Financial Management Department
Purchasing Division
1112 Manatee Ave W Suite 803
Bradenton, FL 34205
Phone: (941) 749-3014
www.mymanatee.org

September 1, 2015

TO: All Interested Bidders

SUBJECT: Invitation for Bids #15-2259CD
44th Avenue East Roadway Project- from 19th Street Court East to 30th Street East

ADDENDUM #1

Bidders are hereby notified that this Addendum shall be acknowledged on page Bid Form-1 of the Bid Form and made a part of the above named bidding and contract documents. Bids submitted without acknowledgment of the Addendum will be considered incomplete.

The following items are issued to add to, modify, and clarify the bid and contract documents. These items shall have the same force and effect as the original bidding and contract documents, and cost involved shall be included in the bid prices. Bids to be submitted on the specified bid date, shall conform to the additions and revisions listed herein.

1. **ADD** the Final Geotechnical Report for the 44th Avenue Extension from 19th Street Court East to 30th Street Court East dated January 2010 that is attached to this Addendum #1 to the Bid Documents.
2. **ADD** the Geotechnical Report for the Proposed 44th Ave and 19th St. Ct. Signal Lights and 38th Ave Roundabouts dated June 2010 that is attached to this Addendum #1 to the Bid Documents.
3. **CHANGE** the Due Date and Time to **Friday, October 2, 2015 at 3:00 PM.**

An additional Addendum will issued in the near future that will address all questions submitted prior to the deadline for clarifications as well as establish a date and time for a site visit.

END OF ADDENDUM #1

Bids will be received at Manatee County Purchasing, 1112 Manatee Avenue West, Bradenton, Florida 34205 until **Friday, October 2, 2015 at 3:00 PM.**

Sincerely,

Melissa M. Wendel, CPPO for
Purchasing Official

Information To Build On
Engineering • Consulting • Testing

January 8, 2010

Cardno TBE
380 Park Place Blvd., Suite 300
Clearwater, FL 33759

Attention: Mr. Tom Fulton, P.E.
Director of Roadway Design

Re: Final Geotechnical Report
44th Avenue Extension
Manatee County, Florida
TBE Project No. 00193-001-18 FF
PSI Project No. 0775121

Dear Mr. Fulton:

Professional Service Industries, Incorporated (PSI) is pleased to submit this Final Geotechnical Report for the proposed roadway alignment, stormwater ponds, mast arms, intersection improvements, and pavement cores along the proposed roadway alignment of the 44th Avenue Extension and associated areas included in this study. Seasonal high borings were performed at the pond locations and are included within this report. An evaluation to delineate the muck and organic soils encountered across the site has also been performed and the results are enclosed. Included in this report are the methods, procedures, field results, analyses, and evaluations for the proposed roadway alignment and associated improvements. This geotechnical exploration was authorized through a subcontract agreement between Cardno TBE and PSI dated February 25, 2009 and PSI Proposal 775-8G0027 (Rev.5).

PSI appreciates the opportunity of providing our services to Cardno TBE and Manatee County on this project. If you have questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.
CERTIFICATE OF AUTHORIZATION 3684

Jessica J. Hansen
Project Geologist

Martin E. Millburg, P.E.
Senior Geotechnical Engineer
Florida License No 36584
1/8/10

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FINAL GEOTECHNICAL REPORT
44TH AVENUE EXTENSION
FROM 19TH COURT STREET EAST TO
30TH STREET EAST
MANATEE COUNTY, FLORIDA
TBE PROJECT NO. 00193-001-18 FF
PSI PROJECT NO. 0775121

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1.0 INTRODUCTION

1.1 PROJECT INFORMATION

This study is to support the design of the proposed extension of 44th Avenue from east of 19th Court Street East to 30th Street East. The proposed extension will be approximately 0.85 miles or 4,500 feet in length. A typical rural two-lane divided section is planned. Roadway improvements are also planned at the intersections of 38th Avenue East and US Highway 301, 38th Avenue East and 27th Street East, and 38th Avenue and 30th Street East. Five (5) stormwater ponds are planned at varied distances south of the proposed 44th Avenue roadway alignment. Two (2) additional stormwater ponds are planned for the upgraded intersection of 38th Avenue East and 30th Street East. Mast arms are planned at the 44th Avenue crossing of US Highway 301 and 30th Street East. The intersection of 38th Avenue East and 30th Street East is planned to be upgraded to include a new intersection alignment and two stormwater ponds. The intersection of US Highway 301 and 38th Avenue East is also planned to be upgraded to include a new roadway alignment.

1.2 SITE DESCRIPTION

The proposed corridor extends from 44th Avenue just east of 19th Court Street East to 30th Street East. The proposed roadway extension is located within Sections 6, 7 and 8 in Township 35 South and Range 18 East in Manatee County. The location of the project corridor is presented on Sheet 1 in Appendix B in the form of USDA and USGS vicinity maps. The proposed roadway alignment essentially traverses through an existing cow pasture, crosses over U.S. Highway 301, and then through another existing cow pasture. US Highway 301 is raised at an elevation several feet higher than the adjacent pastureland. The site is relatively flat and open.

2.0 SCOPE OF SERVICES

Our services for this project consisted of providing geotechnical engineering services in general accordance with the Florida Department of Transportation (FDOT) "Soils and Foundation Handbook" and the scope of services as defined in the Subcontract Agreement dated February 25, 2009.

The purpose of this report was to identify the subsurface conditions along the proposed roadway alignment, ponds, mast arms, and existing pavements in order to make engineering recommendations in each of the following areas:

1. General assessment of the area geology based on our past experience and review of available geological literature.

2. Soil stratigraphy at the boring locations. Development of the soil profiles along the proposed roadway alignment, mast arms, and ponds to provide the

anticipated soil conditions within the depth of influence.

3. Assessment of the existing soil subgrade and groundwater conditions along the subject alignment to determine their suitability for pavement support.

4. Assessment of the existing soil subgrade and groundwater conditions in the proposed ponds to determine the seasonal high groundwater table and suitability for fill.

5. Assessment of the existing soil subgrade and groundwater conditions in the proposed mast arm borings to determine their ability to support the proposed structures.

6. General location and description of potential deleterious materials encountered in the borings which may interfere with construction progress or pavement performance, including existing fills or surficial organics.

7. Observed groundwater levels and estimated normal seasonal high groundwater levels at the boring locations.

8. Determined soil parameters for the design of mast arms pole foundations.

9. Identify existing pavement thicknesses and base materials at requested locations.

10. Performed hand augers to delineate the extent of muck and fill at areas of concentration across the site.

The scope of services for the geotechnical testing program associated with the proposed improvements for this project included the following:

1. Conducted a general visual reconnaissance of the site and coordinated boring locations with a survey of the baseline performed on site.

2. Reviewed readily available published geologic and topographic information including the "Soil Survey of Manatee County, Florida" published by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) and the "Bradenton, Florida" Quadrangle Map published by the United States Geologic Survey (USGS).

3. Performed a roadway soil survey consisting of auger soil borings generally extending to 5 feet below the existing grades. The borings were generally performed at approximate intervals of 100 feet along the project alignment.

4. Performed auger borings within the proposed stormwater ponds to depths of approximately 5 to 20 feet below the existing grade.

5. Performed auger soil borings to a depth of approximately 5 feet in the area of the proposed intersection improvements at 38th Avenue East and 27th Street East and 38th Avenue East and 30th Street East.

6. Collected three (3) bulk samples of the near surface soils for the purpose of performing LBR test to assist with pavement design.

7. Performed Standard Penetration Test (SPT) borings for the planned mast arm signal poles and possible deep utilities to depths of 30 to 50 feet deep each.

8. Performed at total of six (6) pavement cores in the existing asphalt pavement areas in and near the existing intersection of US Hwy 301 and 38th Avenue East, as requested. The asphalt and base materials thicknesses were photographed, measured and recorded.

9. Visually examined and classified the sampled soils for roadway borings and ponds according to the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System. Classified structural borings for mast arms using Unified Soil Classification System (USCS).

10. Conducted a limited laboratory testing program consisting of gradation analysis, Atterberg Limit tests, organic content tests and natural moisture content tests to assist in soil classification, development of the roadway, mast arms, and pond soil survey and to determine selected soil properties.

11. Measured groundwater levels and estimated the normal seasonal high groundwater level at each boring location.

12. Developed engineering recommendations for the design and construction of the subgrade and pavement for the proposed roadway improvements.

13. Developed engineering recommendations for the design of foundations for mast arm signal poles.

14. Prepared this Final Geotechnical report summarizing pertinent information from our review of previous geotechnical data, the field and laboratory testing program results, and the subsurface soil and groundwater conditions encountered.

3.0 SUBSURFACE EXPLORATION

3.1 BORING LOCATIONS

All of the roadway borings performed along the subject alignment or adjacent to it were referenced to the 44th Avenue baseline survey as staked in the field by others unless otherwise noted. The boring locations were determined and established in the field by PSI based on survey markers and the existing features shown on the plans and aerial photographs provided. The borings performed at the proposed 30th Street East and 38th Avenue East intersection improvements were referenced to the baseline survey as established by the surveyor and provided to PSI. Boring location HA-6 was not performed due to limited access. The pond borings, mast arm borings and pavement core locations were located based upon GPS data and aerial photographs provided by Cardno TBE.

3.2 ROADWAY SOIL BORINGS

To evaluate the subsurface conditions along the proposed roadway alignment hand auger borings were generally performed at 100-foot intervals and staggered to the left and right of the baseline survey. The roadway borings for the proposed intersection improvements at 38th Avenue East and 27th Street East and 38th Avenue East and 30th Street East were performed at select locations staggered to the left and right of the baseline survey. The roadway borings generally extended to depths of five (5) feet below existing grades at the time our field exploration. The hand auger borings were performed by manually twisting and advancing a bucket auger into the ground in 4 to 6 inch increments. As each soil type was revealed, representative samples were placed in air-tight jars and returned to the PSI Tampa office for review by a geotechnical engineer and confirmation of the field classification.

The approximate boring locations for the subject alignment and upgraded intersections are presented on **Sheets 2 through 4** in **Appendix B**.

3.3 POND SOIL BORINGS

To evaluate the subsurface conditions at or near the proposed pond locations, hand auger borings and power auger borings were performed to depths of approximately five (5) to twenty (20) feet below existing grades. A total of five (5) proposed stormwater ponds extend along the proposed 44th Avenue extension. Two (2) ponds are planned for the 30th Street East and 38th Avenue East intersection upgrades. The hand auger borings were performed by manually twisting and advancing a bucket auger into the ground in 4 to 6 inch increments. As each soil type was revealed, representative samples were placed in air-tight jars and returned to the PSI Tampa office for review by a geotechnical engineer and confirmation of the field classification.

Each power auger boring was performed by advancing a rotating flight auger slowly into the ground in a “corkscrew” fashion. The flight auger is then retrieved; soil samples were taken at intervals of approximately 2 feet and were placed in air-tight jars for transportation and returned to the Tampa office for review by a geotechnical engineer and confirmation of the field classification. After

performing the auger borings, the boreholes were backfilled with available existing materials for safety.

The pond boring locations are presented on **Sheet 5** of **Appendix B**.

3.4 PAVEMENT CORES

Six pavement cores were performed in and near the existing intersection of US Highway 301 and 38th Avenue East. The pavement cores were performed using an 18 inch long core barrel. The base materials extended below the depth of our sampling. The pavement core was patched using hot mix asphalt as directed by the Sarasota office FDOT. The approximate locations are shown on **Sheet 5** of **Appendix B**. Photographs of the recovered cores are shown in **Appendix C**.

3.5 MAST ARM BORINGS

To evaluate the subsurface conditions at or near the proposed mast arm locations, Standard Penetration Test (SPT) borings were performed to depths of approximately thirty (30) to fifty (50) feet below existing grades. The deeper borings were requested to help evaluate subsurface conditions for possible deep utilities which may bee installed. A total of six (6) proposed mast arm borings were performed. Four (4) borings were performed at the proposed intersection of 44th Avenue East and US Highway 301. Two (2) borings were performed at the proposed intersection of 44th Avenue East and 30th Street East. The SPT boring procedure was conducted in general conformance with the American Society for Testing and Materials (ASTM) test designation D-1586. Closely spaced soil sampling was performed in the upper 10 feet with a 5 foot sample interval used thereafter. After seating the SPT sampler 6 inches, the number of successive blows required to drive the sampler 12 inches into the soil constitutes the test result commonly referred to as the "N" value. The "N" value has been empirically correlated with various soil properties and is considered to be indicative of the relative density of cohesionless soils and the consistency of cohesive soils. The recovered split spoon samples were visually classified in the field with representative portions of the samples placed in jars and transported to our Tampa office for review by a geotechnical engineer and confirmation of the field classification. The mast arm boring locations are presented on **Sheet 5** of **Appendix B**.

3.6 BULK SAMPLING FOR LIMEROCK BEARING RATIO (LBR) TESTS

Bulk samples were retrieved from the near surface soils for LBR testing at three locations along the proposed 44th Avenue East roadway alignment. The LBR samples were taken at stations 59+00, 75+00, and 90+00. The LBR results are presented in **Table 6** of **Appendix A**. The graphical results are presented in **Appendix C**.

3.7 MUCK DELINEATION

Unsuitable soils consisting of organic sands and muck were encountered in several locations along the proposed alignment. Organic soils, which are classified as muck (A-8) in the American Association of Highway and Transportation (AASHTO) guidelines were encountered in three borings along the subject alignment. The muck is identified as Strata 3 in the legend. The borings

which encountered these materials are summarized in the following table. Additional hand auger borings were performed in the vicinity of these borings to delineate the approximate horizontal and vertical extent of unsuitable materials to better quantify them. The results of the delineation program are presented on **Sheets 10** in **Appendix B**.

Boring Location	Approximate Depth of Unsuitable Soils (feet)
HA-5	3.5 - 4.5
HA-7	2 - 3
HA-25	2.5 - 3

4.0 LABORATORY TESTING

4.1 SOIL CLASSIFICATION TESTING

Representative soil samples collected from the borings were visually reviewed in the laboratory by a geotechnical engineer to confirm the field classification. The samples from the roadway and pond borings were classified in general accordance with the AASHTO Classification System. The samples from the mast arm borings were classified in general accordance with the USCS Classification System. Classification was based on visual observations with the aid of the laboratory test results performed on selected representative samples. Laboratory classification tests consisting of grain-size analysis (gradation), Atterberg Limits, organic content and natural moisture content tests were performed on selected soil samples believed to be representative of the materials encountered.

4.2 LABORATORY TEST RESULTS

Sheet 9 in **Appendix B** summarizes the laboratory testing program for roadway as described above. The laboratory test results performed for the roadway, pond and mast arm soil borings are summarized on **Table 5** in **Appendix A**.

5.0 GENERALIZED SUBSURFACE SOIL CONDITIONS

5.1 GENERAL GEOLOGY

Surface and near surface sediments in Manatee County consist of Pleistocene to Halocene quartz sands, consolidated and unconsolidated shell beds, clays, limestone and dolomite. These soils generally makeup the shallow unconfined aquifer system.

Some portions of eastern Manatee County also include the Peace River Formation within this stratigraphic profile. The Peace River Formation makes up the upper most part of the Hawthorne Group. This formation is absent in parts of the county. The formation consists of sediments of yellowish-gray to light olive green interbedded phosphatic sands, clayey sand, clays

and dolomite stringers. The thickness of the formation ranges from 0 to 110 feet thick.

The Arcadia Formation makes up most of the Hawthorne Group throughout Manatee County. The top of the Arcadia Formation is encountered at approximately mean sea level in southeastern Manatee County to just over 100 feet below mean sea level in the southern part of the county. The Arcadia Formation dips gently to the south-southeast. The thickness of this formation ranges from approximately 300 to over 490 feet. The makeup generally consists of white to yellowish-gray quartz sand, phosphatic, sometimes clayey dolomites and limestones. Occasional beds of carbonate rich quartz sand and thin clay beds are present.

The lower unit of the Suwannee Limestone is generally a pale gray to light yellow calculitic limestone. The lower unit is typically softer, more calculitic and less porous and fossiliferous than the upper unit and may contain finely divided pyrite. The top of the Suwanee Limestone is encountered at approximately 360 feet below mean sea level in the southeastern-most part of the country; the top of the Suwannee Limestone is encountered at depths of approximately 150 feet in other parts of the county.

The Oligocene Series consists of Suwannee Limestone. This is generally broken down into two (2) units. The upper unit of the Suwannee Limestone is a creamy white to light yellowish gray limestone containing darker dolomitized zones. The undolomitized portions are variable packstone to wackestone, poorly to well indurated and variably recrystallized. The upper unit is highly fossiliferous, containing abundant poorly preserved foraminifera, mollusks, echinoids and corals.

5.2 MANATEE COUNTY SOIL SURVEY

The USDA Soil Survey map for the project vicinity was reviewed for information regarding near surface soil and groundwater information. A copy of the USDA Soil Survey has been attached as **Sheet 1** of **Appendix B**. The Manatee County Soil Survey identifies three primary mapping units along the roadway alignment. **Table 1** in **Appendix A** summarizes the general descriptions of the mapping units encountered.

It should be noted that information contained in the USDA Soil Survey is very general and may be outdated. It may not therefore be reflective of actual soil and groundwater conditions, particularly if recent development in the project vicinity has modified soil conditions or surface/subsurface drainage.

5.3 USGS TOPOGRAPHIC SURVEY

The published USGS topographic survey maps entitled “Bradenton, Florida” was reviewed for ground surface features along the project route. Based on this review, the natural ground surface elevations within the project vicinity range from approximately 25 to 35 feet.

5.4 ROADWAY AND POND SOIL BORING RESULTS

Based upon the exploratory borings and results of the laboratory testing, the near surface soils along

the project alignment and proposed ponds have been grouped into seven categories/strata. Each stratum group exhibits a range of engineering properties related to their suitability for roadway construction as outlined by FDOT Standard Index 505. **Sheet 9** is provided in **Appendix B** shows the general range of engineering properties measured in the laboratory and suitability of the various soil strata encountered during our exploration.

The results of the auger borings performed for the proposed roadway and stormwater ponds are presented on **Sheets 6** and **7** of **Appendix B**, along with the profile legend and other pertinent information such as measured groundwater levels. Soil stratification is based on an examination of the recovered soil samples, the laboratory testing, and interpretation of field boring logs by a geotechnical engineer. The stratification lines represent the approximate boundaries between soil types of significantly different engineering properties. The actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation my have been abbreviated or omitted for clarity. The profiles represent the conditions at the boring locations only and variations may occur among the borings.

In general, the soil strata encountered in the auger borings performed along the proposed 44th Avenue Extension are summarized in the following table:

STRATUM	SOIL DESCRIPTION	AASHTO SOIL CLASSIFICATION
1	Light Brown to Dark Gray Clean Sand to Slightly Silty Sand	A-3
2	Gray Slightly Silty to Silty Sand (Non-Plastic)	A-2-4
3	Dark Brown to Black Organic Silty Sand	A-8
4	Mixed Fill (Sands, Silts, Clays and Cemented Clays)	Fill
5	Gray to Brown Silty to Slightly Clayey Sand (Plastic)	A-2-4
6	Tan, Gray to Greenish Brown Slightly Calcareous Sandy Silt with Trace Phosphates and Silty Clay	A-6
7	Gray, Brown and Blue-Green Sandy Clay to Clay	A-7

5.5 MAST ARM SOIL BORING RESULTS

Based upon the exploratory borings and results of the laboratory testing, the near surface soils at the mast arms (structure) have been grouped into five categories/strata. **Sheet 8** provided in **Appendix B** shows the results of the soil borings including soil stratum legend, SPT resistances and measured groundwater levels. Soil stratification is based on an examination of the recovered soil samples, the laboratory testing, and interpretation of field boring logs by a geotechnical engineer. The stratification lines represent the approximate boundaries between soil types of significantly different engineering properties. The actual transition may be gradual. In some cases, small variations in properties not considered pertinent to our engineering evaluation my have been abbreviated or omitted for clarity. The profiles represent the conditions at the boring locations only and variations may occur among the borings. Geotechnical engineering parameters for the structure borings are presented in **Table 7** of **Appendix A**.

In general, the soil strata encountered in the mast arm borings performed along the proposed 44th Avenue Extension are summarized in the following table:

SOIL DESCRIPTION	USCS SOIL CLASSIFICATION
Light Brown to Dark Gray Fine Sand to Slightly Silty Fine Sand	SP/SP-SM
Gray to Brown Clayey Sand	SC
Tan, Gray to Greenish Brown Slightly Calcareous Sandy Silt with Trace Phosphates	MH
Gray Interbedded Limestone (Dolostone) and Clay	Limestone/Dolostone
Light Gray Silty Sand	SM

5.6 PAVEMENT CORE RESULTS

The following table summarizes the pavement core results.

PAVEMENT CORE	NORTHING	EASTING	ASPHALT THICKNESS (INCH)	BASE THICKNESS (INCH)
PC-301	1138814.8050	483556.9999	11	7+
PC-302	1138811.2267	483639.2296	18+ (ONLY 2 INCHES RECOVERED)	DID NOT PENETRATE THOUGH ASPHALT
PC-303	1138811.0633	483656.6553	6 ¾	11+
PC-304	1138792.5185	483766.5681	14	4+
PC-305	1138795.4465	483783.3408	5	13+
PC-306	1138551.4087	483803.9370	4	6+

The base materials in the five pavement cores performed in the intersection (PC-301 to PC-305) consisted of soil cement with some shell fragments. The base material encountered in PC-306 was shell fragments and sand.

5.7 GROUNDWATER

The depth to the static water table was measured after a short stabilization period following completion of each soil boring. Water tables were generally found to range from 1 foot to greater than 5 feet below the existing ground surface. The groundwater table depths measured at each boring location during our field survey, when encountered, are presented on **Sheet 6** through **8** of **Appendix B**.

Groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences, such as existing swales, drainage ponds and underdrains. The estimated seasonal high groundwater levels provided are based upon current conditions at the project site and do not account for proposed improvements or future conditions following the altering of the area during construction. In addition, a seasonal effect will also occur in which higher groundwater levels are normally recorded during the rainy seasons. Water levels obtained in SPT borings may be affected by the use of drilling mud and should not be considered as reliable as observations made in borings where drilling mud was not used.

Seasonal high groundwater table depths were estimated at selected auger boring locations for the proposed roadway alignment and stormwater management facilities. Observed and estimated groundwater level information is presented in **Tables 2 and 3** in **Appendix A**. These estimates are based on the soil stratigraphy, measured groundwater levels in the borings, USDA information and past experience. In areas where subsurface soil conditions were disturbed, normal indications such as "stain lines" were not evident.

6.0 ENGINEERING EVALUATIONS & RECOMMENDATIONS

6.1 PAVEMENT DESIGN CONSIDERATIONS

LBR samples have been collected at three locations along the proposed roadway alignment.

It should be noted that the LBR values may not be representative of borrow materials, which may support some of the new proposed roadway. An approximate LBR value should be used in design for fill soils used beneath the proposed pavement section unless borrow sources are known and tested. When fill sources are not known, based on previous experience, a design LBR value of 20 should be available from typical compacted "Select" fill as defined in Index 505. LBR tests on near surface soils yielded design LBR values of 37 based on the +/- 2% of optimum method.

It is recommended that the subgrade soils be stabilized to a minimum LBR of 40. The amount of stabilizing material required will vary depending on the LBR values of the borrow materials.

Groundwater levels along the corridor varied from less than 1 foot to greater than 5 feet below the existing ground surface. Groundwater levels may be at or above the ground surface in some areas for brief periods during heavy rainfall events. In accordance with FDOT guidelines, grades for this type of roadway should be ideally set to provide a minimum separation of 3 feet between the bottom of the base and the estimated seasonal high groundwater levels. Some reduction from this value may be allowed for local roadways. The choice of base material would depend upon the relationship of final roadway improvement grades and the bottom of the base to the estimated seasonal high groundwater table levels.

6.2 SOIL USAGE SUMMARY

In general, the existing subsurface soils should be acceptable for construction to support a typical embankment pavement section after proper subgrade preparation. Unsuitable soils or debris, if encountered within the construction limits during construction, should be removed and replaced with compacted select fill as outlined herein.

The generalized soil strata information is shown on **Sheet 9** in **Appendix B**. Material use and/or removal should be completed in accordance with FDOT Indices 500 and 505. Materials directly beneath the base should be "SELECT" materials. The following summarizes the generalized use or non-use of the soils and materials that will most likely be encountered during construction.

- The material from Strata number 1 (A-3) appears satisfactory for use in the embankment when utilized in accordance with Index 505.

- The material from Stratum number 2 (A-2-4/Non-Plastic) and Stratum number 5 (A-2-4/Plastic) appears satisfactory for use in the embankment when utilized in accordance with Index 505. However, this material is likely to retain excess moisture and may be difficult to dry and compact. It should be used in the embankment above the water level existing at the time of construction.

- The material from Stratum number 3 is organic muck (A-8) material and shall be removed in accordance with Index 500.

- The material from Stratum number 4 (mixed fill) contains plastic material and shall be removed in accordance with Index 500. If separated, the sand portion of this material may be placed above the existing water level (at the time of construction) to within 4 feet of the proposed base. If not separated, this material should be treated as highly plastic and may only be used as indicated in Index 505 when excavated within the project limits and is not to be used when obtained from outside the project limits.

- The material from Stratum number 6 (A-6) and Stratum number 7 (A-7) is highly plastic and shall be removed in accordance with Index 500. It may be used within the project limits as indicated in Index 505 only when excavated within the project limits and is not to be used when obtained from outside the project limits.

6.3 ORGANIC SOIL REMOVAL

Organic soils, classified as Stratum 3 (A-8), were encountered in roadway borings at the following locations: Station 56+00, 10 feet left; Station 58+00, 10 feet left; Station 76+00, 10 feet left. Organic soils are highly compressible and may cause excessive settlements if left in-place. This material is also susceptible to significant secondary compression settlements. The organic soils were encountered at the boring locations at variable depths ranging from 1½ to 4 feet below the existing ground surface. The Muck Delineation Pan on **Sheet 10** of **Appendix B** indicates the extent of organic soils encountered in our additional hand auger borings. We anticipate these organic soils will be removed.

The removal of topsoil and other shallow surficial organic soil deposits should be accomplished in accordance with FDOT Standard Specification for Road and Bridge Construction, Section 110 and as outlined in the Soil Survey Summary table notes on **Sheet 9** of **Appendix B**. Backfill should consist of materials conforming to Standard Index 505 and placed in accordance with Section 120 of the Standard Specification.

6.4 TEMPORARY SIDE SLOPES

In areas where temporary excavation side slopes are feasible, side slopes may stand near one (1) horizontal to one (1) vertical (1H:1V) for short dry periods of time (less than 24 hours) and a maximum excavation depth of five (5) feet. Where restrictions will not permit slopes to be laid back as presented above, the excavation should be shored in accordance with the most current Occupational Safety and Health Administration (OSHA) requirements. Furthermore, open-cut excavations up to a maximum depth of five (5) feet (for periods longer than 24 hours) should be properly dewatered and sloped on 1.5H:1V or flatter or be braced using a bracing plan approved by a professional engineer licensed in the State of Florida. Excavated materials should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth.

6.5 GROUNDWATER CONTROL

Depending upon groundwater levels at the time of construction, some form of dewatering may be required to achieve the required compaction. Groundwater can normally be controlled in shallow excavations with pumps and sumps. During subgrade soil preparation any plastic soils below design grade could become disturbed by construction activities. If this becomes the case, the contractor may be directed by the engineer to remove the disturbed or pumping soils to a depth of 1 to 2 feet below design grade and backfill the area with structural fill. In such situations, FDOT Indices 500 and 505 should be followed closely.

6.6 GENERAL ROADWAY CONSTRUCTION RECOMMENDATIONS

The overall site preparation and mechanical densification work for the construction of the roadway, should be in accordance with the FDOT Standard Specifications for Road and Bridge Construction and Standard Index requirements.

6.7 LATERAL EARTH PRESSURES

Walls for the culverts will be subject to lateral earth pressures. Walls which are restrained at the top and bottom will be subjected to at-rest soil pressures equivalent to a fluid unit weight of 55 pcf. Walls which are not restrained at the top and where sufficient movement may mobilize active earth pressures and an equivalent fluid weight of 36 pcf can be used. At locations where the base of the walls extends below the groundwater table, soil pressures can be calculated using half (½) the equivalent fluid density; however, hydrostatic and seepage forces must then also be included. The given soil pressures do not include any surcharge effects for sloped backfill; point or area loads behind the walls assume that adequate drainage provisions have been incorporated. The walls must be designed by the structural engineer to resist both lateral earth and hydrostatic pressures.

7.0 STORMWATER PONDS

As part of the planned improvements, a total of seven (7) wet stormwater ponds are planned. Five (5) ponds will be along the south side of the proposed 44th Avenue East roadway alignment. Two (2) ponds will be located at the new 38th Avenue East and 30th Street East intersection.

To evaluate the subsurface conditions at the pond sites, hand auger and power auger borings were performed to depths of approximately 5 to 20 feet below existing grades. The boring locations and are shown on **Sheet 5** in **Appendix B**. The soil profiles are on **Sheet 7** of **Appendix B**. Seasonal high groundwater information is found on **Table 3** of **Appendix A**.

8.0 MAST ARM SIGNAL POLE FOUNDATIONS

New mast arm signal poles are planned for the proposed intersection of the 44th Avenue extension and US Highway 301 and 44th Avenue and 30th Street East. A total of six (6) SPT borings were performed for the proposed mast arms signal poles to depths of 30 to 50 feet below existing grade.

The boring locations are presented on the Report of Core Boring **Sheet 5** in **Appendix B**. The boring profiles are on **Sheet 8** of **Appendix B**. **Table 7** of **Appendix A** presents the soil parameters for each soil strata encountered. Included in the soil parameter table are the soil unit weight, friction angle, cohesion and coefficients of active and passive earth pressure.

It is our understanding that the foundation system for the proposed mast arms will be designed by others. Once the final loads are known, the mast arm signal pole foundations should be designed using the soil parameters provided on **Table 7** in **Appendix A**. The foundation design should also consider torsional loads created by wind action.

9.0 FHWA REPORT CHECKLIST

As referenced in the latest Structures Design Guidelines conformance to the FHWA Report "Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Plans and Specifications" prepared by the Geotechnical and Materials Branch, FHWA, Washington, D.C., dated October 1985, is required when preparing geotechnical reports. The FHWA checklist for this report is enclosed in **Appendix D** of this report.

10.0 REPORT LIMITATIONS

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices at the time of this report. PSI is not responsible for the conclusions, opinions or recommendations made by others based on these data.

The scope of the exploration was intended to evaluate shallow soil conditions and does not include an evaluation of the potential of sinkhole development for the project site. The analyses and recommendations submitted in this report are based upon the anticipated location and type of construction and the data obtained from the soil borings performed at the locations indicated and does not reflect any variations which may occur among these borings. If any variations become

evident during the course of construction, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. When final design plans and specifications are available, a general review by our office should be completed to check that the assumptions made in preparation of this report are correct and that earthwork and foundation recommendations are properly interpreted and implemented.

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

APPENDIX A

TABLES 1 – 7

TABLE 1
SUMMARY OF USDA SOIL SURVEY
44TH AVENUE EXTENSION
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775121

USDA MAP SYMBOL AND SOIL NAME	SOIL CLASSIFICATION				SEASONAL HIGH WATER TABLE			RISK OF CORROSION	
	DEPTH (in)	AASHTO GROUP	USCS GROUP	PERMEABILITY (in/hr)	DEPTH (ft)	KIND	DURATION (months)	UNCOATED STEEL	CONCRETE
(17) Delray Complex	0 - 15	A-3, A-2-4	SP-SM, SM, SM-SC	6.0 - 20	0 - 1.0	Apparent	Jun - Mar	Moderate	Low
	15 - 55	A-3, A-2-4	SP-SM	6.0 - 20					
	55 - 80	A-2-4, A-2-6	SM, SM-SC, SC	0.6 - 6.0					
EauGallie Complex	0 - 23	A-3	SP, SP-SM	6.0 - 20	0 - 1.0	Apparent	Jun - Oct	High	Moderate
	23 - 35	A-3, A-2-4	SP-SM, SM	0.6 - 6.0					
	35 - 43	A-3, A-2-4	SP, SP-SM	6.0 - 20					
	43 - 62	A-2-4, A-2-6	SM, SM-SC, SC	0.6 - 6.0					
	62 - 80	A-3, A-2-4	SP-SM, SM	2.0 - 6.0					
(20) EauGallie Fine Sand	0 - 28	A-3	SP, SP-SM	6.0 - 20	0 - 1.0	Apparent	Jun - Oct	High	Moderate
	28 - 42	A-3, A-2-4	SP-SM, SM	0.6 - 6.0					
	42 - 50	A-2-4, A-2-6	SM, SM-SC, SC	0.6 - 6.0					
	50 - 65	A-3, A-2-4	SP-SM, SM	2.0 - 6.0					
(38) Palmetto Sand	0 - 25	A-3, A-2-4	SP, SP-SM	6.0 - 20	0 - 1.0	Apparent	Jun - Nov	High	High
	25 - 45	A-3, A-2-4	SP-SM	6.0 - 20					
	45 - 64	A-2-4, A-2-6	SM, SM-SC, SC	0.2 - 0.6					
	64 - 68	A-3, A-2-4	SM, SP-SM	2.0 - 6.0					

TABLE 2
SUMMARY OF ESTIMATED SHGWL - ROADWAY
44TH AVENUE EXTENSION
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775121

BORING NUMBER	BORING LOCATION			BORING DEPTH (feet)	GROUNDWATER TABLE		DATE RECORDED	ESTIMATED SHGWT[2]	
	STATION NO.	OFFSET (feet)	ELEVATION (feet)		DEPTH[1] (feet)	ELEVATION (feet)		DEPTH (feet)	ELEVATION (feet)
HA - 1	52 + 00	10 LT	-	5.0	GNA	-	04/16/09	>1	-
HA - 2	53 + 00	4 LT	-	5.0	GNA	-	04/16/09	>1	-
HA - 3	54 + 00	10 LT	-	5.0	GNA	-	04/16/09	>1	-
HA - 4	55 + 00	10 RT	-	5.0	GNA	-	04/16/09	>1	-
HA - 5	56 + 00	10 LT	-	5.0	3.5	-	04/16/09	<1	-
HA - 7	58 + 00	10 LT	-	5.0	GNA	-	04/16/09	>1	-
HA - 8	59 + 00	10 RT	-	5.0	3.5	-	04/16/09	<1	-
HA - 9	60 + 00	10 LT	-	5.0	3.5	-	04/16/09	<1	-
HA - 10	61 + 00	10 RT	-	5.0	GNA	-	04/13/09	>1	-
HA - 11	62 + 00	10 LT	-	5.0	GNA	-	04/13/09	>1	-
HA - 12	63 + 00	10 RT	-	5.0	GNA	-	04/13/09	>1	-
HA - 13	64 + 00	10 LT	-	5.0	GNA	-	04/13/09	>1	-
HA - 14	65 + 00	10 RT	-	5.0	4.5	-	04/13/09	>1	-
HA - 15	66 + 00	10 LT	-	5.0	GNA	-	04/13/09	>1	-
HA - 16	67 + 00	10 RT	-	5.0	GNA	-	04/13/09	>1	-
HA - 17	68 + 00	10 LT	-	5.0	GNA	-	04/13/09	>1	-
HA - 18	69 + 00	10 RT	-	5.0	GNA	-	04/13/09	>1	-
HA - 19	70 + 00	10 LT	-	5.0	GNA	-	04/13/09	>1	-
HA - 20	71 + 00	10 RT	-	5.0	4.5	-	04/13/09	<1	-
HA - 21	72 + 00	10 LT	-	5.0	GNA	-	04/13/09	>1	-
HA - 22	73 + 00	10 RT	-	5.0	4.5	-	04/13/09	<1	-
HA - 23	74 + 00	10 LT	-	5.0	GNA	-	04/13/09	>1	-
HA - 24	75 + 00	10 RT	-	5.0	GNA	-	04/10/09	>1	-
HA - 25	76 + 00	10 LT	-	5.0	GNA	-	04/10/09	>1	-
HA - 26	77 + 00	10 RT	-	5.0	GNA	-	04/10/09	>1	-

TABLE 2
SUMMARY OF ESTIMATED SHGWL - ROADWAY
44TH AVENUE EXTENSION
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775121

BORING NUMBER	BORING LOCATION			BORING DEPTH (feet)	GROUNDWATER TABLE		DATE RECORDED	ESTIMATED SHGWT[2]	
	STATION NO.	OFFSET (feet)	ELEVATION (feet)		DEPTH[1] (feet)	ELEVATION (feet)		DEPTH (feet)	ELEVATION (feet)
HA - 27	78 + 00	10 LT	-	5.0	GNA	-	04/10/09	>1	-
HA - 28	79 + 00	10 RT	-	5.0	GNA	-	04/10/09	>1	-
HA - 29	80 + 00	10 LT	-	5.0	GNA	-	04/10/09	>1	-
HA - 30	81 + 00	10 RT	-	5.0	GNA	-	04/10/09	>1	-
HA - 31	85 + 00	10 LT	-	5.0	GNA	-	04/16/09	>1	-
HA - 32	86 + 00	10 RT	-	5.0	GNA	-	04/16/09	>1	-
HA - 33	87 + 00	10 LT	-	5.0	GNA	-	04/16/09	>1	-
HA - 34	88 + 00	10 RT	-	5.0	4.5	-	04/17/09	<1	-
HA - 35	89 + 00	10 LT	-	5.0	4.5	-	04/17/09	<1	-
HA - 36	90 + 00	10 RT	-	5.0	GNA	-	04/16/09	>1	-
HA - 37	91 + 00	10 LT	-	5.0	GNA	-	04/16/09	>1	-
HA - 38	92 + 00	10 RT	-	5.0	GNA	-	04/16/09	>1	-
HA - 39	93 + 00	10 LT	-	5.0	GNA	-	04/16/09	>1	-
HA - 40	94 + 00	10 RT	-	5.0	GNA	-	04/16/09	>1	-
HA - 41	95 + 00	15 LT	-	5.0	4.5	-	04/16/09	<1	-
HA - 42	96 + 00	20 RT	-	5.0	GNA	-	04/16/09	>1	-
HA - 43	235 + 00	5 RT	-	3.5	GNA	-	04/24/09	<1	-
HA - 44	234 + 00	5 LT	-	5.0	GNA	-	04/24/09	>1	-
HA - 45	233 + 00	5 RT	-	4.5	GNA	-	04/24/09	<1	-
HA - 46	225 + 00	5 LT	-	5.0	GNA	-	04/24/09	>1	-
HA - 47	223 + 00	5 RT	-	5.0	GNA	-	04/24/09	>1	-
HA - 48	301 + 00	5 LT	-	5.0	GNA	-	04/24/09	>1	-

(1) Depth below existing grades at the time of field work.
(2) SHGWT indicates seasonal high groundwater table.

TABLE 3
SUMMARY OF ESTIMATED SHGWL - SEASONAL HIGH BORINGS AND PONDS
44TH AVENUE EXTENSION
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775121

BORING NUMBER	BORING LOCATION				BORING DEPTH	GROUND ELEVATION	GROUNDWATER TABLE		DATE RECORDED	ESTIMATED SHGWT[3]	
	STATION NO.	OFFSET (feet)	APPROXIMATE GPS COORDINATES Latitude	Longitude	(feet)	(feet)	DEPTH[1] (feet)	ELEVATION[2] (feet)		DEPTH (feet)	ELEVATION (feet)
SH - 1	57 + 69	169 RT	27° 27' 42.1" N	82° 32' 17.2" W	7.0	30.6	5.5	25.1	04/17/09	1.5	29.1
SH - 2	75 + 95	214 RT	27° 27' 40.0" N	82° 31' 57.1" W	7.0	31.2	6.0	25.2	04/17/09	2.0	29.2
SH - 3	86 + 77	161 RT	27° 27' 40.4" N	82° 31' 45.1" W	7.0	31.0	5.5	25.5	04/17/09	1.5	29.5
SH - 4	94 + 11	442 RT	27° 27' 37.5" N	82° 31' 37.0" W	7.0	29.3	4.5	24.8	04/17/09	0.5	28.8

BORING NUMBER[4]	BORING LOCATION		BORING DEPTH	GROUND ELEVATION	GROUNDWATER TABLE		DATE RECORDED	ESTIMATED SHGWT[3]	
	Northing	Easting	(feet)	(feet)	DEPTH[1] (feet)	ELEVATION[2] (feet)		DEPTH (feet)	ELEVATION (feet)
SH - 101	1137389.60	481130.61	2.0	31.2	1.0	30.2	09/02/09	1.0	30.2
SH - 102	1137438.81	481999.28	3.0	32.0	1.0	31.0	09/02/09	1.0	31.0
SH - 103	1137390.62	482162.82	2.0	32.7	0.5	32.2	09/02/09	0.5	32.2
SH - 104	1137391.05	482676.26	2.0	32.7	1.0	31.7	09/02/09	1.0	31.7
SH - 105	1137346.58	483154.08	2.0	32.1	1.0	31.1	09/02/09	1.0	31.1
SH - 106	1137327.58	483799.30	2.0	31.8	1.0	30.8	09/02/09	1.0	30.8
SH - 107	1137159.50	484605.09	2.0	30.7	1.0	29.7	09/02/09	1.0	29.7
SH - 108	1136919.52	484527.14	2.0	31.1	1.0	30.1	09/02/09	1.0	30.1
SH - 109	1136919.82	484816.57	2.0	30.3	1.5	28.8	09/02/09	1.5	28.8
SH - 110	1138027.49	485515.30	3.0	28.8	1.5	27.3	09/04/09	1.5	27.3
SH 111	1138564.00	485355.98	4.0	26.7	2.5	24.2	09/04/09	2.5	24.2
SH - 112	1138613.34	485501.28	3.0	24.5	1.5	23.0	09/04/09	1.5	23.0
SH - 113	1138851.91	484472.94	5.0	29.9	3.0	26.9	09/04/09	3.0	26.9
B - 204	1137399.96	482636.25	20	32.5	1.5	31.0	10/26/09	1.0	31.5
B - 205	1137367.86	483012.67	20	32.3	1.5	30.8	10/26/09	1.0	31.3
B - 210	1137114.22	484656.46	20	30.3	1.5	28.8	10/27/09	1.0	29.3
B - 211	1136926.98	484563.93	20	31.1	1.5	29.6	10/27/09	1.0	30.1
B - 212	1136919.54	484841.79	20	30.0	1.5	28.5	10/27/09	1.0	29.0
AB - 201	1138648.30	485562.28	5	23.5	2.8	20.7	12/04/09	1.0	22.5
AB - 202	1138753.99	485418.24	5	23.0	3.0	20.0	12/04/09	0.5	22.5

(1) Depth below existing grades at the time of field work.
(2) Elevations were obtained by surveyor contracted by TBE.
(3) SHGWT indicates seasonal high groundwater table.
(4) All B borings on this page used drilling mud, which affects water level readings. If shallow hand auger data is near these locations, that data should be considered more reliable.

TABLE 4
SUMMARY OF ESTIMATED SHGWL - MAST ARMS
44TH AVENUE EXTENSION
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775121

BORING NUMBER	BORING LOCATION			BORING DEPTH	GROUNDWATER TABLE		DATE RECORDED	ESTIMATED SHGWT[2]	
	Northing	Easting	ELEVATION (feet)	(feet)	DEPTH[1] (feet)	ELEVATION (feet)		DEPTH (feet)	ELEVATION (feet)
B-206	1137482.98	484067.95	30.7	50	3.5	27.2	11/17/09	1.0	29.7
B-207	1137490.52	484280.71	32.7	35	3.5	29.2	11/18/09	1.5	31.2
B-208	1137305.39	484072.76	31.7	30	2.0	29.7	10/29/09	1.5	30.2
B-209	1137300.59	484295.81	31.0	30	1.8	29.2	10/27/09	1.3	29.7
B-213	1137395.93	485528.75	30.1	30	1.5	28.6	10/27/09	1.0	29.1
B-214	1137248.11	485631.41	31.0	30	2.0	29.0	10/27/09	1.5	29.5

(1) Depth below existing grades at the time of field work.
(2) SHGWT indicates seasonal high groundwater table.
(3) All borings on this page used drilling mud, which affects water level readings. If shallow hand auger data is near these locations, that data should be considered more reliable.

TABLE 5
SUMMARY OF LABORATORY TEST RESULTS
44TH AVENUE EXTENSION
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775121

ROADWAY BORING LOCATION			SAMPLE DEPTH (feet)	ORGANIC CONTENT (%)	MOISTURE CONTENT (%)	SIEVE ANALYSES (%)					ATTERBERG LIMITS (%)		AASHTO GROUP	ROADWAY/ POND STRATUM NUMBER
STATION NO.	OFFSET[(1)] (feet)	BORING NO.				#10	#40	#60	#100	#200	LL	PI		
58 + 00	10 L	HA-7	2 - 3	13	-	-	-	-	-	-	-	-	A-8	3
62 + 00	10 L	HA-11	4 - 5	-	18	-	-	-	-	16	-	-	A-2-4	2
68 + 00	10 L	HA-17	3 - 4	3	-	-	-	-	-	-	-	-	A-3	1
76 + 00	10 L	HA-25	1.5 - 3	5	-	-	-	-	-	-	-	-	A-8	3
80 + 00	10 L	HA-29	4 - 5	-	22	-	-	-	-	11	-	-	A-2-4	2
87 + 00	10 L	HA-33	2.5 - 3	-	12	-	-	-	-	3	-	-	A-3	1
90 + 00	10 R	HA-36	3 - 5	3	25	-	-	-	-	15	-	-	A-2-4	2
93 + 00	10 L	HA-39	2.5 - 3	-	22	-	-	-	-	19	26	9	A-2-4	5
96 + 00	10 R	HA-42	3 - 4	2	-	-	-	-	-	-	-	-	A-3	1
57 + 69	169 R	SH-1	5 - 5.5	-	-	-	-	-	-	-	46	31	A-7-6	7
57 + 69	169 R	SH-1	6.5 - 7	-	-	-	-	-	-	-	35	11	A-6	6
94 + 11	442 R	SH-4	3.5 - 4	5	-	-	-	-	-	-	-	-	A-8	3

POND BORING LOCATION			SAMPLE DEPTH (feet)	ORGANIC CONTENT (%)	MOISTURE CONTENT (%)	SIEVE ANALYSES (%)					ATTERBERG LIMITS (%)		AASHTO GROUP	ROADWAY/ POND STRATUM NUMBER
Northing	Easting	BORING NO.				#10	#40	#60	#100	#200	LL	PI		
1137427.48	481931.62	B-202	6 - 8	-	-	-	-	-	-	-	39	18	A-6	6
1137399.96	482636.25	B-204	0 - 2	2	-	-	-	-	-	-	-	-	A-2-4	2
1137114.22	484656.46	B-210	14 - 16	-	-	-	-	-	-	-	36	9	A-6	6
1136926.98	484563.93	B-211	8 - 10	-	33	-	-	-	-	62	-	-	A-6	6

MAST ARM BORING LOCATION			SAMPLE DEPTH (feet)	ORGANIC CONTENT (%)	MOISTURE CONTENT (%)	SIEVE ANALYSES (%)					ATTERBERG LIMITS (%)		USCS GROUP	STRUCTURE STRATUM NUMBER
Northing	Easting	BORING NO.				#10	#40	#60	#100	#200	LL	PI		
1137300.59	484295.81	B-209	0 - 2	2	-	-	-	-	-	-	-	-	SP/SP-SM	1
1137395.93	485528.75	B-213	8 - 10	-	21	-	-	-	-	44	-	-	SC	2
1137248.11	485631.41	B-214	10 - 15	-	-	-	-	-	-	-	53	18	MH	3

TABLE 6
SUMMARY OF LIMEROCK BEARING RATIO TEST RESULTS
44TH AVENUE EXTENSION
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775121

SAMPLE LOCATION (feet)		DEPTH (feet)	AASHTO CLASSIFICATION	STRATUM NUMBER	FINER THAN #200 SIEVE (%)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)	LBR VALUE (%)	-2% OPTIMUM LBR VALUE (%)	+2% OPTIMUM LBR VALUE (%)
STATION	OFFSET									
59+00	ONLINE	0-2	Fill	4	47	117	11	37	27	28
75+00	ONLINE	0-2	A-3	1	5	105	10	46	38	42
90+00	ONLINE	0-2	A-2-4	2	15	120	10	45	35	28

TABLE 7
GEOTECHNICAL ENGINEERING PARAMETERS - STRUCTURE BORINGS
44TH AVENUE EXTENSION
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775121

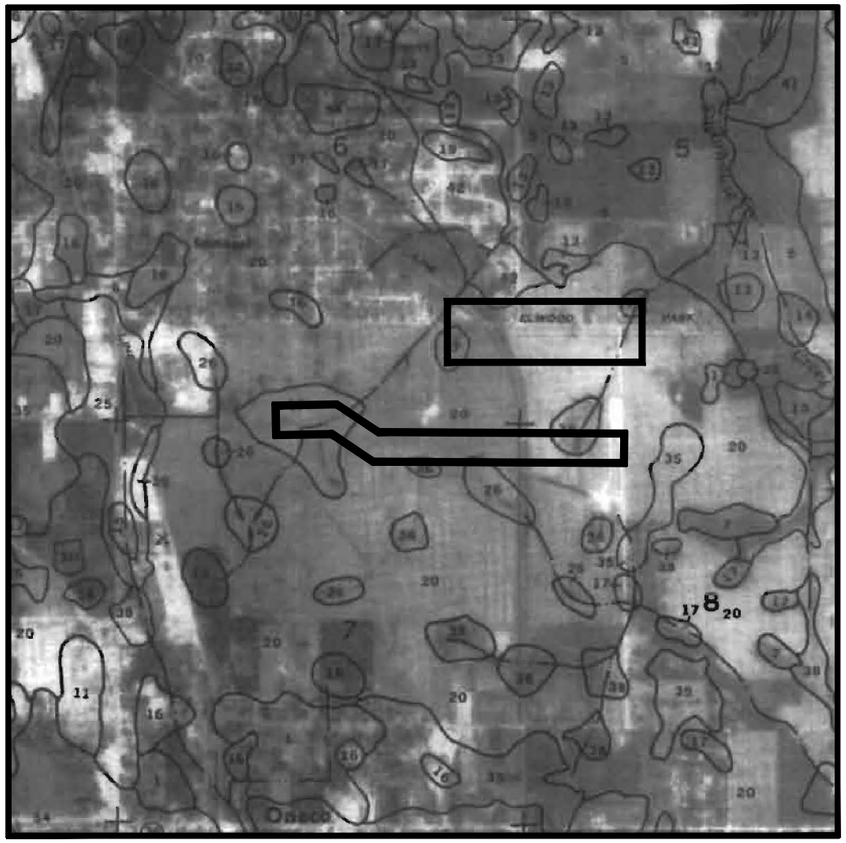
Boring No.	Approximate Elevation* (ft)	Soil Description	Soil Type	Average SPT-N	Unit Weight (pcf)		Cohesion (psf)	Friction Angle (degree)	Ultimate Shear Strength (psf)	Coefficient of Lateral Pressure		
					Total	Submerge				Ka	Kp	Ko
B-206	30.7 - 22.0	SP/SP-SM	Cohesionless	15	105	42.6	-	31	-	0.32	3.12	0.43
	22.0 - 18.5	SM	Cohesionless	20	110	47.6	-	32	-	0.31	3.25	0.42
	18.5 - -4.5	MH	Cohesive	50	125	62.6	6250	-	-	1.00	1.00	1.00
	-4.5 - -19.3	Limestone	Rock	50	135	72.6	-	-	8000	1.00	1.00	1.00
B-207	32.7 - 17.5	SP/SP-SM	Cohesionless	14	105	42.6	-	31	-	0.32	3.10	0.44
	17.5 - 8.0	MH	Cohesive	50	125	62.6	6250	-	-	1.00	1.00	1.00
	8.0 - -2.3	Limestone	Rock	50	135	72.6	-	-	8000	1.00	1.00	1.00
B-208	31.7 - 19.7	SP/SP-SM	Cohesionless	14	105	42.6	-	31	-	0.32	3.10	0.44
	19.7 - 1.7	MH	Cohesive	53	125	62.6	6600	-	-	1.00	1.00	1.00
B-209	31.0 - 25.0	SP/SP-SM	Cohesionless	5	105	42.6	-	29	-	0.35	2.88	0.47
	25.0 - 21.0	SP-SM/SC	Cohesionless	20	110	47.6	-	32	-	0.31	3.25	0.42
	21.0 - 1.0	MH	Cohesive	50	125	62.6	6300	-	-	1.00	1.00	1.00
B-213	30.1 - 24.1	SP/SP-SM	Cohesionless	6	105	42.6	-	29	-	0.34	2.91	0.46
	24.1 - 20.1	SP-SM/SC	Cohesionless	12	105	42.6	-	30	-	0.33	3.05	0.44
	20.1 - 0.1	MH	Cohesive	55	125	62.6	6900	-	-	1.00	1.00	1.00
B-214	31.0 - 27.0	SP/SP-SM	Cohesionless	6	105	42.6	-	29	-	0.34	2.91	0.46
	27.0 - 21.0	SP-SM/SC	Cohesionless	16	110	47.6	-	31	-	0.32	3.15	0.43
	21.0 - 1.0	MH	Cohesive	48	125	62.6	6000	-	-	1.00	1.00	1.00

* Elevation Data Based Upon Elevations Provided by Cardno TBE Group

APPENDIX B

SHEETS 1 – 10

APPROXIMATE SITE LOCATION

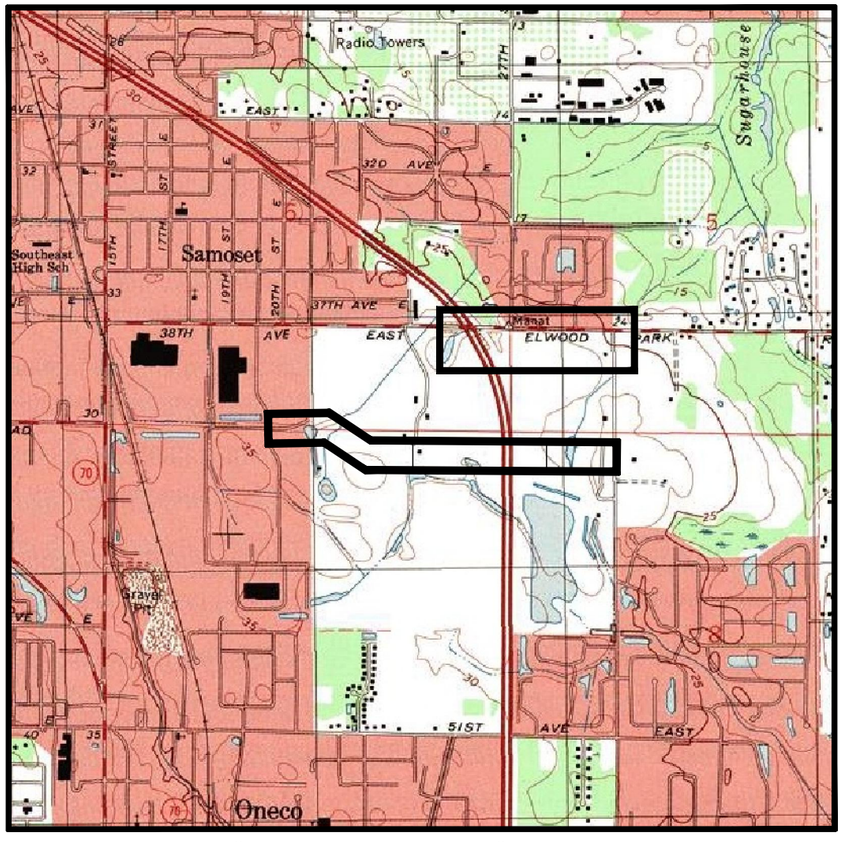


REFERENCE: USDA SCS, "SOIL SURVEY OF MANATEE COUNTY, FLORIDA"

TOWNSHIP:	35 SOUTH	ISSUED:	1983
RANGE:	18 EAST	PHOTO:	1979
SECTIONS:	5, 6, 7 & 8	SCALE:	1" = 2000'

USDA VICINITY MAP

APPROXIMATE SITE LOCATION



REFERENCE: USGS "BRADENTON, FLORIDA" QUADRANGLE MAP

TOWNSHIP:	35 SOUTH	ISSUED:	2001
RANGE:	18 EAST	PHOTOREVISED:	–
SECTIONS:	5, 6, 7 & 8	SCALE:	1" = 2000'

USGS VICINITY MAP

DRAWN	DJG
CHECKED	JH
APPROVED	MEM
SCALE	NOTED

USDA & USGS VICINITY MAPS

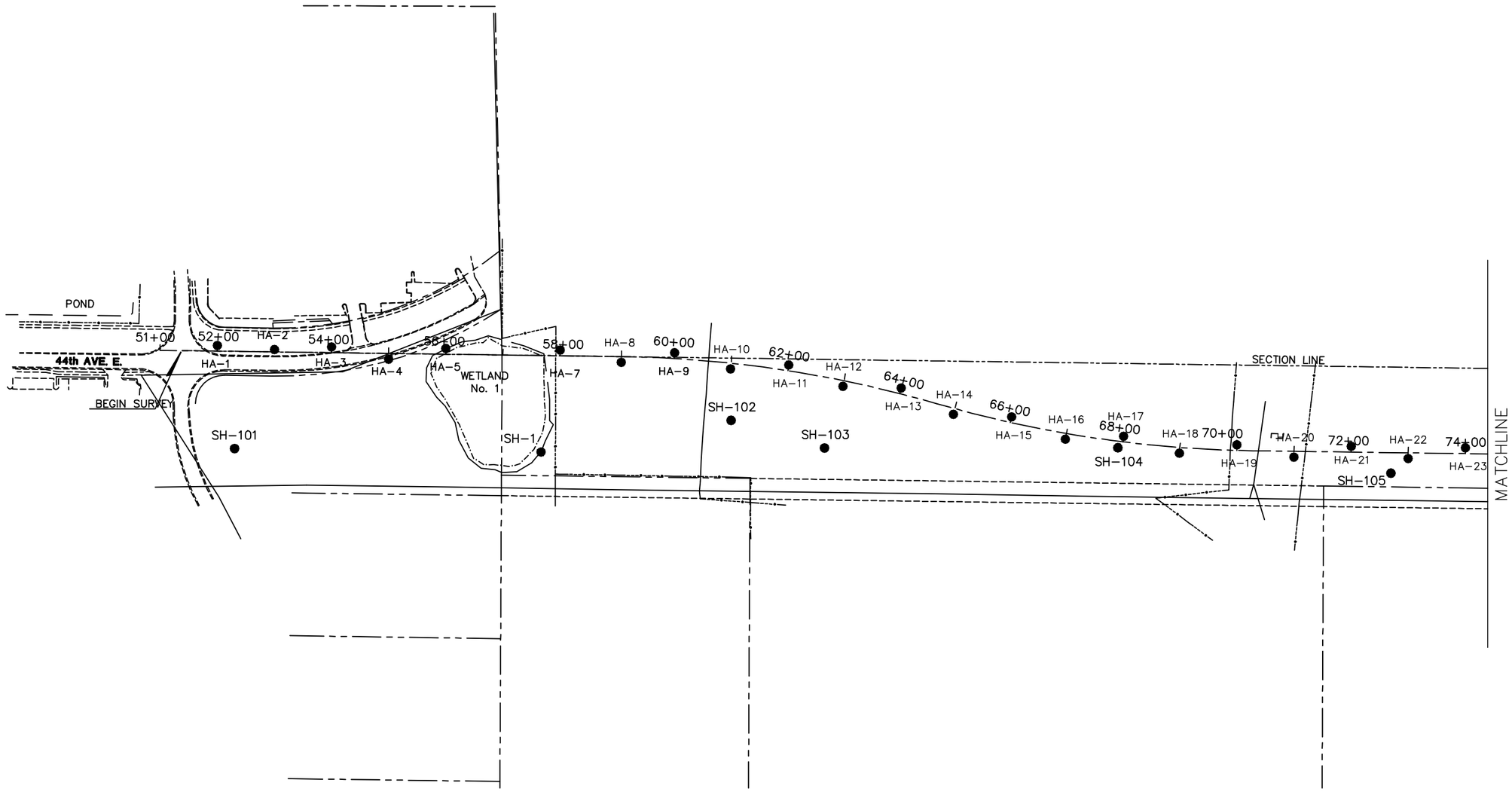
44TH AVENUE EXTENSION

BRADENTON, FLORIDA

psi Information To Build On
Engineering • Consulting • Testing

DATE	PROJ. NO.	SHEET
DEC 09	0775121	SHEET 1

P:\775-Geo\2009\0775121 44th Ave TBE Cardno\cad\121 and 95048\0775121s1



BORING LOCATION PLAN

0 100'

PLAN SCALE

LEGEND

● APPROXIMATE HAND AUGER BORING LOCATION

REVISIONS					
Date	By	Description	Date	By	Description

MARTIN E. MILLBURG, P.E.
FLORIDA LICENSE No. 36584

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TAMPA, FL. 33634
(813)-886-1075
FLORIDA ENGINEERING CERTIFICATE
OF AUTHORIZATION No. 3684

MANATEE COUNTY

ROAD NO.	PROJECT NO.
–	–

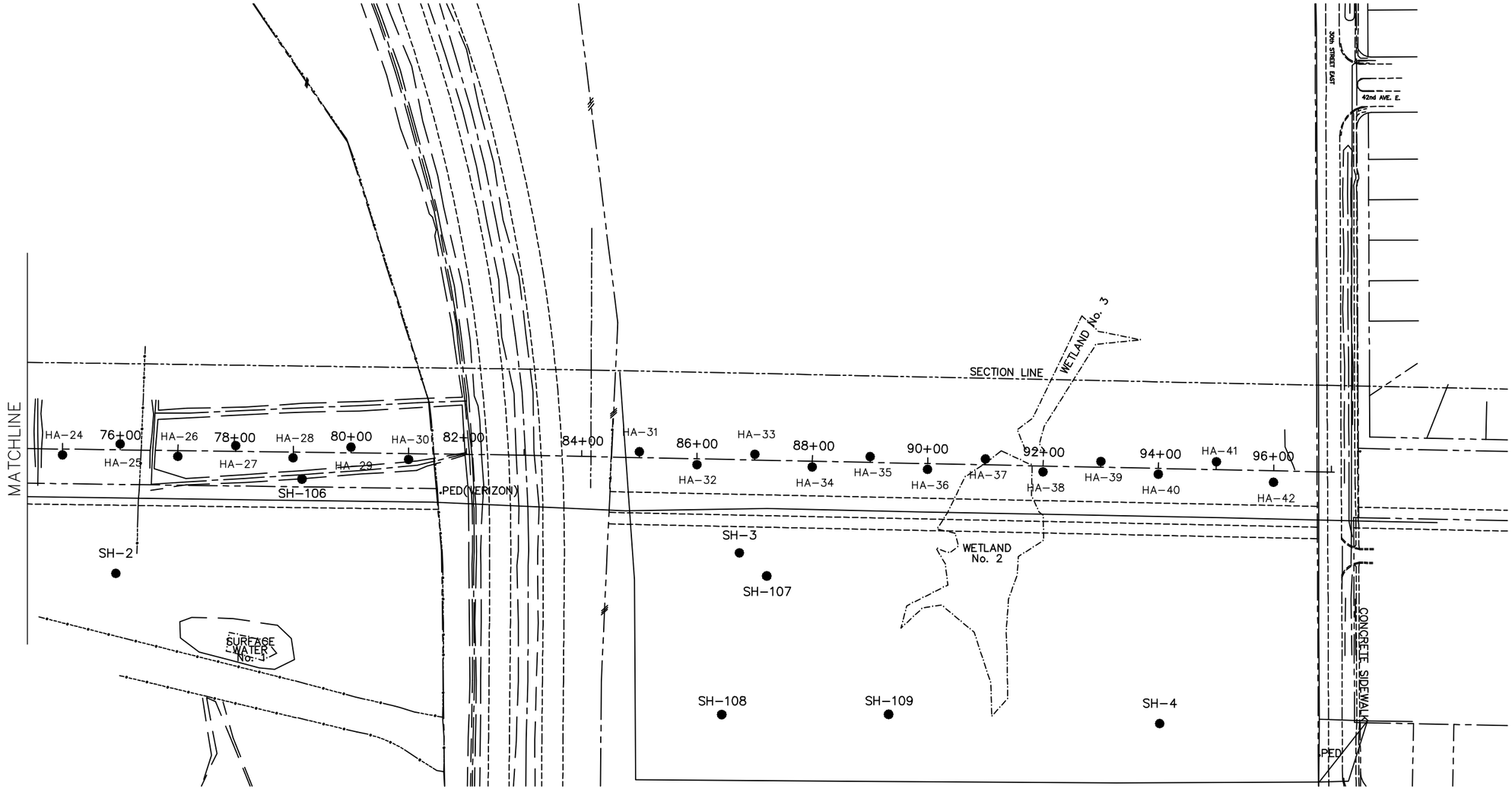
ROADWAY & SEASONAL HIGH BORING LOCATION PLAN

44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.

PSI PROJECT No. 0775121
SHEET 2

P:\775-Geo\2009\0775121 44th Ave TBE Cardno\cad\121 and 95048\0775121s1



BORING LOCATION PLAN

0 100'
PLAN SCALE

LEGEND

● APPROXIMATE HAND AUGER BORING LOCATION

REVISIONS					
Date	By	Description	Date	By	Description

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MARTIN E. MILLBURG, P.E.
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MANATEE COUNTY

ROAD NO.	PROJECT NO.
–	–

ROADWAY & SEASONAL HIGH BORING LOCATION PLAN

44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.

PSI PROJECT No. 0775121
SHEET 3

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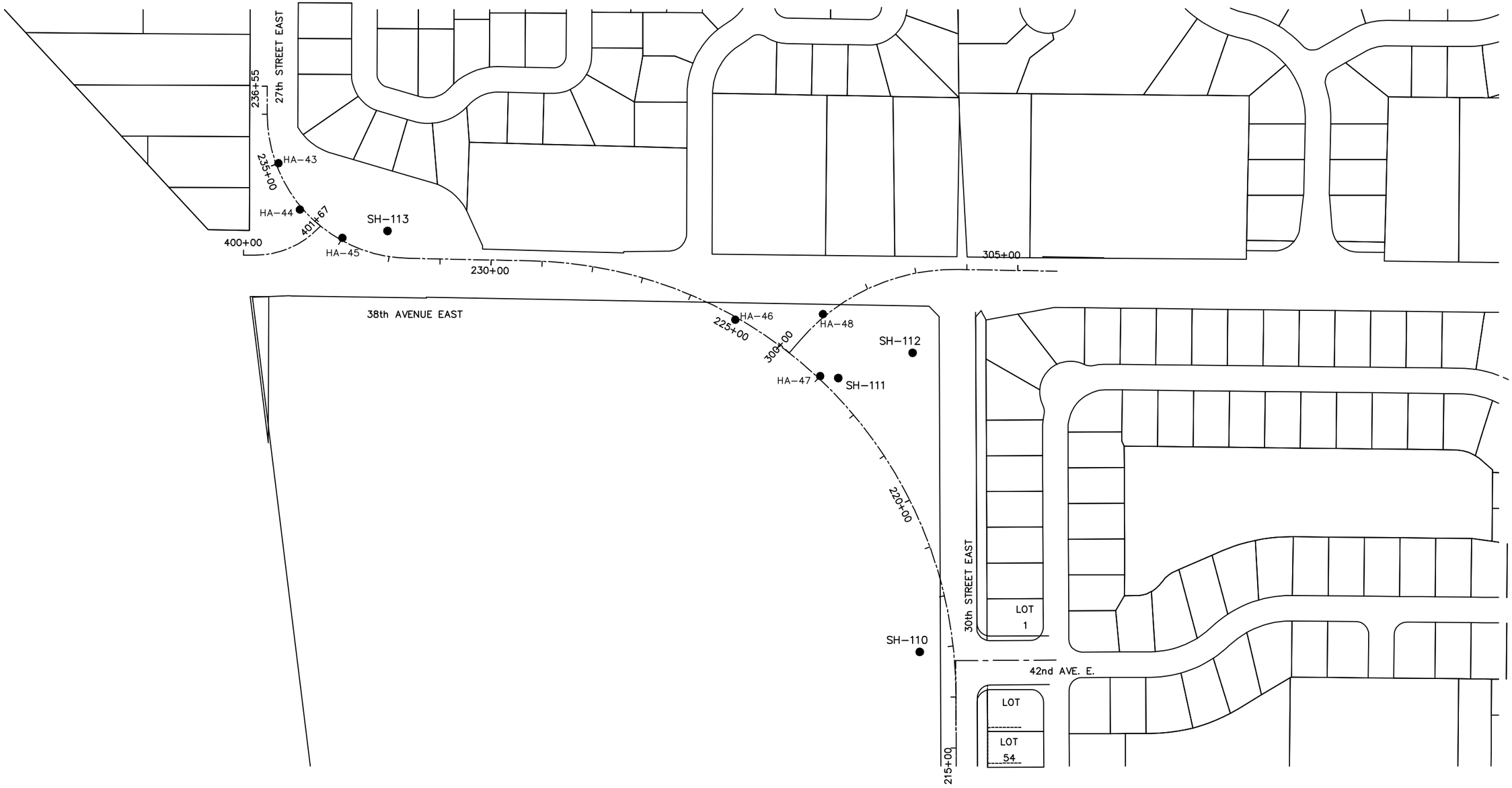

BORING LOCATION PLAN

0 100'

PLAN SCALE

LEGEND

● APPROXIMATE HAND AUGER BORING LOCATION

P:\775-Geo\2009\0775121 44th Ave TBE Cardno\cad\121 and 95048\0775121s1

REVISIONS

Date	By	Description	Date	By	Description

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MANATEE COUNTY

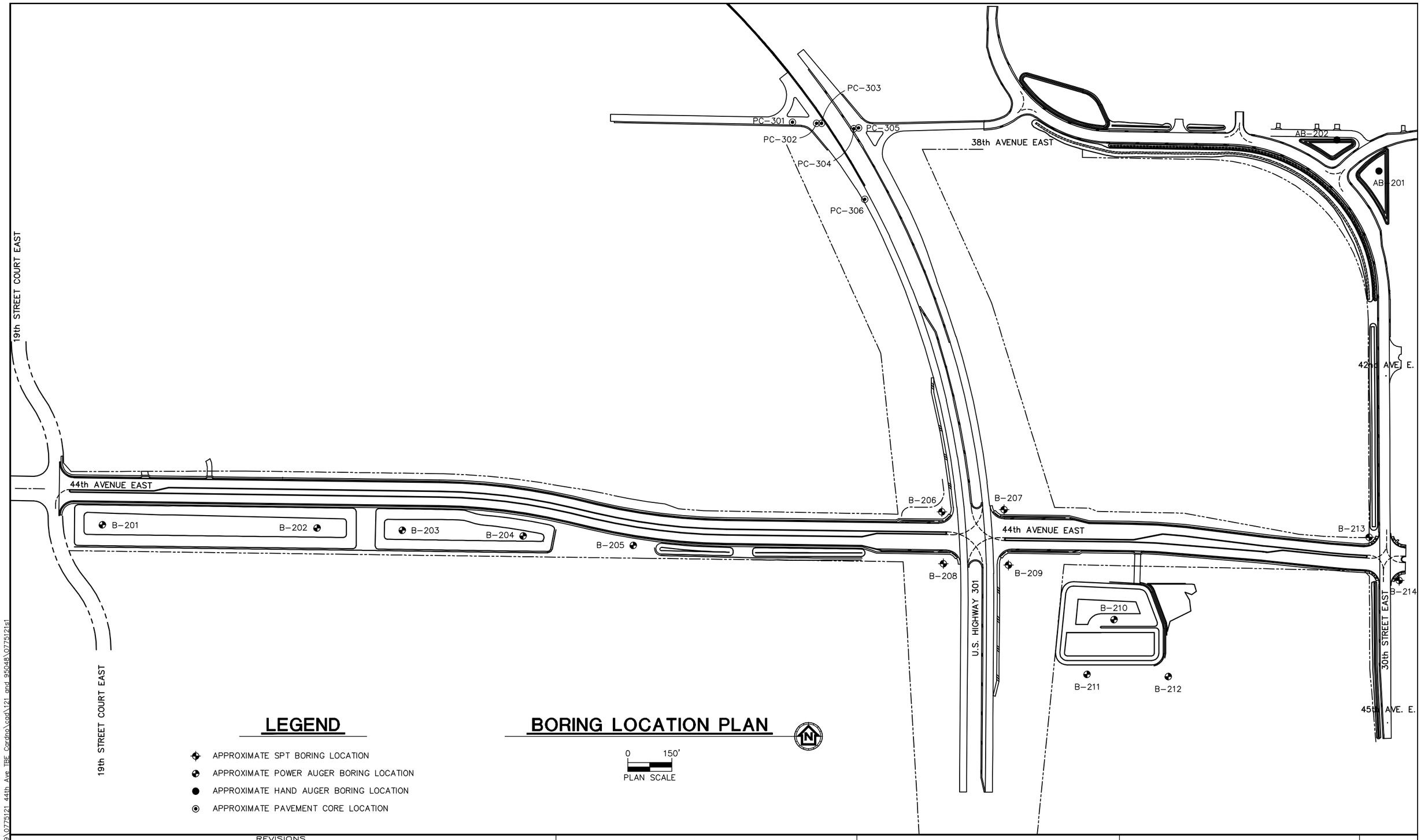
ROAD NO.	PROJECT NO.
–	–

ROADWAY BORING LOCATION PLAN
INTERSECTION UPGRADES

44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.

PSI PROJECT No. 0775121
SHEET 4



LEGEND

- APPROXIMATE SPT BORING LOCATION
- APPROXIMATE POWER AUGER BORING LOCATION
- APPROXIMATE HAND AUGER BORING LOCATION
- APPROXIMATE PAVEMENT CORE LOCATION

BORING LOCATION PLAN

0 150'
PLAN SCALE

REVISIONS					
Date	By	Description	Date	By	Description

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OF AUTHORIZATION No. 3684

MANATEE COUNTY

ROAD NO.	PROJECT NO.
–	–

POND, MAST ARM & PAVEMENT CORE BORING LOCATION PLAN

44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.

PSI PROJECT No. 0775121
SHEET 5

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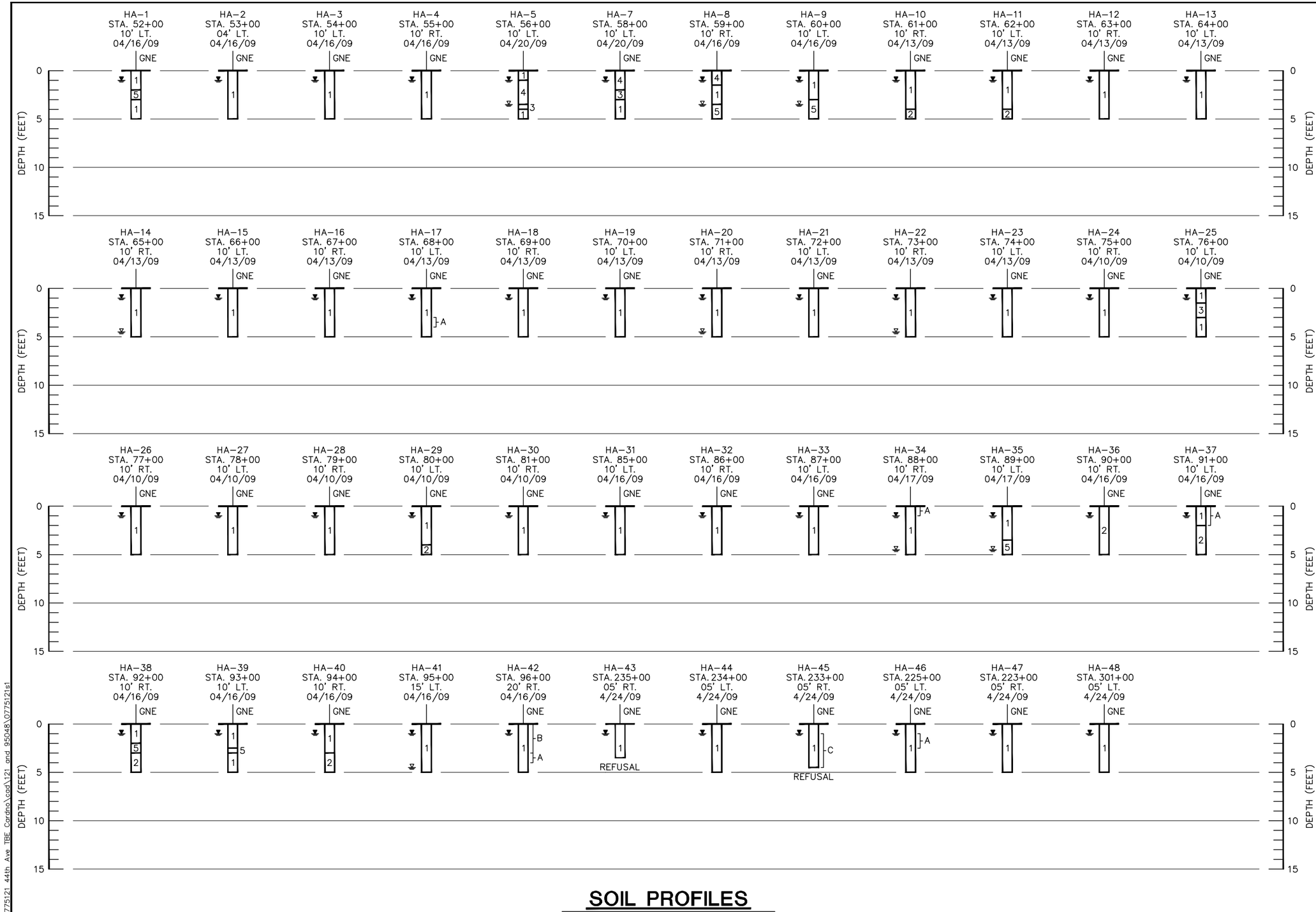

SOIL PROFILES

LEGEND

1. LIGHT BROWN TO DARK GRAY CLEAN SAND TO SLIGHTLY SILTY SAND (A-3)
2. GRAY SLIGHTLY SILTY TO SILTY SAND (NON-PLASTIC) (A-2-4)
3. DARK BROWN TO BLACK ORGANIC SILTY SAND (A-8)
4. MIXED FILL (SANDS, SILTS, CLAYS AND CEMENTED CLAYS) (FILL)
5. GRAY TO BROWN SILTY TO SLIGHTLY CLAYEY SAND (PLASTIC) (A-2-4)
6. TAN, GRAY TO GREENISH BROWN SLIGHTLY CALCAREOUS SANDY SILT WITH TRACE PHOSPHATES AND SILTY CLAY (A-6)
7. GRAY, BROWN AND BLUE-GREEN SANDY CLAY TO CLAY (A-7)

A WITH TRACE ORGANICS

B WITH SHELL FRAGMENTS

C WITH CEMENTED SANDS

A-3 AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

GROUNDWATER LEVEL, DATE OBSERVED

ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL

GNE GROUNDWATER LEVEL NOT ENCOUNTERED

REVISIONS

Date	By	Description	Date	By	Description

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MANATEE COUNTY

ROAD NO.	PROJECT NO.
–	–

ROADWAY SOIL PROFILES

44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.

PSI PROJECT No. 0775121
SHEET 6

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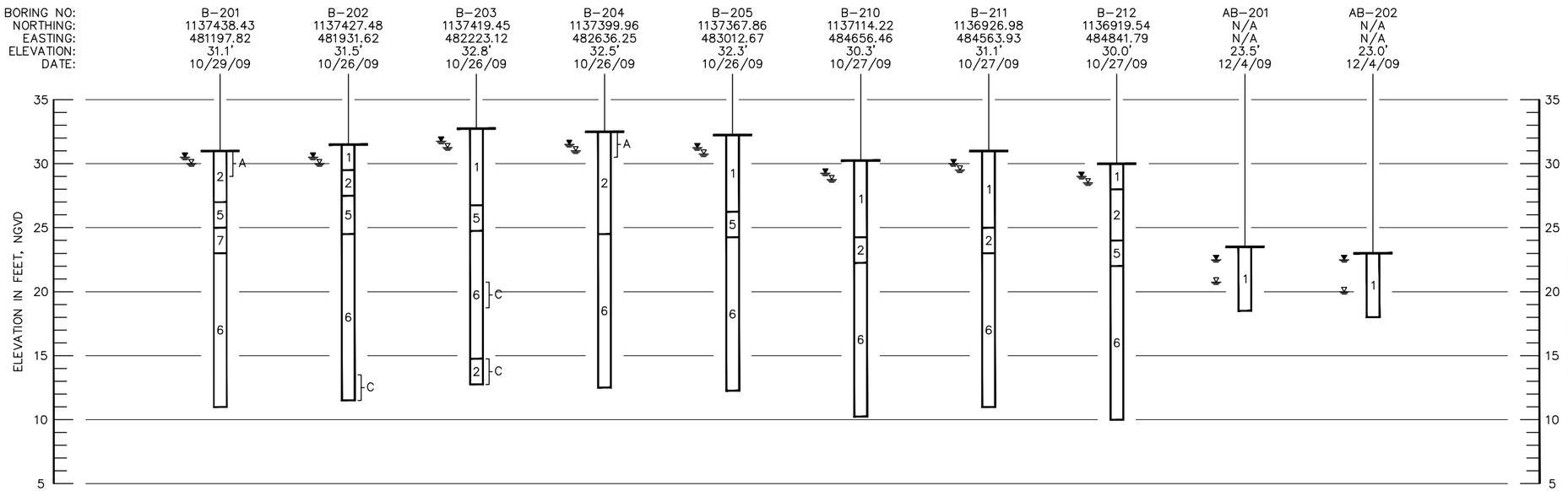

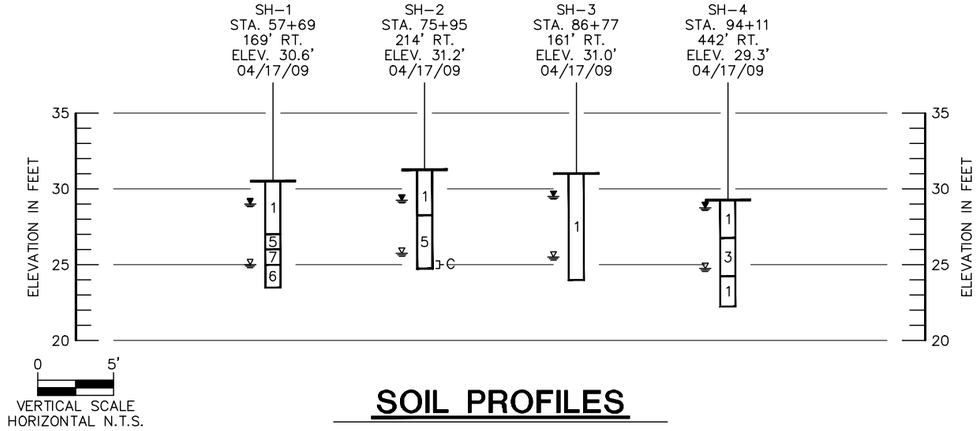

SOIL PROFILES

LEGEND

1. LIGHT BROWN TO DARK GRAY CLEAN SAND TO SLIGHTLY SILTY SAND (A-3)
2. GRAY SLIGHTLY SILTY TO SILTY SAND (NON-PLASTIC) (A-2-4)
3. DARK BROWN TO BLACK ORGANIC SILTY SAND (A-8)
4. MIXED FILL (SANDS, SILTS, CLAYS AND CEMENTED CLAYS) (FILL)
5. GRAY TO BROWN SILTY TO SLIGHTLY CLAYEY SAND (PLASTIC) (A-2-4)
6. TAN, GRAY TO GREENISH BROWN SLIGHTLY CALCAREOUS SANDY SILT WITH TRACE PHOSPHATES AND SILTY CLAY (A-6)
7. GRAY, BROWN AND BLUE-GREEN SANDY CLAY TO CLAY (A-7)

A	WITH TRACE ORGANICS
B	WITH SHELL FRAGMENTS
C	WITH CEMENTED SANDS
A-3	AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
	GROUNDWATER LEVEL, DATE OBSERVED
	ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL
GNE	GROUNDWATER LEVEL NOT ENCOUNTERED

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REVISIONS

Date	By	Description	Date	By	Description

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MARTIN E. MILLBURG, P.E.
FLORIDA LICENSE No. 36684

MANATEE COUNTY

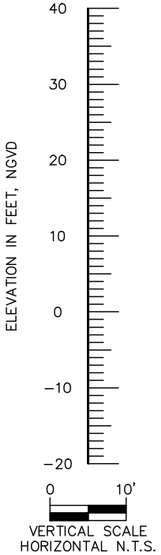
ROAD NO.	PROJECT NO.
–	–

POND & SEASONAL HIGH BORING SOIL PROFILES

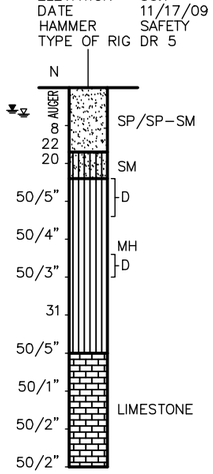
44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.

PSI PROJECT No. 0775121
SHEET 7

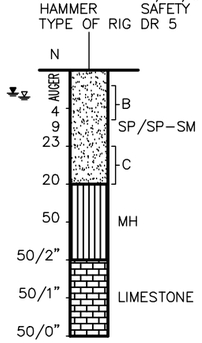


BORING NO. B−206
NORTHING 1137482.98
EASTING 484067.95
ELEVATION 30.7'
DATE 11/17/09
HAMMER SAFETY
TYPE OF RIG DR 5



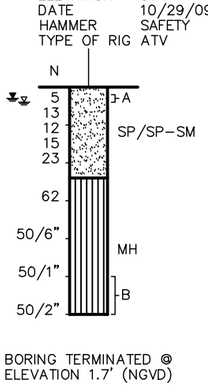
BORING TERMINATED @
ELEVATION −19.3' (NGVD)

BORING NO. B−207
NORTHING 1137490.52
EASTING 484280.71
ELEVATION 32.7'
DATE 11/18/09
HAMMER SAFETY
TYPE OF RIG DR 5



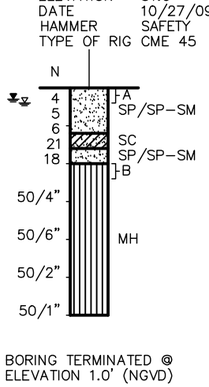
BORING TERMINATED @
ELEVATION −2.3' (NGVD)

BORING NO. B−208
NORTHING 1137305.39
EASTING 484072.76
ELEVATION 31.7'
DATE 10/29/09
HAMMER SAFETY
TYPE OF RIG ATV



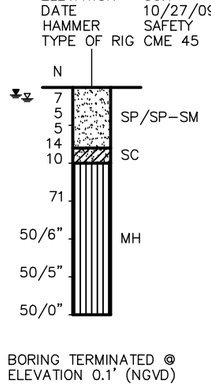
BORING TERMINATED @
ELEVATION 1.7' (NGVD)

BORING NO. B−209
NORTHING 1137300.59
EASTING 484295.81
ELEVATION 31.0'
DATE 10/27/09
HAMMER SAFETY
TYPE OF RIG CME 45



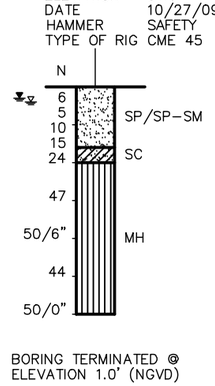
BORING TERMINATED @
ELEVATION 1.0' (NGVD)

BORING NO. B−213
NORTHING 1137395.93
EASTING 485528.75
ELEVATION 30.1'
DATE 10/27/09
HAMMER SAFETY
TYPE OF RIG CME 45

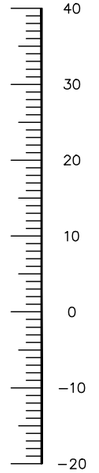


BORING TERMINATED @
ELEVATION 0.1' (NGVD)

BORING NO. B−214
NORTHING 1137248.11
EASTING 485631.41
ELEVATION 31.0'
DATE 10/27/09
HAMMER SAFETY
TYPE OF RIG CME 45



BORING TERMINATED @
ELEVATION 1.0' (NGVD)



LEGEND

- (SP/SP−SM), LIGHT BROWN TO DARK GRAY FINE SAND TO SLIGHTLY SILTY FINE SAND
- (SC), GRAY TO BROWN CLAYEY SAND
- (MH), TAN, GRAY TO GREENISH BROWN SLIGHLTY CALCAREOUS SANDY SILT WITH TRACE PHOSPHATES
- GRAY INTERBEDDED LIMESTONE (DOLOSTONE) AND CLAY
- (SM), LIGHT GRAY SILTY SAND

A WITH TRACE ORGANICS
B SLIGHTLY CEMENTED NODULES
C SIGNIFICANT PHOSPHATES
D ROCK FRAGMENTS

NOTES:

SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW

WATER TABLE

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE

N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12" PENETRATION. (UNLESS OTHERWISE NOTED.)

50/6" FIFTY BLOWS FOR SIX INCHES

GRANULAR MATERIALS− RELATIVE DENSITY	SPT (BLOWS/FT.)
VERY LOOSE	LESS THAN 4
LOOSE	4−10
MEDIUM DENSE	10−30
DENSE	30−50
VERY DENSE	GREATER THAN 50

SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT.)
VERY SOFT	LESS THAN 2
SOFT	2−4
FIRM	4−8
STIFF	8−15
VERY STIFF	15−30
HARD	GREATER THAN 30

P:\775-Geo\2009\0775121 44th Ave TBE Cardno\cad\121 and 95048\0775121s8

REVISIONS

Date	By	Description	Date	By	Description

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FLORIDA ENGINEERING CERTIFICATE OF AUTHORIZATION No. 3684

MANATEE COUNTY

ROAD NO.	PROJECT NO.
−	−

STRUCTURE BORING SOIL PROFILES FOR MAST ARMS

44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.

PSI PROJECT No. 0775121
SHEET 8

DATE OF SURVEY: APRIL, OCTOBER AND DECEMBER 2009
SURVEY MADE BY: PSI
SUBMITTED BY: MARTIN E. MILLBURG, P.E.

MANATEE COUNTY

DISTRICT: 44TH AVENUE EXTENSION
ROAD No.: –
COUNTY: MANATEE

CROSS SECTION SOIL SURVEY FOR THE DESIGN OF ROADS

SURVEY BEGINS STA. 52+00 SURVEY ENDS STA. 96+00

		ORGANIC CONTENT		MOISTURE CONTENT		SIEVE ANALYSIS RESULTS % PASS						ATTERBERG LIMITS (%)					CORROSION TEST RESULTS				
STRATUM NO.	LBR VALUE (%)	No. OF TESTS	% ORGANIC	No. OF TESTS	MOISTURE CONTENT	No. OF TESTS	10 MESH	40 MESH	60 MESH	100 MESH	200 MESH	NO. OF TESTS	LIQUID LIMIT	PLASTIC INDEX	AASHTO GROUP	DESCRIPTION	NO. OF TESTS	RESISTIVITY OHM–CM	CHLORIDES PPM	SULFATE PPM	pH
1	-----	2	2–3	1	12	1	-----	-----	-----	-----	3	--	-----	-----	A–3	LIGHT BROWN TO DARK GRAY CLEAN SAND TO SLIGHTLY SILTY SAND	--	-----	-----	-----	-----
2	-----	2	2–3	3	18–25	3	-----	-----	-----	-----	11–16	--	-----	-----	A–2–4/ NON–PLASTIC	GRAY SLIGHTLY SILTY TO SILTY SAND	--	-----	-----	-----	-----
3	-----	3	5–13	--	-----	--	-----	-----	-----	-----	-----	--	-----	-----	A–8	DARK BROWN TO BLACK ORGANIC SILTY SAND	--	-----	-----	-----	-----
4	-----	--	-----	--	-----	--	-----	-----	-----	-----	-----	--	-----	-----	FILL	MIXED FILL (SANDS, SILTS, CLAYS AND CEMENTED CLAYS)	--	-----	-----	-----	-----
5	-----	--	-----	1	22	1	-----	-----	-----	-----	19	1	26	9	A–2–4/ PLASTIC	GRAY TO BROWN SILTY TO SLIGHTLY CLAYEY SAND	--	-----	-----	-----	-----
6	-----	--	-----	1	33	1	-----	-----	-----	-----	62	2	35–39	9–18	A–6	TAN, GRAY TO GREENISH BROWN SLIGHTLY CALCAREOUS SANDY SILT WITH TRACE PHOSPHATES AND SILTY CLAY	--	-----	-----	-----	-----
7	-----	--	-----	--	-----	--	-----	-----	-----	-----	-----	1	46	31	A–7	GRAY, BROWN AND BLUE–GREEN SANDY CLAY TO CLAY	--	-----	-----	-----	-----

EMBANKMENT AND SUBGRADE MATERIAL

STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY.

⏷	GROUNDWATER TABLE ENCOUNTERED	A	WITH TRACE ORGANICS
⏷	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE	B	WITH SHELL FRAGMENTS
GNE	GROUNDWATER TABLE NOT ENCOUNTERED	C	WITH CEMENTED SANDS

NOTES:

1. THE MATERIAL FROM STRATUM NUMBER 1 (A–3) APPEARS SATISFACTORY FOR USE IN THE EMBANKMENT WHEN UTILIZED IN ACCORDANCE WITH INDEX 505.
2. THE MATERIAL FROM STRATA NUMBERS 2 (A–2–4/NON–PLASTIC) AND 5 (A–2–4/PLASTIC), CERTAIN TYPES OF A–2–4 MATERIAL ARE LIKELY TO RETAIN EXCESS MOISTURE AND MAY BE DIFFICULT TO DRY AND COMPACT. THEY SHOULD BE USED IN THE EMBANKMENT ABOVE THE WATER LEVEL EXISTING AT TIME OF CONSTRUCTION. THEY MAY BE USED IN THE SUBGRADE PORTION OF THE ROADBED WHEN APPROVED BY THE DISTRICT MATERIALS ENGINEER. A–2–4 MATERIAL PLACED BELOW THE EXISTING WATER LEVEL MUST BE NONPLASTIC AND CONTAIN LESS THAN 15% PASSING THE NO. 200 U.S. STANDARD SIEVE.
3. THE MATERIAL FROM STRATUM NUMBER 3 IS ORGANIC/(A–8) MATERIAL AND SHALL BE REMOVED IN ACCORDANCE WITH INDEX 500. THIS MATERIAL MAY BE USED IN EMBANKMENT CONSTRUCTION AS OUTLINED IN FDOT INDEX 505. THIS MATERIAL SHALL NOT BE USED IN THE CONSTRUCTION OF STORMWATER POND BERMS WITH THE EXCEPTION OF MUCK USED AS A SUPPLEMENT TO CONSTRUCT TOP SOIL AS DESCRIBED IN SECTION 162 OF THE FDOT STANDARD SPECIFICATIONS.
4. THE MATERIAL FROM STRATUM NUMBER 4 (MIXED FILL) CONTAINS PLASTIC MATERIAL AND SHALL BE REMOVED IN ACCORDANCE WITH INDEX 500. IF SEPARATED THE SAND PORTION OF THIS MATERIAL MAY BE PLACED ABOVE THE EXISTING WATER LEVEL (AT THE TIME OF CONSTRUCTION) TO WITHIN 4 FEET OF THE PROPOSED BASE. IF NOT SEPARATED THE MATERIAL SHOULD BE TREATED AS HIGHLY PLASTIC AND MAY ONLY BE USED AS INDICATED IN INDEX 505 WHEN EXCAVATED WITHIN THE PROJECT LIMITS AND IS NOT TO BE USED WHEN OBTAINED FROM OUTSIDE THE PROJECT LIMITS.
5. THE MATERIAL FROM STRATUM NUMBER 6 (A–6) AND 7 (A–7) IS HIGHLY PLASTIC A–7 MATERIAL AND SHALL BE REMOVED IN ACCORDANCE WITH INDEX 500. IT MAY BE USED WITHIN THE PROJECT LIMITS AS INDICATED IN INDEX 505 ONLY WHEN EXCAVATED WITHIN THE PROJECT LIMITS AND IS NOT TO BE USED WHEN OBTAINED FROM OUTSIDE THE PROJECT LIMITS.

P:\775–Geo\2009\0775121 44th Ave TBE Cardno\cad\121 and 95048\0775121s1

REVISIONS					
Date	By	Description	Date	By	Description

psi
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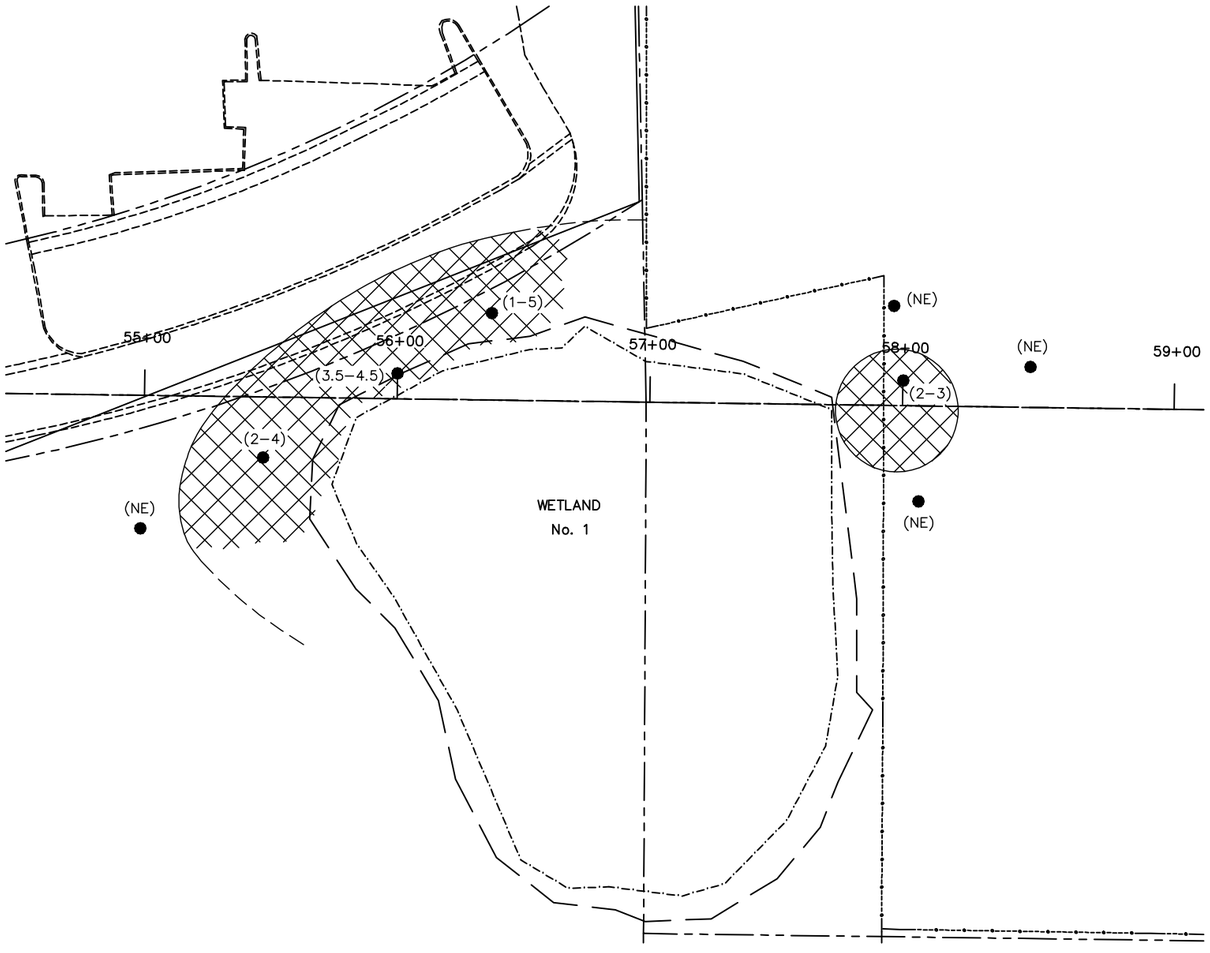
MANATEE COUNTY

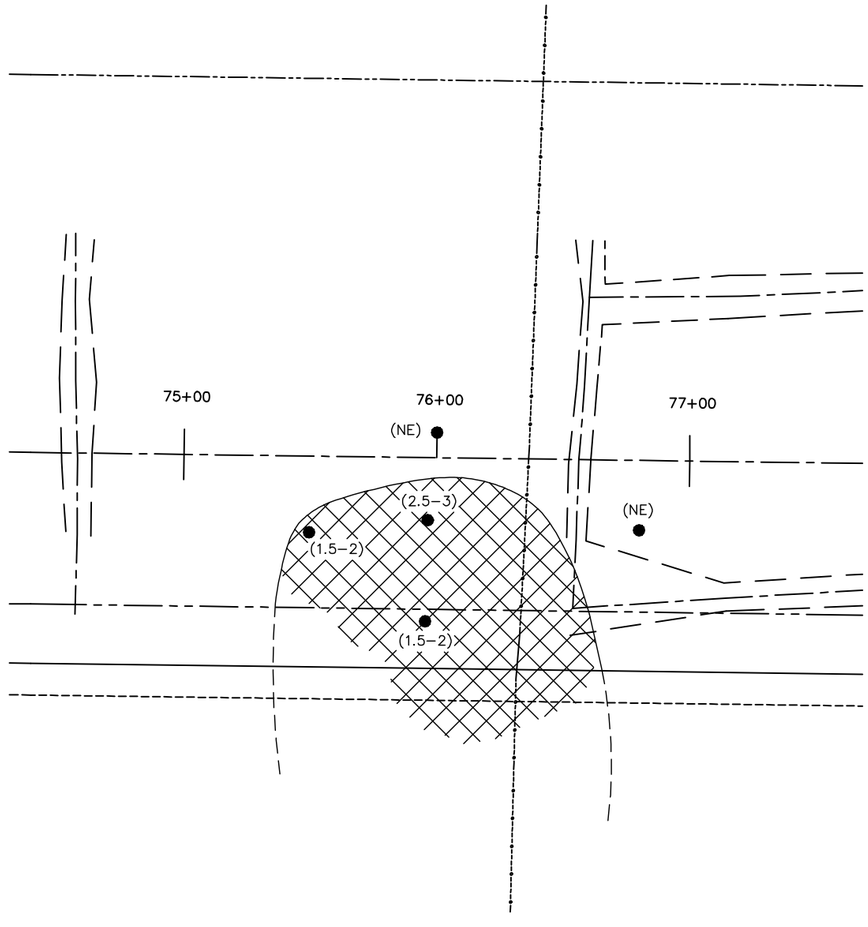
ROAD NO.	PROJECT NO.
–	–

POND SOILS SURVEY

44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.





MUCK DELINEATION PLAN

0 30'
PLAN SCALE

LEGEND

- ● APPROXIMATE MUCK PROBE LOCATION
- (NE) MUCK NOT ENCOUNTERED
- (2–3) DEPTH OF MUCK ENCOUNTERED (FEET)
- APPROXIMATE EXTENT OF ORGANIC SOIL

REVISIONS					
Date	By	Description	Date	By	Description

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MANATEE COUNTY

ROAD NO.	PROJECT NO.
–	–

MUCK DELINEATION PLAN

44TH AVENUE EXTENSION
BRADENTON, FLORIDA

SHEET NO.

PSI PROJECT No. 0775121
SHEET 10

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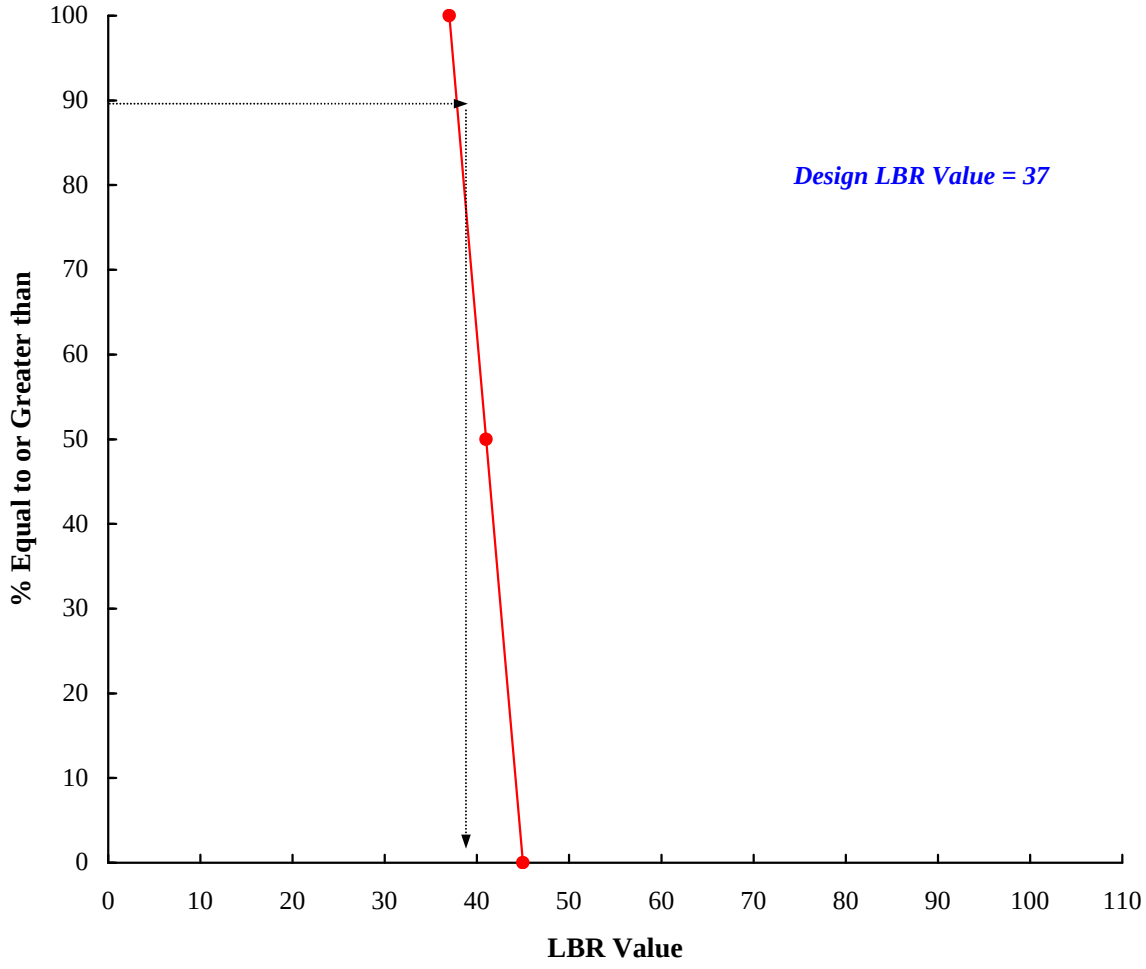
APPENDIX C

LBR RESULTS
PAVEMENT CORE PHOTOGRAPHS

LBR Design Curve (90% Method)



LBR DESIGN CURVE
44th Avenue Extension
MANATEE COUNTY, FLORIDA

psi Information To Build On
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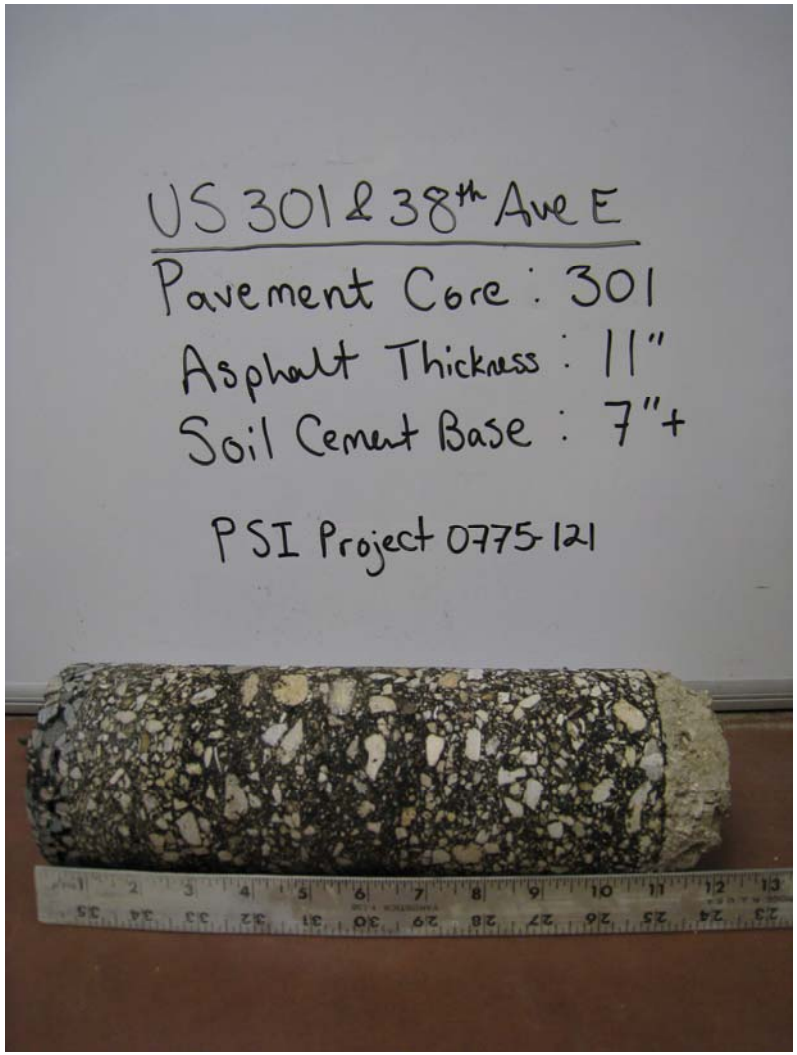
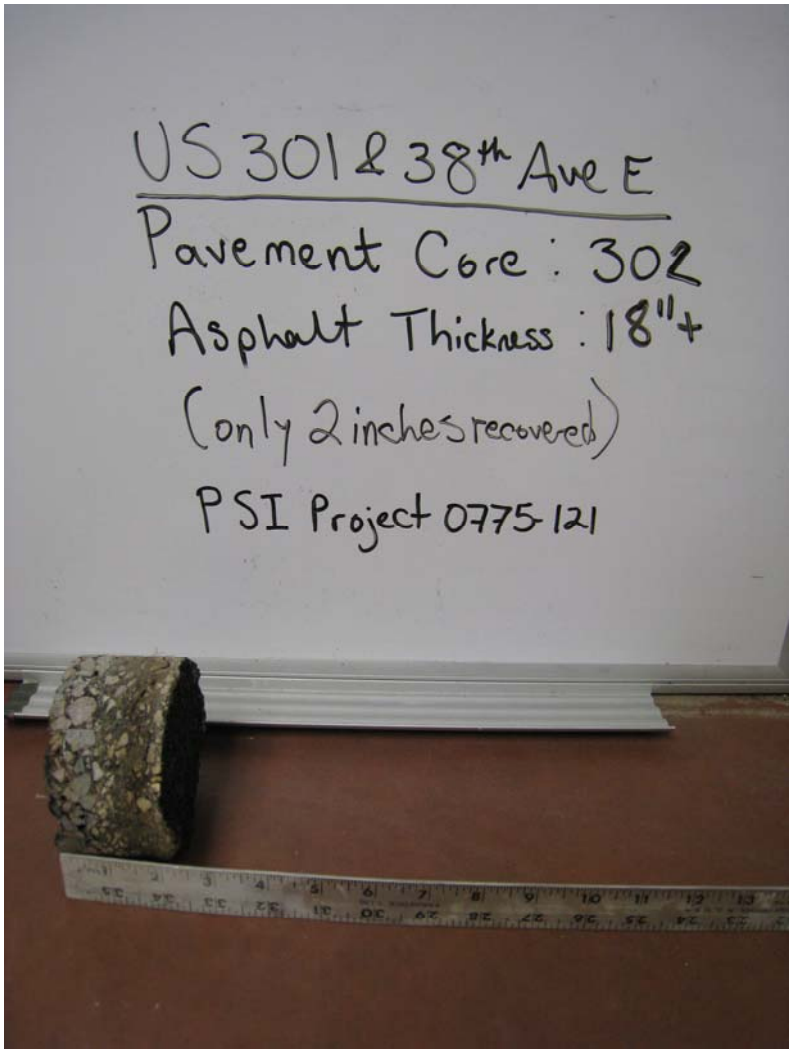
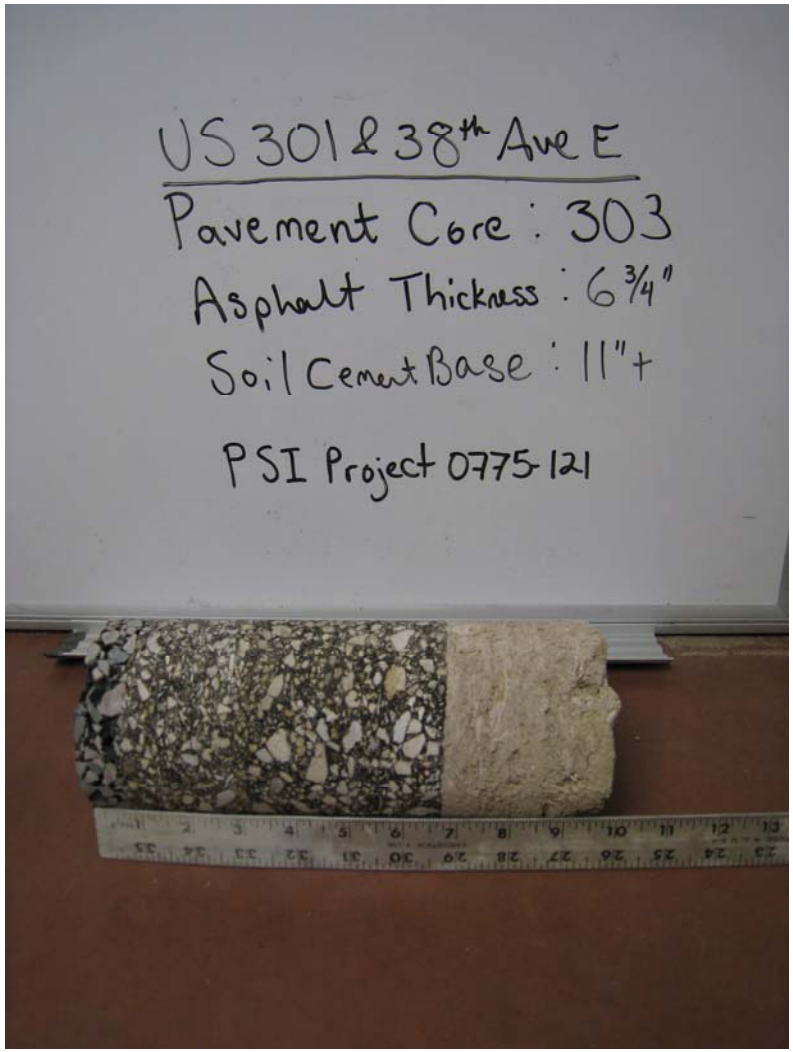
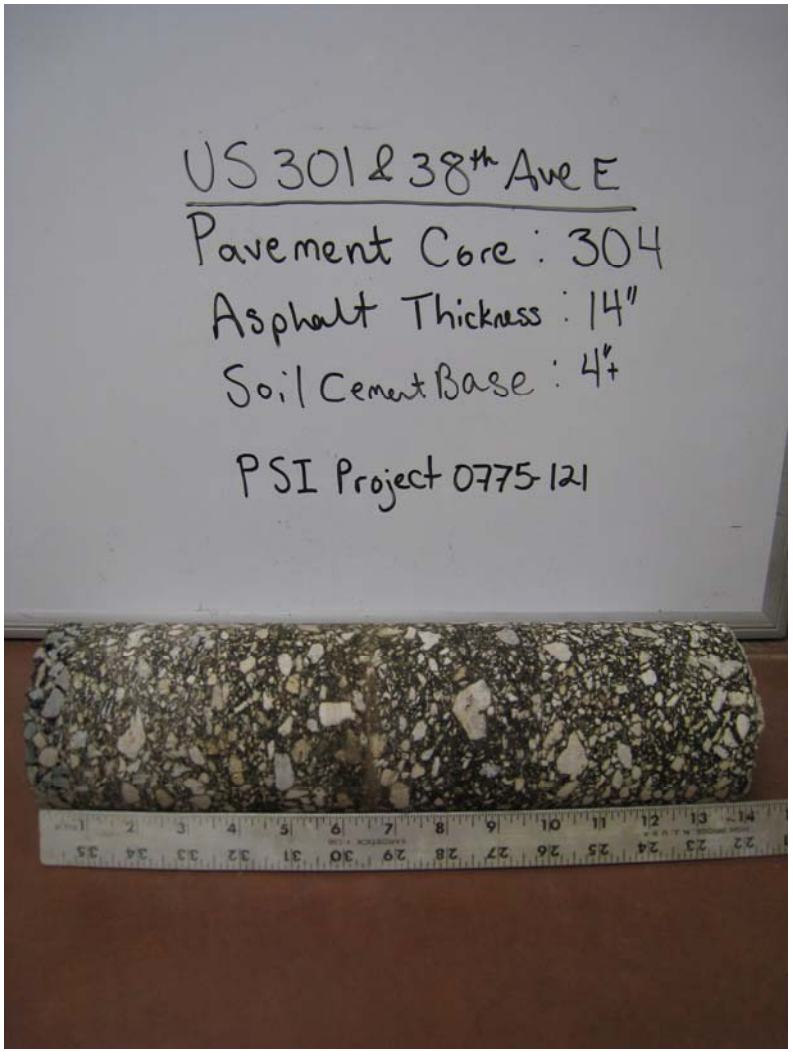
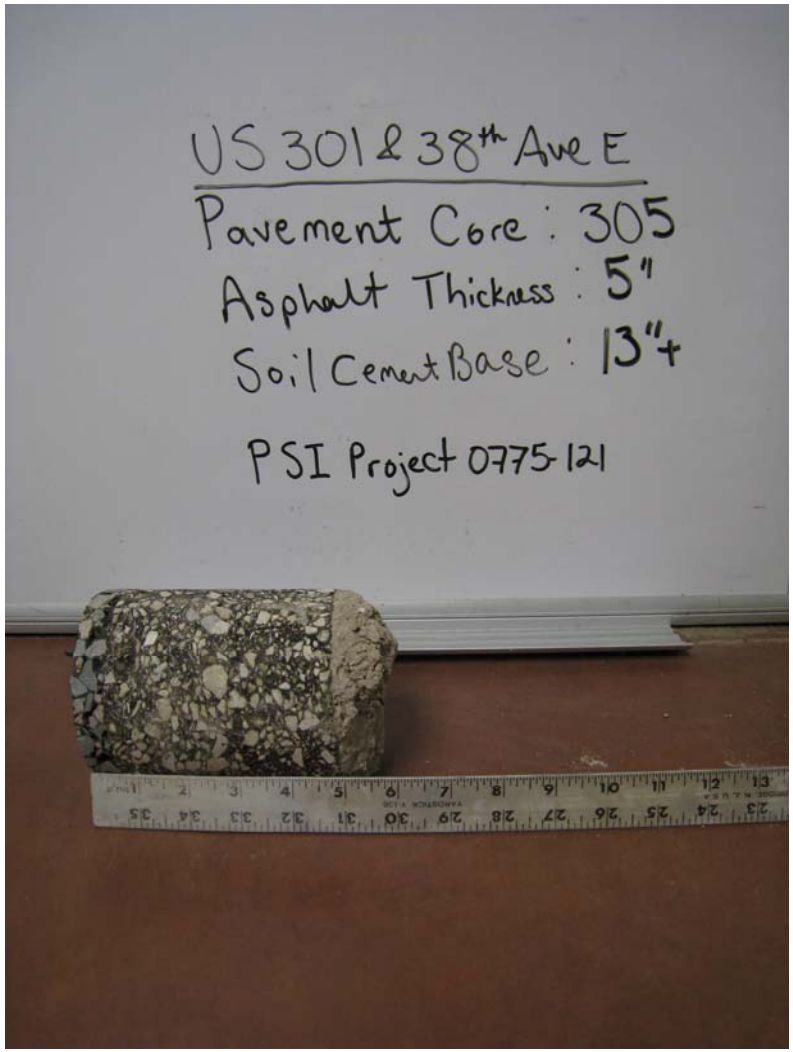
DRAWN	SCALE	PROJ. NO.
TP	NOTED	775121
CHECKED	DATE	County ID
MEM	5/29/2009	

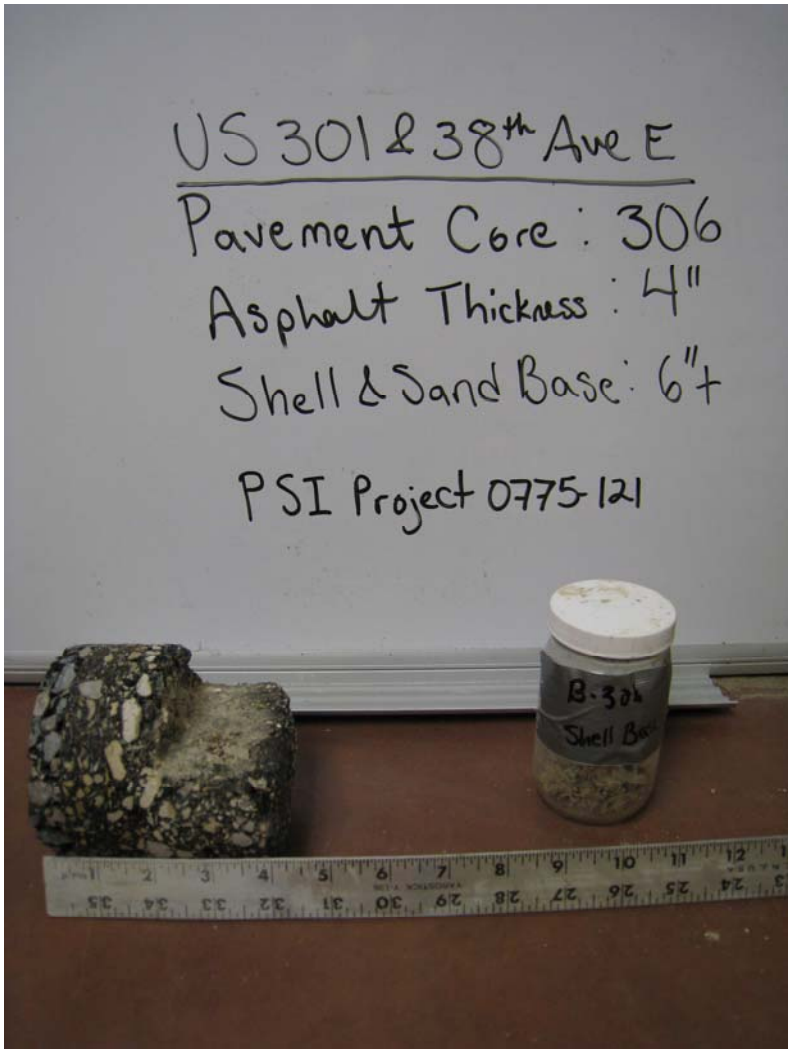

US 301 & 38th Ave E
Pavement Core : 301
Asphalt Thickness : 11"
Soil Cement Base : 7"+
PSI Project 0775-121


US 301 & 38th Ave E
Pavement Core : 302
Asphalt Thickness : 18"+
(only 2 inches recovered)
PSI Project 0775-121


US 301 & 38th Ave E
Pavement Core : 303
Asphalt Thickness : 6 3/4"
Soil Cement Base : 11"+
PSI Project 0775-121


US 301 & 38th Ave E
Pavement Core : 304
Asphalt Thickness : 14"
Soil Cement Base : 4"+
PSI Project 0775-121


US 301 & 38th Ave E
Pavement Core : 305
Asphalt Thickness : 5"
Soil Cement Base : 13"+
PSI Project 0775-121


US 301 & 38th Ave E
Pavement Core : 306
Asphalt Thickness : 4"
Shell & Sand Base : 6"+
PSI Project 0775-121

APPENDIX D

FHWA REPORT CHECKLIST

GEOTECHNICAL REPORT REVIEW CHECKLISTS

The following checklists cover the major information and recommendations which should be addressed in project geotechnical reports.

Section A covers site investigation information which will be common to all geotechnical reports for any type of geotechnical feature.

Sections B through I cover the basic information and recommendations which should be presented in geotechnical reports for specific geotechnical features: centerline cuts and embankments, embankments over soft ground, landslides, retaining walls, structure foundation and material sites.

In most sections and subsections, the user has been provided supplemental page references to the Soils and Foundations Workshop Manual. These page numbers appear in parentheses ( ) immediately adjacent to the section or subsection topic. Generalist engineers are particularly encouraged to read these references. Additional reference information on these topics is available in the Geotechnical Notebook, a copy of which is kept in all Division Offices by either the Bridge Engineer or the engineer with the soils responsibility.

Certain checklist items are of vital importance to have been included in the geotechnical report. These checklist items have been marked with an asterisk (*). A negative response to any of these asterisked items is cause to contact the geotechnical engineer for clarification of this omission.

"GTR REVIEW CHECKLIST" (SITE INVESTIGATION)

A. Site Investigation Information

Since the most important step in the geotechnical design process is the conduct of an adequate site investigation, presentation of the subsurface information in the geotechnical report and on the plans deserves careful attention.

Geotechnical Report Text (Introduction)
(Pages 322-325)

	Yes	No	Unknown or N/A
1. Is the general location of the investigation described and/or vicinity map included?	X		
2. Is scope and purpose of the investigation summarized?	X		
3. Is concise description given of geologic setting and topography of area?	X		
4. Are the field explorations and laboratory tests on which the report is based listed?	X		
5. Is general description of subsurface soil, rock and groundwater conditions given?	X		
*6. Is the following information included with the geotechnical report (typically included in report appendices):			
a. Test hole logs? (Pages 25-33)	X		
b. Field test data?	X		
c. Laboratory test data? (Pages 74-75)	X		
d. Photographs (if pertinent)?	X		
Plan and Subsurface Profile (Pages 24, 47-49, 335)			
*7. Is a plan and subsurface profile of the investigation site provided?	X		

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

A. Site Investigation Information (Cont.)

	Yes	No	Unknown or N/A
8. Are the field explorations located on the plan view?	X		
*9. Does the conducted site investigation meet minimum criteria outlined in Table 2?	X		
10. Are the explorations plotted and correctly numbered on the profile at their true elevation and location?		X	
11. Does the subsurface profile contain a word description and/or graphic depiction of soil and rock types?	X		
12. Are groundwater levels and date measured shown on the subsurface profile?	X		
Subsurface Profile or Field Boring Log (Pages 16-17, 25-29)			
13. Are sample types and depths noted?	X		
*14. Are SPT blow counts, percent core recovery, and RQD values shown?	X		
15. If cone penetration tests were made, are plots of cone resistance and friction ratio shown with depth?			X
Laboratory Test Data (Pages 60, 74-75)			
*16. Were lab soil classification tests such as natural moisture content, gradation, Atterberg limits, performed on selected representative samples to verify field visual soil identifications?	X		
17. Are laboratory test results such as shear strength (Page 62, consolidation (Page 68), etc., included and/or summarized?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (CENTERLINE CUTS AND EMBANKMENTS)

B. Centerline Cuts and Embankments (Pages 6-9)

In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report?

	Yes	No	Unknown or N/A
Are station to station descriptions included for:			
1. Existing surface and subsurface drainage?			X
2. Evidence of springs and excessively wet areas?			X
3. Slides, slumps, and faults noted along the alignment?			X
Are station to station recommendations included for the following:			
General Soil Cut or Fill			
4. Specific surface/subsurface drainage recommendations.			X
5. Excavation limits of unsuitable materials?	X		
* 6. Erosion protection measures for backslopes, side slopes, and ditches, including riprap recommendations or special slope treatments?			X
Soil Cuts Pages (101-102)			
* 7. Recommended cut slope design?			X
8. Are clay cut slopes designed for minimum F.S. = 1.50?			X
9. Special usage of excavated soils?	X		
10. Estimated shrink-swell factors for excavated materials?			X
11. If answer to 3 is yes, are recommendations provided for design treatments?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

B. Centerline Cuts and Embankments (Cont.)

	Yes	No	Unknown or N/A
Fills (Pages 77-79)			
11. Recommended fill slope design?			X
12. Will fill slope design provide minimum F.S. = 1.25?			X
Rock Slopes			
*13. Are recommended slope designs and blasting specifications provided?			X
*14. Is the need for special rock slope stabilization measures, e.g., rockfall catch ditch, wire mesh slope protection, shotcrete, rock bolts, addressed?			X
15. Has the use of "template" designs been avoided (such as designing all rock slopes on ¼ to 1 rather than designing based on orientation of major rock jointing)?			X
*16. Have effects of blast induced vibrations on adjacent structures been evaluated?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (EMBANKMENTS OVER SOFT GROUND)

C. Embankments over Soft Ground

Where embankments must be built over soft ground (such as soft clays, organic silts, or peat), stability and settlement of the fill should be carefully evaluated. In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report?

	Yes	No	Unknown or N/A
Embankment Stability (Pages 77-79, 95-97)			
* 1. Has the stability of the embankment been evaluated for minimum safety factors of 1.25 for side slope stability and 1.30 for end slope stability of bridge approach embankments?			X
* 2. Has the shear strength of the foundation soil been determined from lab testing and/or field vane shear or static cone penetrometer tests?			X
* 3. If the proposed embankment does not provide minimum factors of safety given above, are recommendations given for feasible treatment alternates which will increase factor of safety to minimum acceptable (such as change alignment, lower grade, use stabilizing counterberms, excavate and replace weak subsoil, fill stage construction, lightweight fill, geotextile fabric reinforcement, etc.)?			X
* 4. Are cost comparisons of treatment alternates given and a specific alternate recommended?			X
Settlement of Subsoil (Pages 146-160)			
5. Have consolidation properties of fine grained soils been determined from laboratory consolidation tests?			X
* 6. Have settlement amount and settlement time been estimated?			X
7. For bridge approach embankments, are recommendations made to get the settlement out before the bridge abutment is constructed (waiting period, surcharge, or wick drains)?			X

* A response other than (yes) or (N/A) for any of these checklists questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

C. Embankments Over Soft Ground (Cont.)

	Yes	No	Unknown or N/A
8. If geotechnical instrumentation is proposed to monitor fill stability and settlement, are detailed recommendations provided on the number, type, and specific locations of the proposed instruments?			X
9. Construction Considerations (Pages 183, 331-334)			
a. If excavation and replacement of unsuitable shallow surface deposits (peat, muck, topsoil) is recommended. Are vertical and lateral limits of recommended excavation provided? (Vertical extents provided in terms of depths and horizontal extents provided in terms of stations and offsets.)	X		
b. Where a surcharge treatment is recommended, are plan and cross-section of surcharge treatment provided in geotechnical report for benefit of the roadway designer?			X
c. Are instructions or specifications providing concerning instrumentation, fill placement rates and estimated delay times for the contractor?			X
d. Are recommendations provided for disposal of surcharge material after the settlement period is complete?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST (LANDSLIDE CORRECTIONS)"

D. Landslide Corrections (Pages 77-80, 103-105)

In addition to the basic information listed in Section A, is the following information provided in the landslide study geotechnical report? (Refer to Table 4 for guidance on the necessary technical support data for correction of slope instabilities.)

	Yes	No	Unknown or N/A
* 1. Is a site plan and scaled cross-section provided showing ground surface conditions both before and after failure?			X
* 2. Is the past history of the slide area summarized - including movement history, summary of maintenance work and costs, and previous corrective measures taken (if any)?			X
* 3. Is a summary given of results of site investigation, field and lab testing, and stability analysis, including cause(s) of the slide?			X
Plan			
4. Are detailed slide features – including locations of ground surface cracks, head scarp, and toe bulge – shown on the site plan?			X
Cross Section			
* 5. Are the cross sections used for stability analysis included with the soil profile, water table, soil unit weights, soil shear strengths, and failure plane shown as it exists?			X
6. Is slide failure plane location determined from slope indicated?			X
* 7. For an active slide, was soil strength along the slide failure plane backfigured using a safety factor equal to 1.0 at the time of failure?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

D. Landslide Corrections (Cont.)

Text	Yes	No	Unknown or N/A
* 8. Is the following information presented for each proposed correction alternate: (typical correction methods include buttress, shear key, rebuild slope, surface drainage, subsurface drainage-interceptor, drain trenches or horizontal drains and retaining structures)?			X
a. Cross-section of proposed alternate?			X
b. Estimated safety factor?			X
c. Estimated cost?			X
d. Advantages and disadvantages?			X
9. Is a recommended correction alternate(s) given which provides a minimum F.S. = 1.25?			X
10. If horizontal drains are proposed as part of slide correction, has subsurface investigation located definite water bearing strata that can be tapped with horizontal drains?			X
11. If a toe counterberm is proposed to stabilize an active slide, has field investigation confirmed that the toe of the existing slide does not extend beyond the toe of the proposed counterberm?			X
12. Construction Considerations			
a. Where proposed correction will require excavation into the toe of an active slide (such as for buttress or shear key), has the "during construction backslope F.S." with open excavation been determined?			X
b. If open excavation F.S. is near 1.0, has excavation stage construction been proposed?			X
c. Has seasonal fluctuation of groundwater table been considered?	X		
d. Are special construction features, techniques and materials described and specified?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (RETAINING WALLS)

E. Retaining Walls (See Section 5 of "Geotechnical Engineering Notebook")

In addition to the basic information listed in Section A, is the following information provided in the project geotechnical report? (See Geotechnical Structures Report)

	Yes	No	Unknown or N/A
* 1. Does the geotechnical report include recommended soil strength parameters and groundwater elevation for use in computing wall design lateral earth pressures and factor of safety for overturning, sliding, and external slope stability?			X
2. Is it proposed to bid alternate wall designs?			X
* 3. Are acceptable reasons given for the choice and/or exclusion of certain wall types (gravity, reinforced soil, tieback, cantilever, etc.)?			X
* 4. Is an analysis of the wall stability included with minimum acceptable factors of safety against overturning (F.S. = 2.0), sliding (F.S. = 1.5), and external slope stability (F.S. = 1.5)?			X
5. If wall will be placed on compressible foundation soils, is estimated total settlement, differential settlement, and time rate of settlement given?			X
6. Will wall types selected for compressible foundation soils allow differential movement without distress?			X
7. Are wall drainage details including materials and compaction provided?			X
8. Construction Considerations:			
a. Are excavation requirements covered – safe slopes for open excavations, need for sheeting or shoring?			X
b. Fluctuation of groundwater table?			X

* A response other (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (SPREAD FOOTINGS)

F. Structure Foundations – Spread Footings (Pages 191-205)

In addition to the basic information listed in Section A, is the following information provided in the project foundation report? (See Geotechnical Structures Report)

	Yes	No	Unknown or N/A
* 1. Are spread footings recommended for foundation support? If not, are reasons for not using them discussed.			X
* 2. Is recommended bottom of footing elevation and reason for recommendation (e.g., based on frost depth, estimated scour depth or depth to competent bearing material) given?			X
* 3. Is recommended allowable soil or rock bearing pressure given?			X
* 4. Is estimated footing settlement and time given?			X
* 5. Where spread footings are recommended to support abutments placed in the bridge end fills, are special gradation and compaction requirements provided for select and fill and backwall drainage material? (Pages 137-141)			X
6. Construction Considerations:			
a. Have the materials been adequately described on which the footing is to be placed so the project inspector can verify that material is as expected?			X
b. Have excavation requirements been included for safe slopes in open excavations, need for sheeting or shoring, etc.?	X		
c. Has fluctuations of the groundwater table been addressed?	X		

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (PILE FOUNDATIONS)

G. Structure Foundations – Piles (Pages 224-311)

In addition to the basic information listed in Section A, if pile support is recommended or given as an alternate, conclusions/recommendations should be provided in the project geotechnical report for the following: (See Geotechnical Structures Report)

	Yes	No	Unknown or N/A
* 1. Is the recommended pile type given (displacement, nondisplacement, pipe pile, concrete pile, H-pile, etc.) with valid reasons given for choice and/or exclusion? (Pages 224-226)			X
2. Do you consider the recommended pile type(s) to be the most suitable and economical?			X
* 3. Are estimated pile lengths and estimated tip elevations given for the recommended allowable pile design loads?			X
4. Do you consider the recommended design loads to be reasonable?			
5. Has pile group settlement been estimated (only of practical significance for friction pile groups ending in cohesive soil)? (Pages 245-247)			X
6. If a specified or minimum pile tip elevation is recommended, is a clear reason given for the required tip elevation, such as underlying soft layers, scour, downdrag, piles uneconomically long, etc.?			X
* 7. Has design analysis (wave equation analysis) verified that the recommended pile section can be driven to the estimated or specified tip elevation without damage (especially applicable where dense gravel-cobble-boulder layers or other obstructions have to be penetrated?			X
8. Where scour piles are required, have pile design and driving criteria been established based on mobilizing the full pile design capacity below the scour zone?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

G. Pile Foundations (Cont.)

	Yes	No	Unknown or N/A
9. Where lateral load capacity of large diameter piles is an important design consideration, are p-y curves (load vs. deflection) or soil parameters given in the geotechnical report to allow the structural engineer to evaluate lateral load capacity of all piles?			X
*10. For pile supported bridge abutments over soft ground:			X
a. Has abutment pile downdrag load been estimated and solutions such as bitumen coating considered in design? Not generally required if surcharging of the fill is being performed. (Pages 248-251)			X
b. Is bridge approach slab recommended to moderate differential settlement between bridge ends and fill?			X
c. If the majority of subsoil settlement will not be removed prior to abutment construction (by surcharging), has estimate been made of the amount of abutment rotation that can occur due to lateral squeeze of soft subsoil? (Pages 114-115)			X
d. Does the geotechnical report specifically alert the structural designer to the estimated horizontal abutment movement?			X
11. If bridge project is large, has pile load test program been recommended? (Pages 229-302)			X
12. For a major structure in high seismic risk area, has assessment been made of liquefaction potential of foundation soil during design earthquake (note: only loose saturated sands and silts are “susceptible” to liquefaction)?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for clarification and/or to discuss the project.

G. Pile Foundations (Cont.)

	Yes	No	Unknown or N/A
13. Construction Considerations: (Pages 279-311)			
Have the following important construction considerations been adequately addressed?			X
a. Pile driving details such as: boulders, or obstructions which may be encountered during driving – need for preaugering, jetting, spudding, need for pile tip reinforcement, driving shoes, etc.?			X
b. Excavation requirements – safe slope for open excavations, need for sheeting or shoring? Fluctuation of groundwater table?			X
c. Have effects of pile driving operation on adjacent structures been evaluated – such as protection against damage caused by footing excavations or pile driving vibrations?			X
d. Is preconstruction condition survey to be made of adjacent structures to prevent unwarranted damage claims?			X
e. On large pile driving projects have other methods of pile driving control been considered such as dynamic testing or wave equation analysis?			X

"GTR REVIEW CHECKLIST" (DRILLED SHAFTS)

H. Structure Foundations – Drilled Shafts (Pages 252-260)

In addition to the basic information listed in Section A, if drilled shaft support is recommended or given as an alternate, are conclusions/recommendations provided in the project foundation report for the following: (See Geotechnical Structures Report)

	Yes	No	Unknown or N/A
* 1. Are recommended shaft diameter(s) and length(s) for allowable design loads based on an analysis using soil parameters for side friction and end bearing?			X
* 2. Settlement estimated for recommended design load?			X
* 3. Where lateral load capacity of shaft is an important design consideration, are P-Y (load vs. deflection) curves or soils data provided in geotechnical report which will allow structural engineer to evaluate lateral load capacity of shaft?			X
4. Is static load test (to plunging failure) recommended?			X
5. Construction Considerations:			
a. Have construction methods been evaluated, i.e., can less expensive dry method or slurry method be used or will casing be required?			X
b. If casing will be required, can casing be pulled as shaft is concreted (this can result in significant cost savings or very large diameter shafts)?			X
c. If artesian water was encountered in explorations, have design provisions been included to handle it (such as by requiring casing and tremie seal)?			X
d. Will boulders be encountered? (Note: If boulders will be encountered, then the use of shafts should be seriously questioned due to construction installation difficulties and resultant higher cost the boulders can cause.)			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

"GTR REVIEW CHECKLIST" (MATERIAL SITES)

I. Material Sites

In addition to the basic information listed in Section A, is the following information provided in the project Material Site Report?:

	Yes	No	Unknown or N/A
1. Material site location, including description of existing or proposed access routes and bridge load limits (if any)?			X
* 2. Have soil samples representative of all materials encountered during the pit investigation been submitted and tested?			X
* 3. Are laboratory quality test results included in the report?			X
4. For aggregate sources, do the laboratory quality test results (such as L.A. abrasion, sodium sulfate, degradation, absorption, reactive aggregate, etc.) indicate if specification materials can be obtained from the deposit using normal processing methods?			X
5. If the lab quality test results indicate that specification material cannot be obtained from the pit materials as they exist naturally- has the source been rejected or are detailed recommendations provided for processing or controlling production so as to ensure a satisfactory product?			X
* 6. For soil borrow sources, have possible difficulties been noted - such as above optimum moisture content clay-silt soils, waste due to high PI, boulders, etc.?			X
* 7. Where high moisture content clay-silt soils must be used, are recommendations provided on the need for aeration to allow the materials to dry out sufficiently to meet compaction requirements?			X
8. Are estimated shrink-swell factors provided?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

I. Material Sites (Cont.)

	Yes	No	Unknown or N/A
* 9. Do the proven material site quantities satisfy the estimated project quantity needs?			X
10. Where materials will be excavated from below the water table, has seasonal fluctuation of the water table been determined?			X
11. Are special permit requirements covered?			X
12. Have pit reclamation requirements been covered adequately?			X
13. Has a material site sketch (plan and profile) been provided for inclusion in the plans, which contains:			X
! Material site number?			X
! North arrow and legal subdivision?			X
! Test hole or test pit logs, location, number and date?			X
! Water table elevation and date?			X
! Depth of unsuitable overburden which will have to be stripped?			X
! Suggested overburden disposal area?			X
! Proposed mining area and previously mined areas?			X
! Existing stockpile locations?			X
! Existing or suggested access roads?			
! Bridge load limits?			X
! Reclamation details?			X
14. Are recommended special provisions provided?			X

* A response other than (yes) or (N/A) for any of these checklist questions is cause to contact the appropriate geotechnical engineer for a clarification and/or to discuss the project.

psi Information To Build On
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GEOTECHNICAL ENGINEERING SERVICES REPORT

For the

PROPOSED 44TH AVE AND 19TH ST. CT. SIGNAL LIGHTS AND 38TH AVE ROUNDABOUTS MANATEE COUNTY, FLORIDA

Prepared for

Cardno TBE
380 Park Place Boulevard
Suite 300
Clearwater, Florida 33759

Prepared by

Professional Service Industries, Inc.
5801 Benjamin Center Drive
Suite 112
Tampa, Florida 33634
Telephone (813) 886-1075
Fax (813) 888-6514

PSI Project No. 0775-623

June 17, 2010

Jessica J. Hansen
Project Geologist

Martin E. Millburg, P.E. 6/17/2010
Senior Geotechnical Engineer
Florida License No. 36584

TABLE OF CONTENTS

APPENDIX

1.0 PROJECT INFORMATION

1.1 PROJECT AUTHORIZATION

Initial authorization to proceed with this project was provided through Cardno TBE Subcontract for Professional Services, Cardno TBE Project No. 00193-001-18 FF in February 2009. This most recent phase of this study was conducted in accordance with our proposal for these services dated January 13, 2010, PSI Proposal No. 775-8G0027.

1.2 PROJECT DESCRIPTION

This project includes two mast arms signal lights at the intersection of 44th Avenue and 19 Street Court. In addition, the two intersections along 38th Avenue will be converted to roundabouts. The roundabouts include the northwest corner of 27th Street East and 30th Street East. PSI was requested to provide subsurface soil and groundwater information for the proposed construction.

Should any of the above information or assumptions made by PSI be inconsistent with the planned construction, we request that you contact us immediately to allow us to make any necessary modifications to the recommendations contained herein.

1.3 PURPOSE AND SCOPE OF WORK

The purpose of this study is to provide subsurface information for the proposed signal lights and roundabouts. In this regard, engineering assessments of the following items have been formulated:

1. General location and description of potentially deleterious materials encountered in the borings which may interfere with construction progress, including existing fills or surficial organics.

2. Identification of existing groundwater level and estimated seasonal high groundwater level (SHGL).

3. Pond design criteria including depth to the seasonal high groundwater, depth to the confining layer, permeability rates of the soils and the fillable porosity.

4. Soil parameters required for the proposed signal lights.

The following services have been provided in order to achieve the preceding objectives:

1. Submitted utility clearances for proposed boring locations. Performed field reconnaissance to determine site access and stake the boring locations.

2. Executed a program of subsurface exploration consisting of subsurface sampling and field-testing. As requested, we performed a total of four (4) Standard Penetration Test (SPT) borings extended to depths of 20 to 25 feet below the ground surface. Two borings were extended to 20 feet deep in the proposed roundabouts. Stormwater ponds are anticipated in these areas. Two SPT soil borings were performed to depths of 25 feet each for potential signal foundations at the intersection of 44th Avenue and 19th Street Court East. Soil samples and SPT resistances were collected virtually continuously for the upper 10 feet and at intervals of 5 feet thereafter. Representative soil samples were returned to the Tampa office for visual classification and testing.

3. Visually classified representative soil samples in the laboratory using the Unified Soil Classification System (USCS) for the signal lights and American Association of State Highway and Transportation Officials (AASHTO) for the roundabout borings. Conducted a limited laboratory testing program including Atterberg limits, sieve analysis and natural moisture content. Identified soil conditions at each boring location and formed an opinion of the site soil stratigraphy.

4. Collected groundwater level measurements and estimated normal wet seasonal high groundwater levels. Estimated seasonal high groundwater elevations based upon elevations of the ground surface provided by Cardno TBE.

5. The results of the exploration have been used in the engineering analysis and the formulation of recommendations. The results of the subsurface exploration, including the recommendations and the data on which they are based, are presented in this report supervised by a professional engineer.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, bedrock, ground water, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors, unusual or suspicious items or conditions are strictly for the information of our client.

2.0 SUBSURFACE CONDITIONS

2.1 SOIL BORING RESULTS

As noted above, the subsurface conditions were explored using four (4) SPT borings extended to depths of 20 to 25 feet below the current ground surface. Boring locations were located by PSI personnel using Northing and Easting coordinates provided by Cardno TBE and measuring distances from existing features based upon the site plan provided.

The SPT boring procedure was conducted in general conformance with ASTM D-1586. SPT sampling was completed using a split barrel sampler with a 1.5 inch I.D. barrel and a 1⅜ inch I.D. open shoe. A liner was not used within the barrel. Closely spaced soil sampling was performed from a depth of about 4 to 10 feet with a 5 foot sample interval used thereafter. The initial 4 feet of the borings was augered to avoid possible utility conflicts. After seating the sampler 6 inches, the number of successive blows required to drive the sampler 12 inches into the soil constitutes the test result commonly referred to as the N-value. The N-value has been empirically correlated with various soil properties and is considered to be indicative of the relative density of cohesionless soils and the consistency of cohesive soils. The recovered split spoon samples were visually classified in the field with representative portions of the samples placed in jars and transported to our Tampa office for review by a geotechnical engineer and for confirmation of the field classification.

The results of the subsurface exploration program including the soil profiles and some pertinent exploration information such as SPT N-values are graphically presented on Sheets 2 and 3. Soil stratification is based on review of recovered soil samples and interpretation of field boring logs by a geotechnical engineer. The stratification lines represent the approximate boundaries between soil types; however, the actual transition may be gradual. The signal light borings were visually classified using the Unified Soil Classification System and the roundabout borings were classified using the American Association of State Highway and Transportation Officials. Minor variations not considered important to our engineering evaluation may have been abbreviated or omitted for clarity. Table 2 presents soil parameters for each soil strata encountered in this project. Included in the soil parameter table are the soil unit weight, friction angle, cohesion, and coefficients of active and passive earth pressure.

The boring performed at the northwest corner of the intersection of 38th Ave East and 27th St. East for the proposed roundabout encountered slightly silty sand (AASHTO Classification A-2-4) from the ground surface to about 6 feet deep. Clayey sand (A-2-6) was found below to about 10 feet deep. From about 10 feet to the boring termination depth of 20 feet we encountered calcareous silt (A-7-5) with SPT resistances (N-values) of 18 to greater than 50 blows per foot.

The boring performed at the southwest corner of the intersection of 38th Ave East and 30th St. East for the proposed roundabout encountered fine sand (A-3) to slightly silty sand (A-2-4) from the ground surface to about 11 feet deep. The N-values in the upper sands

ranged from 6 to 14 BPF. Below about 11 feet to the boring termination depth of 20 feet we encountered calcareous silt (A-7-5) with SPT resistances (N-values) of 15 to greater than 50 blows per foot.

The borings performed for proposed signal lights at the intersection of 44th Ave East and 19th St. Ct. East encountered fine sand to slightly silty fine sand (USCS Classification SP/SP-SM) from the ground surface to depths of about 4 to 6 feet below land surface. Silty sand (SM) and clayey sand (SC) were encountered below to a depth of about 10 feet. The SPT resistances in the upper sands ranged from 13 to 23 BPF indicating medium dense conditions. Below about 10 feet silt to clay with phosphates (ML-CL) was found to depths of about 15 feet. Highly weathered limestone with clay extended below to about 20 feet. The SPT resistances in these clayey to rocky soils ranged from 6 to 13 BPF indicating medium stiff to stiff conditions. Refusal sandy silt was encountered below about 20 feet to the boring termination depth of 25 feet. The SPT resistances in this material measured greater than 50 BPF.

The description presented above is of a generalized nature to highlight the major subsurface features and material characteristics. The soil profiles included on **Sheets 2 and 3** of the **Appendix** should be reviewed for specific information at the individual boring locations. These profiles include soil description, stratifications, and laboratory classification of soils. The stratifications shown on the boring profiles represent the conditions only at the actual boring locations. Variations may occur and should be expected throughout the site. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual.

2.2 GROUNDWATER INFORMATION

The groundwater table was measured about 3 feet below the current ground surface in each of the soil borings. It should be noted that groundwater levels tend to fluctuate during periods of prolonged drought and extended rainfall and may be affected by manmade influences. In addition, a seasonal effect will also occur in which higher groundwater levels are normally recorded in rainy seasons. In this regard, it is estimated that the seasonal high groundwater table (SHGWT) will range from 1 ½ to 2 ½ feet below the ground surface in the soil borings performed. The estimated seasonal groundwater levels are based upon known topography, elevation data provided, and our experience with this site. **Table 1** in the **Appendix** should be reviewed for specific groundwater information at each boring location.

In general, the estimated 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 levels could exceed the estimated seasonal high groundwater levels as a result of a series of rainfall events, changed conditions at the site that alter surface water drainage characteristics, and/or variations in duration, intensity, or total volume of rainfall.

3.0 EVALUATION AND RECOMMENDATIONS

3.1 GENERAL

The following design recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered. If there are any changes in these project criteria, including project location on the site, a review must be made by PSI to determine if any modifications in the recommendations will be required. The findings of such a review should be presented in a supplemental report.

Once final design plans and specifications are available, a general review by PSI is recommended as a means to check that the evaluations made in preparation of this report are correct and that earthwork recommendations are properly interpreted and implemented. If these services are desired, PSI can submit a proposal for them, if requested.

3.2 POND DESIGN RECOMMENDATIONS

Borings B-400 and B-401 were performed in proposed pond and roundabout areas.

3.2.1 BASE OF AQUIFER

For the design of stormwater pond, the base of the aquifer can be determined by the depth to the confining layer. A confining layer is generally regarded as a soil stratum that will significantly impede the infiltration of water. Based on the soil borings performed, a confining layer is about 10 to 11 feet deep at the soil boring locations.

3.2.2 FILLABLE POROSITY

The porosity of a soil is the percentage of the total volume of the material that is occupied by pores or interstices. These pores may be filled with water or air and are referred to as void space. Generally, it is assumed 90 percent of the unsaturated void space is available for filling. From St. Johns Water Management District, special publication SJ93-SP10 (1993), the value for fillable porosity for fine sands can be expected to vary from 20 to 30 percent. Based on the soil profile encountered, we believe a value on the order of 20% should be assumed for the fillable porosity.

3.2.3 SUMMARY OF STORMWATER POND DESIGN RECOMMENDATIONS

Approximate Base of Aquifer Depth	10-11 feet deep
Estimated Seasonal High Groundwater Depth	2 – 2 ½ feet deep
Fillable Porosity	20%

3.3 FILL AVAILABILITY

The fine sand (A-3) and slightly silty fine sands (A-2-4) encountered from the ground surface to depths of about 6 to feet deep can be used as structural fill material provided it is free of significant clay, organics or deleterious materials. Stratum 3 material (A-2-4 Plastic) may not be ideal for structural fill as compaction may be hard to achieve in these slightly clayey soils.

3.4 EXCAVATIONS

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the current OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractors "responsible person", as defined in 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in all local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other party's compliance with local, state, and federal safety or other regulations.

4.0 REPORT LIMITATIONS

The recommendations submitted are based on the available subsurface information obtained by PSI and design details furnished by Cardno TBE for the proposed roundabouts and signal lights at the project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the pond recommendations are required.

Much of the State of Florida is underlain by a soluble limestone foundation. This limestone can dissolve, resulting in the formation of a sinkhole. An evaluation of the risk of sinkhole development was not included in the Scope of work for this study.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. This report has been prepared for the exclusive use of Cardno TBE and its consultants for the specific application to the proposed 44th Ave and 19th St. Ct. signal lights and 38th Ave roundabouts in Bradenton, Manatee County, Florida.

APPENDIX

NOT TO SCALE

LEGEND

APPROXIMATE SPT BORING LOCATION

401

402

403

404

38TH AVENUE EAST

44TH AVENUE EAST

U.S. HIGHWAY 301

US HIGHWAY 301

27TH STREET EAST

29TH STREET EAST

30TH STREET EAST

24th ST. E.

27th ST. E.

29th ST. E.

19th ST CT E

19TH STREET CT EAST

POND 1

POND MITIGATION AREA

POND 2

POND 3

POND 3 (OPTION 1)

POND 4

POND 5

WETLAND MITIGATION (OPTION 1)

SECTION LINE

35' WIDE FLORIDA POWER & LIGHT COMPANY EASEMENT (O.R.B. 807, PG. 1476)

35' WIDE UTILITY EASEMENT (O.R.B. 1555, PG. 1871)

P:\775-Geo\0775623 44th Ave & 19th St\cad\0775623s1

REVISIONS

Date	By	Description	Date	By	Description

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MANATEE COUNTY

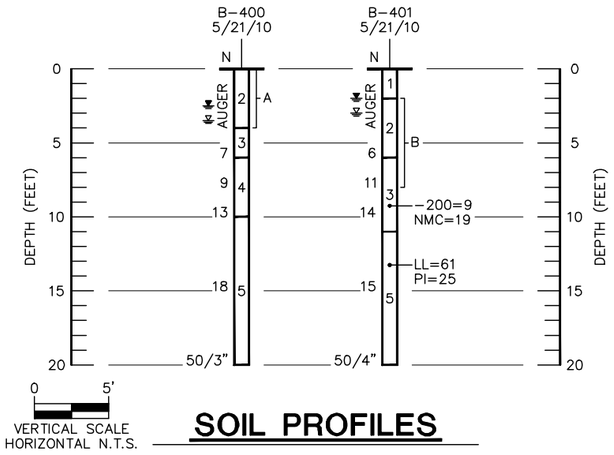
ROAD NO.	COUNTY PROJECT NO.
–	–

BORING LOCATION PLAN

PROPOSED 44TH AVENUE
ROUNDABOUTS AND SIGNAL LIGHTS

SHEET NO.

PSI PROJECT No. 0775623
SHEET 1



SOIL PROFILES

LEGEND

1. LIGHT TO DARK GRAY, BROWN FINE SAND (A–3)
2. LIGHT TO DARK BROWN SLIGHTLY SILTY SAND (A–2–4) NON PLASTIC
3. BROWN, LIGHT TO DARK GRAY SLIGHTLY SILTY/CLAYEY SAND (A–2–4) PLASTIC
4. BROWN, GRAY CLAYEY SAND (A–2–6)
5. TAN, LIGHT GREENISH GRAY TO DARK GRAY SLIGHTLY CALCAREOUS SILT WITH TRACE PHOSPHATES (A–7–5)

A–3	AASHTO GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
▼	GROUNDWATER LEVEL, DATE OBSERVED
▼	ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
N	NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12" PENETRATION. (UNLESS OTHERWISE NOTED.)
50/6"	FIFTY BLOWS FOR SIX INCHES
–200	FINES PASSING NO. 200 SIEVE (%)
NMC	NATURAL MOISTURE CONTENT (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
A	TRACE ROOTS; ORGANICS (<5%)
B	SMALL CEMENTED SANDS (ROCK) (<1")

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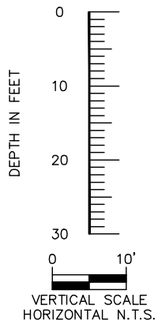
ROAD NO.	COUNTY PROJECT NO.
–	–

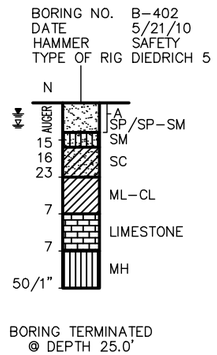
ROADWAY SOILS SURVEY

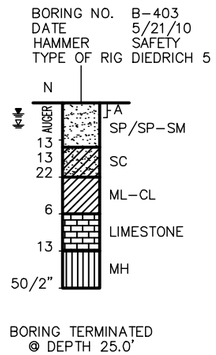
PROPOSED 44TH AVENUE
ROUNDABOUTS AND SIGNAL LIGHTS

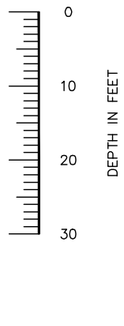
SHEET NO.

PSI PROJECT No. 0775623
SHEET 2









LEGEND

- (SP/SP-SM), LIGHT BROWN TO DARK GRAY FINE SAND TO SLIGHTLY SILTY FINE SAND
- (SC), GRAY TO BROWN CLAYEY SAND
- (MH), TAN, GRAY TO GREENISH BROWN SLIGHLTY CALCAREOUS SANDY SILT WITH TRACE PHOSPHATES
- GRAY INTERBEDDED LIMESTONE (DOLOSTONE) AND CLAY
- (SM), LIGHT GRAY TO DARK BROWN SILTY SAND
- (ML-CL), DARK GRAY SILT TO CLAY WITH TRACE PHOSPHATES
- A WITH TRACE ORGANICS

NOTES:

- SP UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
- WATER TABLE
- ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
- N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12" PENETRATION. (UNLESS OTHERWISE NOTED.)

50/6" FIFTY BLOWS FOR SIX INCHES

GRANULAR MATERIALS– RELATIVE DENSITY	SPT (BLOWS/FT.)
VERY LOOSE	LESS THAN 4
LOOSE	4–10
MEDIUM DENSE	10–30
DENSE	30–50
VERY DENSE	GREATER THAN 50

SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT.)
VERY SOFT	LESS THAN 2
SOFT	2–4
FIRM	4–8
STIFF	8–15
VERY STIFF	15–30
HARD	GREATER THAN 30

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ROAD NO.	COUNTY PROJECT NO.
–	–

STRUCTURE BORING SOIL PROFILES FOR MAST ARMS

PROPOSED 44TH AVENUE
ROUNDABOUTS AND SIGNAL LIGHTS

SHEET NO.

PSI PROJECT No. 0775623
SHEET 3

TABLE 1
SUMMARY OF ESTIMATED SHGWL - ROUNDABOUT AND MAST ARMS
44TH AVENUE & 19TH ST CT
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775623

BORING NUMBER	BORING LOCATION			BORING DEPTH (feet)	GROUNDWATER TABLE		DATE RECORDED	ESTIMATED SHGWT[3]	
	NORTHING	EASTING	ELEVATION[1] (feet)		DEPTH[2] (feet)	ELEVATION (feet)		DEPTH (feet)	ELEVATION[1] (feet)
B - 400*	1138693.55	485379.98	25.1	20	3	22.1	5/21/2010	2 1/2	22.6
B - 401	1138909.58	484289.12	29.7	20	3	26.7	5/21/2010	2	27.7
B - 402	1137616.75	481001.36	31.9	25	3	28.9	5/21/2010	1 1/2	30.4
B - 403	1137498.27	481085.39	31.8	25	3	28.8	5/21/2010	1 1/2	30.3

(1) Based upon elevations provided by Cardno TBE.
(2) Depth below existing grades at the time of field work.
(3) SHGWT indicates seasonal high groundwater table.
* SHGWT estimate primarily based upon Dec 2009 borings.

TABLE 2
GEOTECHNICAL ENGINEERING PARAMETERS - ROUNDABOUT AND MAST ARMS
44TH AVENUE & 19TH ST CT
MANATEE COUNTY, FLORIDA
PSI PROJECT NO. 0775623

Boring No.	Approximate Depth (ft)	Soil Description	Soil Type	Average SPT-N	Unit Weight (pcf)		Cohesion (psf)	Friction Angle (degree)	Coefficient of Lateral Pressure		
					Total	Submerge			Ka	Kp	Ko
B-400	0-6	A-2-4	Cohesionless	7	105	42.6	-	29	0.34	2.93	0.46
	6-18	A-2-6/A-7-5	Cohesive	13	115	52.6	1625	-	1.00	1.00	1.00
	18-20	A-7-5	Cohesive	50	125	62.6	6250	-	1.00	1.00	1.00
B-401	0-11	A-3/A-2-4	Cohesionless	10	105	42.6	-	30	0.33	3.00	0.45
	11-18	A-7-5	Cohesive	15	115	52.6	1875	-	1.00	1.00	1.00
	18-20	A-7-5	Cohesive	50	125	62.6	6250	-	1.00	1.00	1.00
B-402	0-6	SP/SP-SM/SM	Cohesionless	15	105	42.6	-	31	0.32	3.12	0.43
	6-10	SC	Cohesive	20	120	57.6	2500	-	1.00	1.00	1.00
	10-22	ML-CL/Limestone with Clay	Cohesive	7	110	47.6	875	-	1.00	1.00	1.00
	22-25	MH	Cohesive	50	125	62.6	6250	-	1.00	1.00	1.00
B-403	0-6	SP/SP-SM	Cohesionless	13	105	42.6	-	31	0.33	3.07	0.44
	6-10	SC	Cohesive	18	120	57.6	2250	-	1.00	1.00	1.00
	10-23	ML-CL/Limestone with Clay	Cohesive	10	115	52.6	1250	-	1.00	1.00	1.00
	23-25	MH	Cohesive	50	125	62.6	6250	-	1.00	1.00	1.00