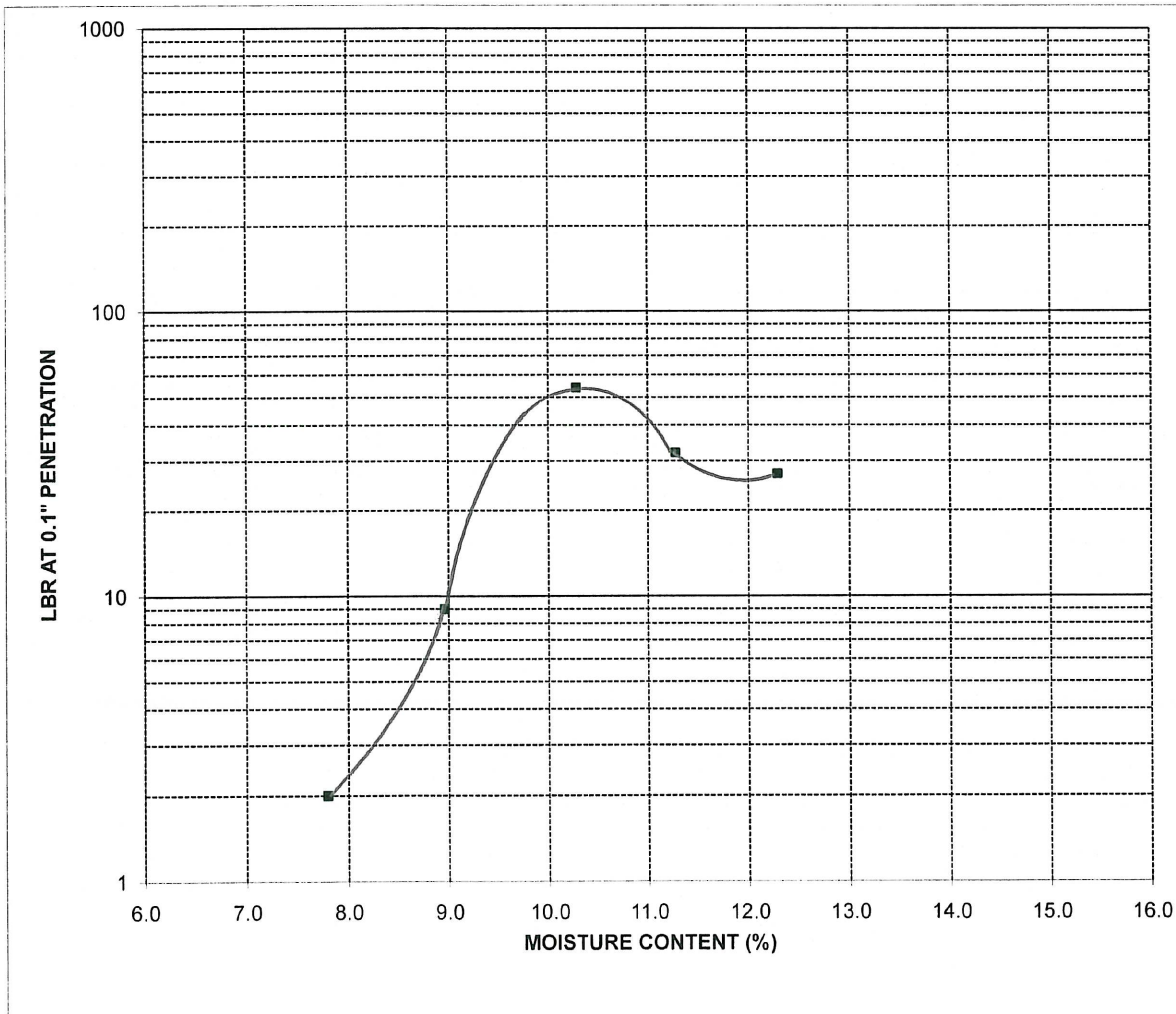
DATA SHEET

LIMEROCK BEARING RATIO (LBR) FLORIDA TEST METHOD (FM 5-515)

TEST IDENTIFICATION:

DATE: 6/15/2009 SET: D
PROJECT NO: 22-31-09-03 BORING NO: BH-6
DEPTH: 0.5 - 1.5 FEET TESTED BY: JN
SOIL DESCRIPTION CL A-6 / STRATUM 3
BROWN VERY SANDY CLAY

LBR TEST RESULTS:

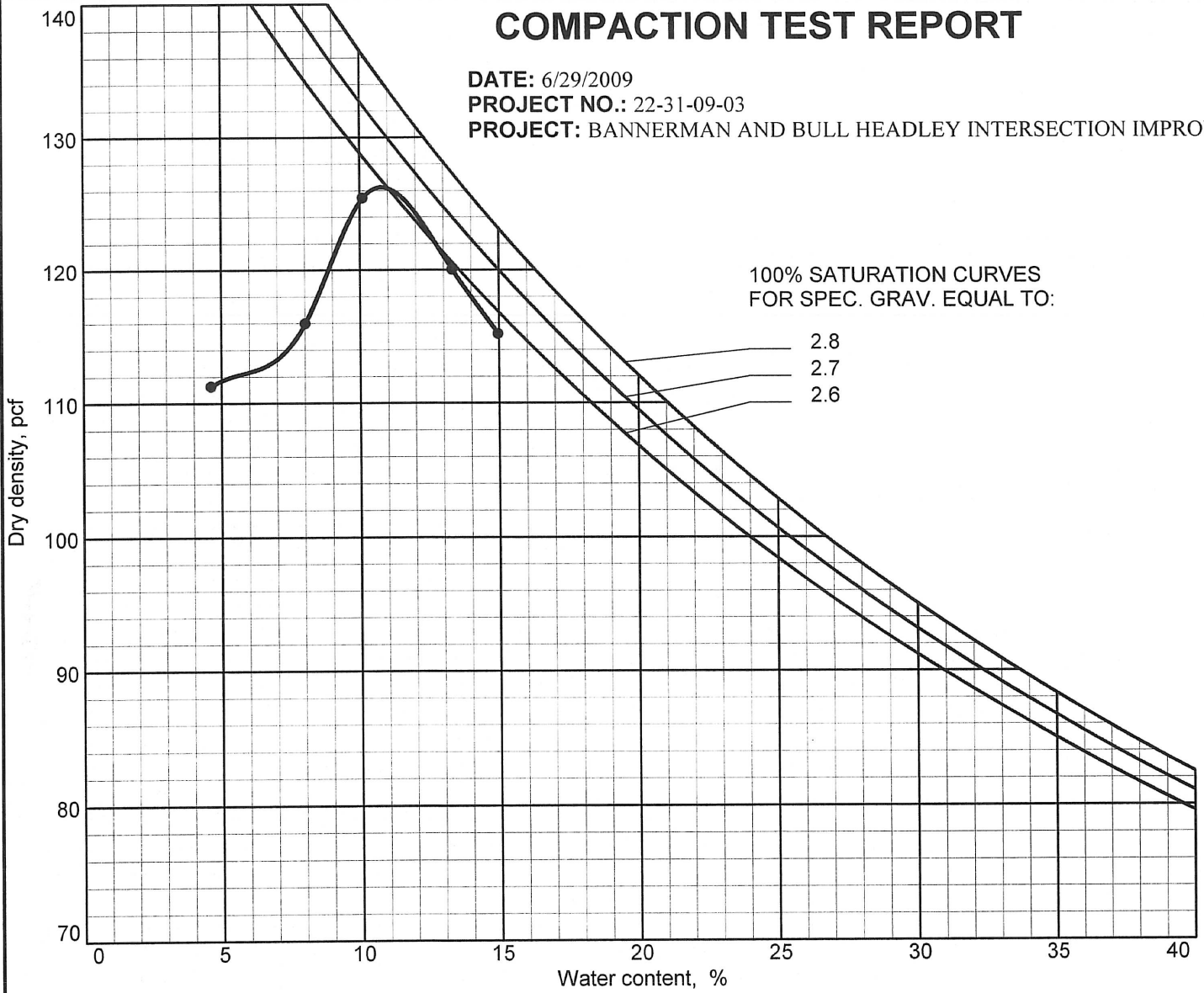


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ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC

COMPACTION TEST REPORT

DATE: 6/29/2009
PROJECT NO.: 22-31-09-03
PROJECT: BANNERMAN AND BULL HEADLEY INTERSECTION IMPROVE



No.	LOCATION AND DESCRIPTION	TEST SPECIFICATION						
●	Source: BH-6 Sample No.: BH-6 Elev./Depth: 0.5 - 1.5 BROWN VERY SANDY CLAY	AASHTO T 180 Method A Modified						
No.	USCS	LL	PI	NAT. MOIST.	%> No.4	%< No.200	MAX. DRY DEN.	OPT. MOIST.
●	CL	25	11		0 %	51 %	126.3 pcf	10.8 %

Figure

MOISTURE DENSITY TEST DATA

Client: PBS&J

Project: BANNERMAN AND BULL HEADLEY INTERSECTION IMPROVEMENTS

Project Number: 22-31-09-03

Specimen Data

Source: BH-6

Sample No.: BH-6

Elev. or Depth: 0.5 - 1.5 FEET

Sample Length(in./cm.): 12 IN

Location:

Description: BROWN VERY SANDY CLAY
STRATUM 3

Water Content:

Liquid Limit: 25

Plasticity Index: 11

USCS: CL

AASHTO: A-6

Percent retained on No.4 sieve: 0

Percent passing No. 200 sieve: 51

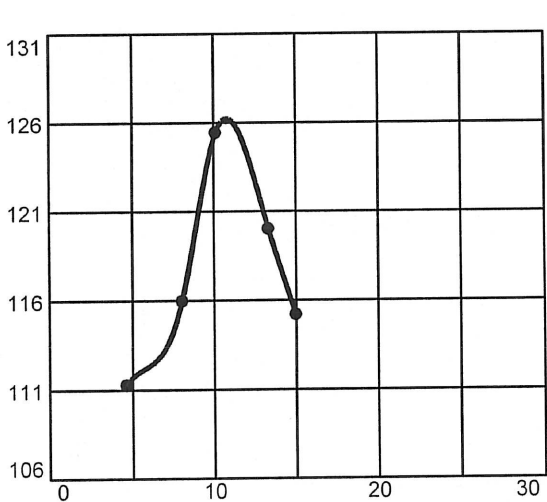
Specific gravity:

Test Data And Results

Type of test: AASHTO T 180 Method A Modified

Mold Dia.: 4.00 in. **Hammer Wt.:** 10 lb. **Drop:** 18 in.

Layers: five **Blows per Layer:** 25



	1	2	3	4	5
WM + WS	7016.0	7150.0	7344.0	7312.0	7258.0
WM	5256.0	5256.0	5256.0	5256.0	5256.0
WW+T	31.45	25.91	27.91	26.33	28.12
WD+T	30.08	24.02	25.39	23.29	24.52
TARE	0.45	0.45	0.45	0.45	0.45
MOIST	4.6	8.0	10.1	13.3	15.0
MOISTURE	4.6	8.0	10.1	13.3	15.0
DRY DEN	111.3	116.0	125.4	120.0	115.2

Max dry den= 126.3 pcf **Opt moisture=** 10.8 %

DATA SHEET
LIMEROCK BEARING RATIO (LBR)
FLORIDA TEST METHOD
(FM 5-515)

TEST IDENTIFICATION:

PAGE 1 OF 2

DATE: 6/16/2009 **SET:** F

PROJECT NO: 22-31-09-03 **BORING NO:** BH-7

DEPTH: 1.0 - 2.0 FEET **TESTED BY:** JN

SOIL DESCRIPTION SC A-6 / STRATUM 2
BROWN CLAYEY SAND

TEST DATA:

TARE NO.	1	2	3	4	5
WT. OF TARE (g)	0.45	0.45	0.45	0.45	0.45
WT. WET SOIL + TARE (g)	36.91	33.69	39.15	38.33	35.96
WT. DRY SOIL + TARE (g)	33.90	30.58	35.12	33.86	31.46
WATER CONTENT, w%	9.0	10.3	11.6	13.4	14.5

MOLD NO.	1F	2F	3F	4F	5F
WEIGHT OF SOIL AND MOLD (g)	11224.0	11550.0	11754.0	11808.0	11796.0
WEIGHT OF MOLD (g)	7120.0	7190.0	7214.0	7198.0	7226.0
WEIGHT OF WET SOIL (g)	4104.0	4360.0	4540.0	4610.0	4570.0
MOLD VOLUME (ft ³)	0.075	0.075	0.075	0.075	0.075
WET DENSITY OF SOIL (lb/ft ³)	120.5	128.0	133.3	135.4	134.2
DRY DENSITY OF SOIL (lb/ft ³)	110.6	116.0	119.4	119.4	117.2
WATER CONTENT, w%	9.0	10.3	11.6	13.4	14.5
LBR	3	9	47	31	11

TEST RESULTS:

MAX. DRY DENSITY: 123.0 (lb/ft³)

OPT. MOISTURE CONTENT: 11.5 (%)

MAX. LBR VALUE: 47

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DATA SHEET
LIMEROCK BEARING RATIO (LBR)
FLORIDA TEST METHOD
(FM 5-515)

TEST IDENTIFICATION:

PAGE 2 OF 2

DATE: 6/16/2009 SET: F

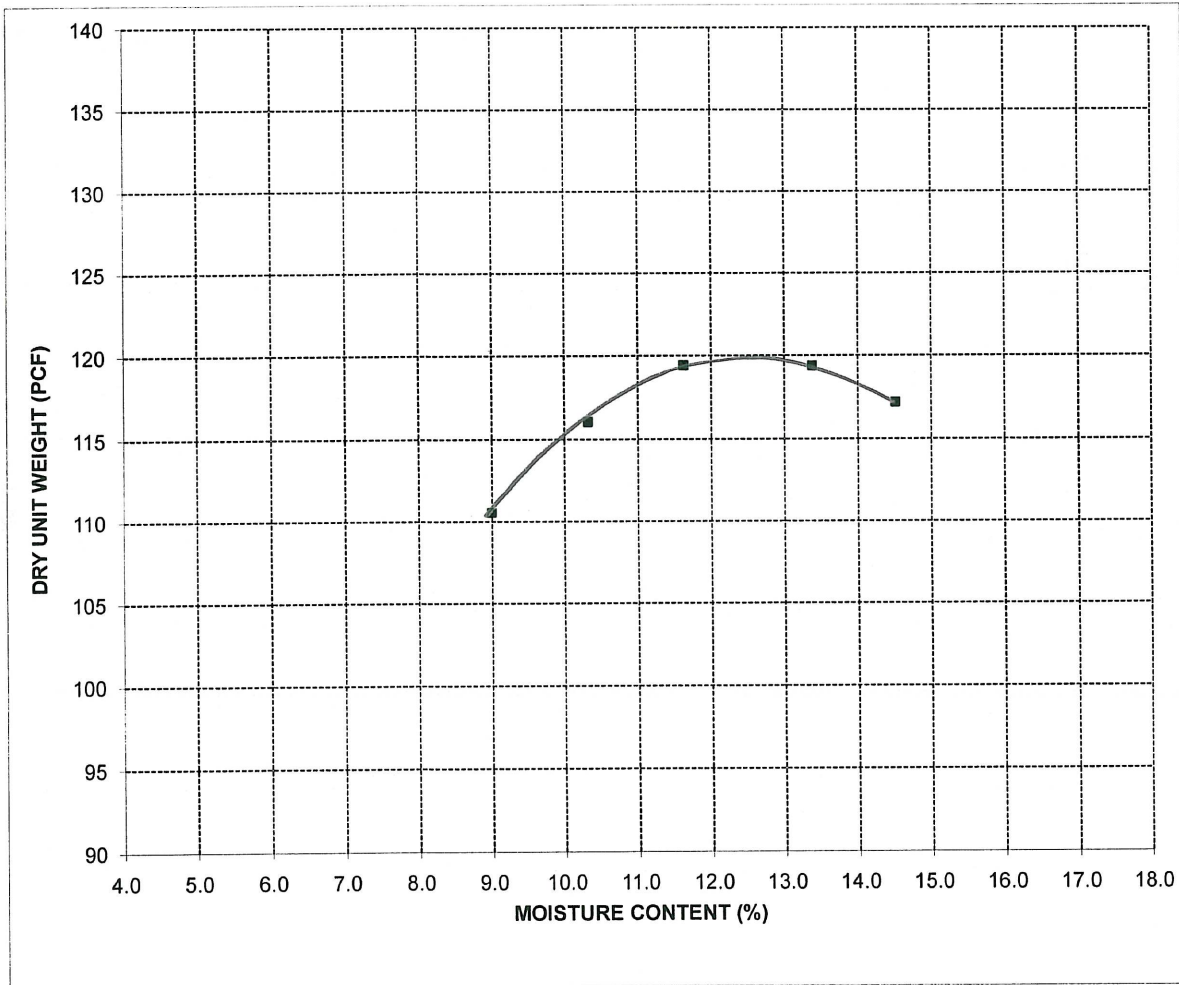
PROJECT NO: 22-31-09-03 BORING NO: BH-7

DEPTH: 1.0 - 2.0 FEET TESTED BY: JN

SOIL DESCRIPTION SC A-6 / STRATUM 2

BROWN CLAYEY SAND

MODIFIED PROCTOR TEST RESULTS:



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ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC.

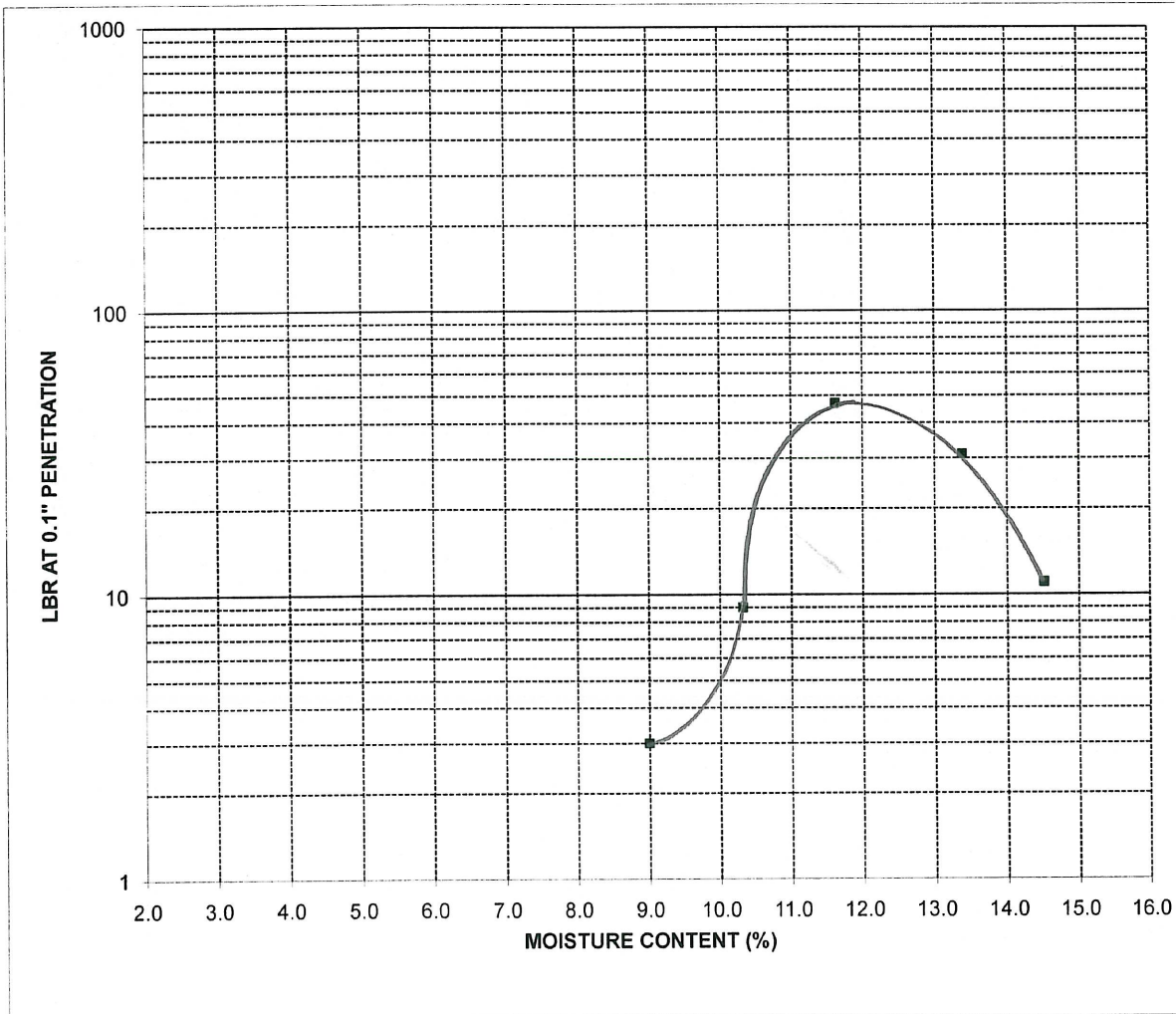
DATA SHEET

LIMEROCK BEARING RATIO (LBR) FLORIDA TEST METHOD (FM 5-515)

TEST IDENTIFICATION:

DATE: 6/16/2009 SET: F
PROJECT NO: 22-31-09-03 BORING NO: BH-7
DEPTH: 1.0 - 2.0 FEET TESTED BY: JN
SOIL DESCRIPTION SC A-6 / STRATUM 2
BROWN CLAYEY SAND

LBR TEST RESULTS:

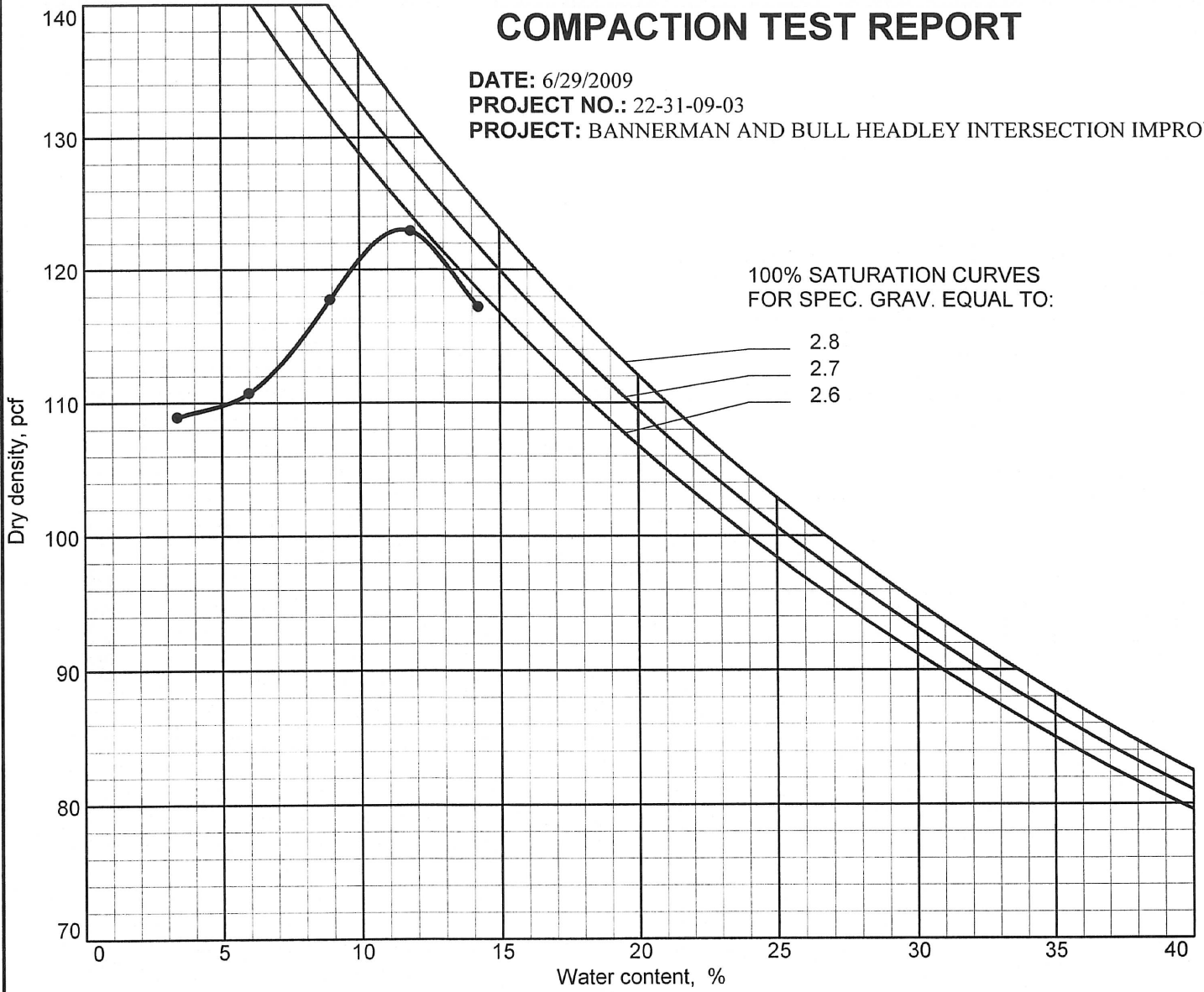


CHECKED BY: *Tom R...* 6-29-09

ENVIRONMENTAL & GEOTECHNICAL SPECIALISTS, INC

COMPACTION TEST REPORT

DATE: 6/29/2009
PROJECT NO.: 22-31-09-03
PROJECT: BANNERMAN AND BULL HEADLEY INTERSECTION IMPROVE



No.	LOCATION AND DESCRIPTION	TEST SPECIFICATION						
●	Source: BH-7 Sample No.: BH-7 Elev./Depth: 1.0 - 2.0 BROWN CLAYEY SAND	AASHTO T 180 Method A Modified						
No.	USCS	LL	PI	NAT. MOIST.	%> No.4	%< No.200	MAX. DRY DEN.	OPT. MOIST.
●	SC	26	11		0 %	45 %	123.0 pcf	11.5 %

Figure

MOISTURE DENSITY TEST DATA

Client: PBS&J

Project: BANNERMAN AND BULL HEADLEY INTERSECTION IMPROVEMENTS

Project Number: 22-31-09-03

Specimen Data

Source: BH-7

Sample No.: BH-7

Elev. or Depth: 1.0 - 2.0 FEET

Sample Length(in./cm.): 12 IN

Location:

Description: BROWN CLAYEY SAND
STRATUM 2

Water Content:

Liquid Limit: 26

Plasticity Index: 11

USCS: SC

AASHTO: A-6

Percent retained on No.4 sieve: 0

Percent passing No. 200 sieve: 45

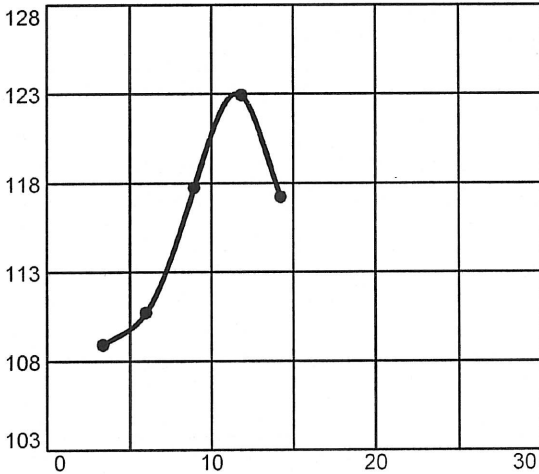
Specific gravity:

Test Data And Results

Type of test: AASHTO T 180 Method A Modified

Mold Dia.: 4.00 in. **Hammer Wt.:** 10 lb. **Drop:** 18 in.

Layers: five **Blows per Layer:** 25



POINT NO.	1	2	3	4	5
WM + WS	6958.0	7030.0	7195.0	7334.0	7280.0
WM	5256.0	5256.0	5256.0	5256.0	5256.0
WW+T	28.70	21.89	19.47	20.78	23.17
WD+T	27.78	20.68	17.91	18.63	20.34
TARE	0.45	0.45	0.45	0.45	0.45
MOIST	3.4	6.0	8.9	11.8	14.2
MOISTURE	3.4	6.0	8.9	11.8	14.2
DRY DEN	108.9	110.7	117.7	122.9	117.2

Max dry den= 123.0 pcf **Opt moisture=** 11.5 %