APPENDIX C

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GEOTECHNICAL REPORTS

5300 W. Cypress Street
Suite 200
Tampa, FL 33607
Phone: (800) 477-7275

Date: 20 July 2009

East Naples Bay
Rock Boring and Geotechnical Investigation
To: Dr. Michael Bauer
From: Jeffrey R. Tabar

APPENDIX 1: Geotechnical Services Summary by Tierra, Inc.
APPENDIX 2: Rock Boring Photos
APPENDIX 3: PBS&J Rock Boring Summary Sheet

Introduction:

Rock borings were conducted at eleven locations within East Naples Bay in Naples, Florida. Each boring consisted of performing a Standard Penetration Test (SPT) boring to a depth at least ten feet below the existing mudline. Five sediment samples were collected from each rock boring (one sample collected during every two feet of penetration). These borings and related tests were completed by Tierra, Inc. PBS&J staff was onsite during drilling activities to monitor subsurface sampling and ensure ASTM standards. The purpose of this rock boring investigation is to identify the elevation, hardness and thickness of the capstone rock within East Naples Bay to allow the City of Naples to dredge the residential canals to a depth of -5.5ft NGVD (-5ft MLW).

Three appendices are provided to supply additional information on the project. Appendix 1 is the Geotechnical Services Summary report provided to PBS&J by Tierra, Inc. The report includes a summary of the project description, site conditions, laboratory testing, and subsurface testing methods. Also supplied in this Tierra report is a location map showing where each boring was retrieved and a soil-profile drawing depicting stratigraphy in each boring. Appendix 2 contains a log of rock boring split spoon photos. Appendix 3 is a rock boring soil profile summary sheet depicting rock borings vertically adjusted to the National Geodetic Vertical Datum of 1929 (NGVD).

SPT Testing and Rock Boring (Methods):

The SPT boring system utilized a 130lb slide hammer mounted on the top of a core barrel constructed of steel pipe that contained a sampling spoon. The slide hammer rig is attached with a rope to a pulley which is manually raised approximately five feet and then dropped, striking the core barrel. Notes are recorded every six inches stating how many blows of the hammer it takes to the barrel to penetrate the soil. This procedure is repeated until the barrel moves two feet into the soil. After two feet, the core barrel is retrieved releasing the sediment sampling spoon which is two feet in length. The sediment sampling spoon is split, visually inspected, photographed and logged in accordance with ASTM procedures. This SPT boring process is repeated five more times until the core barrel rig has penetrated ten feet below the mud surface. Each two-foot horizon was sampled and select samples were analyzed by Tierra Inc. for grain-size analysis and natural moisture content. Approximately fifty-five samples were taken from the five borings. The rock cores were analyzed for percent rock recovery (REC) and rock quality designation (RQD). REC is defined as the percent of rock recovered from the core versus the total core length. RQD is defined as the percent of intact core pieces longer than 4 inches in length compared to the total core length. Photos of selected sediment samples collected from representative sampling spoons can be found in Appendix 2. Results of the physical sediment analysis performed by Tierra, Inc. are included in the Soil Profile attachment in Appendix 1. Five borings were successfully conducted during one field day using these methods.

The location of the selected core boring sites was based on previous jet probe results, water depths, and proximity to areas to be dredged. A figure showing the core locations can be found in Appendix 1. The table below summarizes some of the field data collected during the borings.

Table 1. Field notes summary table.

Point Name	Time	Date	Water Depth (ft)	Bottom Elevation MLLW (ft)	Bottom Elevation NGVD (ft)	Latitude	Longitude
RC-1	2:26pm	4/20/2009	-6	-4.5	-5.3	N26 08.290	W81 47.186
RC-1A	12:00pm	4/22/2009	-5.5	-2.8	-3.6	N26 08.288	W81 47.149
RC-2	10:20am	4/22/2009	-5.6	-3.2	-4	N26 08.217	W81 47.267
RC-3	9:15am	4/22/2009	-5	-3	-3.8	N26 08.148	W81 47.271
RC-4	2:30pm	4/22/2009	-4.9	-3	-3.8	N26 08.082	W81 47.250
RC-5	4:15pm	4/22/2009	-3.8	-2.9	-3.7	N26 08.034	W81 47.178
RC-6	5:45pm	4/22/2009	-4.1	-3.8	-4.6	N26 07.966	W81 47.227
RC-7	8:07am	4/23/2009	-4.3	-3.4	-4.2	N26 07.894	W81 47.139
RC-8	10:08am	4/23/2009	-6	-3.75	-4.55	N26 07.682	W81 46.996
RC-9	12:56pm	4/23/2009	-5.9	-3.7	-4.5	N26 07.422	W81 47.030
RC-10	2:37pm	4/23/2009	-3.9	-1.8	-2.6	N26 07.329	W81 46.985

Rock Boring Analysis:

RC-1: The bottom elevation at this boring location is -5.3ft NGVD. From -5.3ft to -7.3ft, the material is clayey sand with shell. This SPT for this material required eight blows for one foot of penetration. From -7.3ft to -9.3ft, the material is silty sand with shell and limestone fragments, which required twelve blows for one foot of penetration. From -9.3ft to -11.3ft, the material is cemented sand with limestone fragments, which required four blows for one foot of penetration. From -11.3ft to -13.3ft, the material is silty sand with shell and limestone fragments, which required four blows for one foot of penetration. The final portion of the boring from -13.3ft to -15.3ft is extremely weathered limestone rock with a soft consistency, which only required one blow for one foot of penetration. Note: No rock was encountered above -5.5ft NGVD. Therefore, it was decided to move the boring location approximately 200ft east and retry. The additional boring location was named "RC-1A."

RC-1A: The bottom elevation at this boring location is -3.6ft NGVD. From -3.6ft to -4.6 ft, the material is cemented limestone rock, which required fifty blows for only one inch of penetration. At this location, a limestone core run was able to be conducted through approximately one to two feet of rock. A thirteen inch sample of limestone rock was able to be recovered (See Appendix 2 for picture). The rock sample had an unconfined compression strength of 4,440psi, a rock

quality designation of 83%, and a recovery percentage of 100%. Note: This boring and core was conducted in the same canal as RC-1, but was moved approximately 200ft east from RC-1 to allow for a suitable limestone core run.

RC-2: The bottom elevation at this boring location is -4.0ft NGVD. From -4.0ft to -5.0ft, the material started as clayey sand with shells, then progressing to hard, moderately weathered limestone which required twenty-one blows for one foot of penetration. From -5.0ft to -5.5ft, the material is slightly weathered limestone rock, very to extremely hard, which required fifty blows for four inches of penetration. From -5.5ft to -6.0ft, the material is cemented limestone and shell fragments, only requiring five blows for one foot of penetration. The final portion of the boring from -6.0ft to -14.0ft is cemented limestone and shell fragments, which required a maximum of four blows for one foot of penetration.

RC-3: The bottom elevation at this boring location is -3.8ft NGVD. From -3.8ft to -5.3ft, the material is slightly weathered limestone rock, very to extremely hard, which required fifty blows for five inches of penetration. From -5.3ft to -7.3ft, the material is moderately weathered, hard limestone rock, which required forty-seven blows for one foot of penetration. From -7.3ft to -9.8ft, the material is again weathered limestone rock with a soft consistency, only requiring three blows for one foot of penetration. The final portion of the boring from -9.8ft to -13.8ft is silty sand with shell and limestone fragments, only requiring five blows for one foot of penetration.

RC-4: The bottom elevation at this boring location is -3.8ft NGVD. From -3.8ft to -4.3ft, the material is sand with shell and limestone fragments. From -4.3ft to -5.3ft, the material is very to extremely hard, slightly weathered limestone, which required fifty blows for six inches of penetration. From -5.3ft to -7.3ft, the material is hard, moderately weathered limestone, requiring ten blows for one foot of penetration. From -7.3ft to -9.3ft, the material is cemented limestone, which required four blows for one foot of penetration. From -9.3ft to -11.8, the material is cemented limestone, requiring seven blows for one foot of penetration. The final portion of the boring from -11.8ft to -13.8ft is silty sand with shell and limestone fragments, which only required two blows for one foot of penetration.

RC-5: The bottom elevation at this boring location is -3.7ft NGVD. From -3.7ft to -4.7ft, the material is silty sand with organic material, which was penetrated by the weight of the hammer. From -4.7ft to -5.7ft, the material is slightly weathered, very to extremely hard limestone rock,

requiring fifty blows for only four inches of penetration. From -5.7ft to -6.7ft, the material is weathered limestone, having only a moderately hard consistency, which required twenty-five blows for one foot of penetration. The final portion of the boring from -6.7ft to -12.7ft, the material is cemented limestone and shell with a soft consistency, only requiring two blows for one foot of penetration.

RC-6: The bottom elevation at this boring location is -4.6ft NGVD. From -4.6ft to -5.1ft, the material is silty sand with organic material. From -5.1ft to -6.1ft, the material is slightly weathered, very to extremely hard limestone rock, which required fifty blows for only one inch of penetration. The final portion of the core from -6.1ft to -14.6 is cemented shell and limestone rock, with a firm consistency, requiring five blows for one foot of penetration.

RC-7: The bottom elevation at this boring location is -4.2ft NGVD. From -4.2ft to -5.2ft, the material is slightly weathered, very to extremely hard limestone rock, which required fifty blows for only two inches of penetration. From -5.2ft to -6.2ft, the material is silty sand with limestone fragments. From -6.2ft to -8.2ft, the material is cemented shell and limestone, requiring six blows for one foot of penetration. The final portion of the boring from -8.2ft to -14.2ft is cemented shell and limestone material with a firm consistency, requiring five blows for one foot of penetration.

RC-8: The bottom elevation at this boring location is -4.5ft NGVD. From -4.5ft to -7.0ft, the material is weathered limestone rock with a very hard consistency, requiring fifty blows for only two inches of penetration. The final portion of the boring from -7.0ft to -14.5 is cemented shell and limestone material, requiring four blows for one foot of penetration.

RC-9: The bottom elevation at this boring location is -4.5ft NGVD. From -4.5ft to -5.5ft, the material is silty sand with shell and limestone fragments. From -5.5ft to -6.5ft, the material is slightly weathered, very to extremely hard limestone rock, requiring fifty blows for five inches of penetration. From -6.5ft to -8.5ft, the material is silty sand with shell and limestone fragments. From -8.5 to -10.0ft, the material is cemented shell and limestone with a very stiff consistency, requiring twenty-four blows for one foot of penetration. The final portion of the core from -10.0ft to -14.5ft is cemented shell and limestone material with a firm consistency, requiring six blows for one foot of penetration.

RC-10: The bottom elevation at this boring location is -2.6ft NGVD. From -2.6 ft to -6.6ft, the material is cemented shell and limestone fragments, requiring four blows for one foot of

penetration. From -6.6ft to -9.6ft, the material is weathered limestone rock, with a very hard consistency, requiring fifty blows for five inches of penetration. At this location, a limestone core run was able to be conducted through approximately seven inches of rock. A seven inch sample of limestone rock was able to be recovered (See Appendix 2 for picture). The rock sample had an unconfined compression strength of 8,070psi, a rock quality designation of 33%, and a recovery percentage of 50%.

Conclusions:

At all of the boring locations, weathered limestone rock was encountered. This cap rock is first encountered at elevations of -3.6ft to -6.6ft NGVD. The consistency of the limestone rock was extremely hard resulting in SPT N-Values up to fifty blows for one inch of penetration. All eleven of the borings contained cemented shell with limestone fragments. The consistency of this cemented sand varies from very soft to hard material. SPT N-Values for this material ranged from one blow for one foot of penetration up to fifty blows for one inch of penetration. The results of the rock borings indicate that removal of cap rock is necessary to dredge the East Naples Bay canals to a depth of -5.5ft NGVD in the locations sampled. These borings represent localized results and variations should be expected between boring locations.

Recommended Removal Methods:

The rock encountered in the majority of the areas sampled was a very hard cap rock layer but only ranged from six inches to 1.5 feet thick before entering a softer layer of material. Locations

where the cap rock is thinner may be removed with a long tooth bucket or trenching bucket attached to an excavator. The rock encountered at Cores 1A, 8, and 10 ranged from 2.5 feet to 4 feet thick. The rock in these areas will have to be removed with a hydraulic hammer or hydraulic rotary cutter attached to a 30-40 ton excavator on a barge. If a hydraulic hammer is used the rock will be retrieved using another excavator with a grappling attachment. The advantages to this method are that the rock removed could be used as shoreline protection and the hydraulic hammer will create less turbidity. The disadvantage is the bottom of the canal

will not be completely uniform and rock will be removed 1-2 feet deeper than the dredge template to ensure completion.

The advantage of the hydraulic rotary cutter is more precise control over the dredge depth, with a smoother bottom to the dredge template that can be achieved within six inches tolerance. The rotary cutter will grind the rock into pieces that are not usable for shore protection, but the smaller pieces can then can be removed with the hydraulic dredge an disposed of at the landfill. Grinding the rock will also create more turbidity in the water column than the hydraulic hammer. Another advantage to the rotary cutter is lower vibration and noise. Both techniques are projected to take about four months to complete the rock removal.

Certification of Engineer – I hereby certify that the information presented within this Study was under my direct supervision and is in accordance with Florida Statutes Chapter 471. In addition, the services performed were under this work assignment were conducted as an engineering study and not intended to represent a final design recommendation. It should be noted that the implementation of rock removal techniques described in this document may result in disruption of the surrounding area. It is recommended that vibration and noise levels be monitored during construction. The discussion in this document does not take into account potential damage to the surrounding area and further investigation is required prior to construction. This document does not hold liable in whole or in part any damage caused by rock removal on the below signee.

_____

Jeffrey R. Tabar
Professional Engineer
No. 54094
State of Florida
Date: _____

APPENDIX 1

TIERRA

May 26, 2009

PBS&J, Inc.
5300 West Cypress Street, Suite 200
Tampa, FL 33607

Attn: Mr. Bryan Flynn

RE: Geotechnical Services Summary
East Naples Bay Dredging Project
Collier County, Florida
Tierra Project No. 6511-09-042

Mr. Flynn:

Per your authorization, Tierra, Inc. has completed the subsurface soil sampling for the referenced project. The results of the study are provided herein.

Should there be any questions regarding the report, please do not hesitate to contact our office at (813) 989-1354. We look forward to working with you and your organization on this and future projects.

Respectfully Submitted,

TIERRA, INC.

Marc E. Novak, Ph.D., P.E.
Geotechnical Engineer
Florida License No. 67431

Henri V. Jean, P.E.
Principal Geotechnical Engineer
Florida License No. 55420

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Phone (813) 989-1354 ● Fax (813) 989-1355
Certificate No. 6486

TABLE OF CONTENTS

PROJECT DESCRIPTION

Project Information

The project, as we understand it, consists of the dredging of portions of East Naples Bay and intracoastal canals along Naples Bay in Collier County, Florida. The geotechnical aspect of this project was to indentify the subsurface soils present at 11 locations established by PBS&J within the proposed dredging areas.

Scope of Services

The objective of our study was to obtain information concerning subsurface conditions at the requested locations with barge-mounted drilling equipment.

In order to meet the proceeding objective, we provided the following services:

1. Executed a program of subsurface exploration consisting of borings, subsurface sampling and field-testing. We performed a total of 11 Standard Penetration Test (SPT) borings to depths ranging from approximately 1 to 10 feet below the existing mudline at locations identified by PBS&J. In each boring, samples were collected and SPT resistances measured.

   In addition, limestone core runs were performed at locations C-1A and C-10, where competent limestone was encountered and recovery could be obtained. The core locations were identified by PBS&J. The core runs ranged from 1 to 2 feet in length.

2. Visually classified the samples in the laboratory using the Unified Soil Classification System (USCS). Identified soil and limestone conditions at each boring location. Determined the rock recovery (REC) and rock quality designation (RQD) for each limestone core sample. Perform unconfined uniaxial compression tests of the limestone samples obtained from the cores.

3. Prepared a summary report in accordance with the scope of services outlined above summarizing the course of study pursued, the field and laboratory data generated and the subsurface conditions encountered.

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

SITE CONDITIONS

The subsurface sampling was performed within the existing canals and waterways with barge mounted equipment. The depth of water at the time the borings ranged from approximately from 4 to 7 feet and was tide dependent.

In general, this part of Collier County is known for a near-surface limestone layer known as “caprock”. Caprock varies in consistency from extremely hard to very soft. Caprock typically ranges in thicknesses from 2 to 15 feet.

Based on information provided by PBS&J, the ground surface elevations, at the sample locations ranged from approximately -2.4 to -5.3 feet National Geodetic Vertical Datum of 1929 (NGVD 29).

LABORATORY TESTING

Representative soil samples collected from the borings were classified and stratified in general accordance with the USCS soil classification system. Our classification was based on visual inspection, using the results from the laboratory testing as confirmation. These tests included grain-size analyses, organic content determination, Atterberg series testing, natural moisture content, and uniaxial unconfined compression tests. The following list summarizes the laboratory tests performed by type and number:

- Grain-Size Analysis 6
- Organic Content 2
- Atterberg Limits 6
- Natural Moisture Content 6
- Uniaxial Unconfined Compression Tests 2

The rock cores were reviewed and Percent Recovery (REC) and Rock Quality Designation (RQD) values were measured. REC is defined as the percent of rock recovered from the core versus the total core length. RQD is defined as the percent of intact core pieces longer than 4 inches in length compared to the total core length.

The results of the laboratory tests are presented alongside the soil profiles on Sheet 2 in the Appendix.

SUBSURFACE CONDITIONS

The subsurface conditions were explored using 11 Standard Penetration Test (SPT) borings drilled to depths of approximately 1 to 10 feet below the existing mudline and two (2) limestone core runs through competent limestone of approximately 1 to 2 feet in length. The borings were located in the field by a representative of Tierra using a hand held Global Positioning System (GPS). The approximate boring/coring locations are presented in the Boring Location Plan in the Appendix. The subsurface sampling was observed by representatives of PBS&J.

The SPT borings were performed with the use of a barge-mounted drill rig using Bentonite Mud drilling procedures. The soil sampling was performed in general accordance with American Society for Testing and Materials (ASTM) Test Designation D-1586 titled "Penetration Test and Split-Barrel Sampling of Soils".

As each soil type was revealed, representative samples were placed in air-tight jars and returned to our office for confirmation of the field classification by a geotechnical engineer.

The soil strata encountered in the borings are summarized in the following table:

Stratum Number	Soil Description	USCS Group Symbol
1	Weathered LIMESTONE to Cemented SHELL/LIMESTONE	---*
2	SAND With Shell and/or Cemented Sand and/or Limestone Fragments	SP
3	Clayey SAND with Shell	SC
4	Silty SAND with Shell and/or Limestone Fragments	SM
5	Silty SAND with Organics	SM
*The USCS does not have a classification symbol for Limestone.		

In general, weathered limestone (Stratum 1) of varying consistencies was encountered at the boring locations. The limestone was encountered either at the mudline or beneath sandy soils ranging in thickness from six (6) inches to eight (8) feet.

The consistency of the limestone was highly variable ranging from extremely hard (N values of 50 blows for less than one inch of penetration) to very soft where the drill rods penetrated through the limestone under their own weight (Weight-of-Rod, WR).

Limestone Cores were attempted at locations where the limestone consistency was hard enough to be cored, i.e., recovery of the core run could be obtained. Limestone cores were obtained at Boring Locations RC-1A and RC-10 as directed by PBS&J. At other locations, the limestone was not “competent” or consistent enough in sufficient depth to obtain a core. The limestone varied in consistency with apparent hard and interlayered soft seams that precluded the ability to core the limestone.

It is important to note that the soil and rock conditions presented on the soil profiles on Sheet 2 in the Appendix represent the conditions at the boring/coring locations and variations should be expected.

The subsurface soil stratification is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The soil profiles included in the Soil Profiles Sheet in the Appendix should be reviewed for specific information at individual boring locations. These profiles include soil description, stratification and penetration resistances. The stratifications shown on the boring profiles represent the conditions only at the actual boring location. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual.

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. This company is not responsible for the conclusions, opinions or recommendations made by others based on this data.

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 the geotechnical information has been properly incorporated into the design documents. This report has been prepared for the exclusive use of PBS&J and its consultant(s) for the specific application to the proposed East Naples Bay Dredging project in Collier County, Florida.

APPENDIX

Boring Location Plan

Soil Profiles

BORING LOCATION PLAN

0 500'

PLAN SCALE

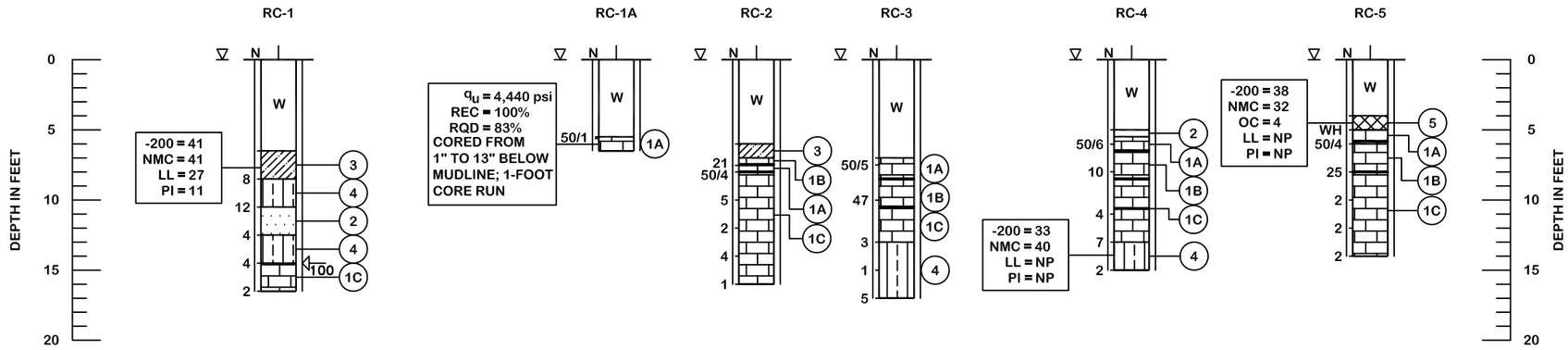
LEGEND

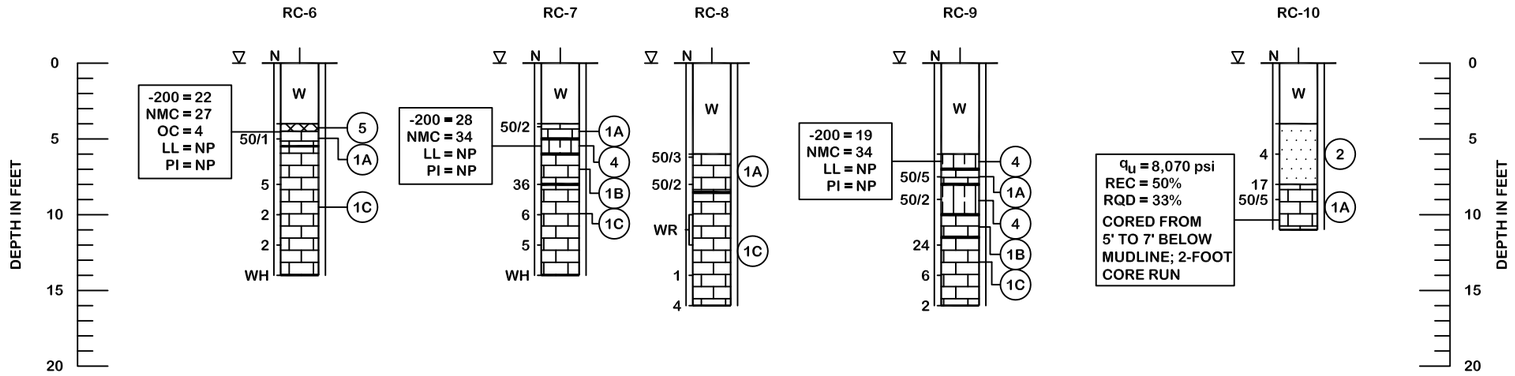
APPROXIMATE LOCATION OF SPT BORING

DRAWN BY: SW CHECKED BY: DE	APPROVED BY: MEN DATE: MAY 2009	ENGINEER OF RECORD: MARC E. NOVAK, Ph. D., P.E. FLORIDA LICENSE NO.: 67431	TIERRA 7351 Temple Terrace Highway Tampa, Florida 33637 Phone: 813-989-1354 Fax: 813-989-1355 FL Cert. No.: 6486	SCALE: NOTED	PROJECT NUMBER: 6511-09-042	GEOTECHNICAL ENGINEERING SERVICES EAST NAPLES BAY DREDGING PROJECT COLLIER COUNTY, FLORIDA	SHEET 1

J:\6511\2009 Files\6511-09-042\CAD\6511-09-042.dwg, BORING LOCATION PLAN, 5/28/2009 9:02:50 AM

SOIL PROFILES





NOTE: WATER DEPTH REFLECTS THE WATER DEPTH AT THE TIME OF FIELD ACTIVITIES; WATER DEPTHS FLUCTUATE AND ARE TIDALLY INFLUENCED AND MAY NOT REFLECT THE WATER DEPTH AT THE TIME OF CONSTRUCTION.

LEGEND

1	WEATHERED LIMESTONE TO CEMENTED SHELL/ LIMESTONE
2	SAND WITH SHELL AND/OR CEMENTED SAND AND/OR LIMESTONE FRAGMENTS (SP)
3	CLAYEY SAND WITH SHELL (SC)
4	SILTY SAND WITH SHELL AND/OR LIMESTONE FRAGMENTS (SM)
5	SILTY SAND WITH ORGANICS (SM)
A	SLIGHTLY WEATHERED LIMESTONE; VERY TO EXTREMELY HARD CONSISTENCY
B	MODERATELY TO HIGHLY WEATHERED LIMESTONE; HARD CONSISTENCY
C	EXTREMELY TO HIGHLY WEATHERED LIMESTONE; SOFT TO VERY SOFT CONSISTENCY
▽	GROUNDWATER TABLE
W	WATER
N	SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED)
SP	UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
50/4	NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
||	CASING
WH	FELL UNDER WEIGHT OF ROD AND HAMMER
WR	FELL UNDER WEIGHT OF ROD
100	LOSS OF CIRCULATION OF DRILLING FLUID (100%)
-200	PERCENT PASSING #200 SIEVE
NMC	NATURAL MOISTURE CONTENT (%)
OC	ORGANIC CONTENT (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
q_u	UNCONFINED COMPRESSION STRENGTH
REC	PERCENT RECOVERY(%)
RQD	ROCK QUALITY DESIGNATION (%)

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

SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT.)
VERY SOFT	LESS THAN 2
SOFT	2 TO 4
FIRM	4 TO 8
STIFF	8 TO 15
VERY STIFF	16 TO 30
HARD	GREATER THAN 30

DRAWN BY: SW
CHECKED BY: DE
APPROVED BY: MEN
DATE: MAY 2009
ENGINEER OF RECORD: MARC E. NOVAK, Ph. D., P.E.
FLORIDA LICENSE NO.: 67431

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7351 Temple Terrace Highway
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FL Cert. No.: 6486

SCALE: NOTED
PROJECT NUMBER: 6511-09-042

GEOTECHNICAL ENGINEERING SERVICES
EAST NAPLES BAY DREDGING PROJECT
COLLIER COUNTY, FLORIDA

SHEET 2

APPENDIX 2

RC-1

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

Split spoon recovery from rock boring depth of 4ft to 6ft

Split spoon recovery from rock boring depth of 6ft to 8ft

RC-1A

Rock core recovery from rock boring depth of 0ft to 1ft

Rock core recovery dried in lab

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

RC-2

Split spoon recovery from rock boring depth of 4ft to 6ft

Split spoon recovery from rock boring depth of 6ft to 8ft

RC-2

Split spoon recovery from rock boring depth of 8ft to 10ft

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

Split spoon recovery from rock boring depth of 4ft to 6ft

Split spoon recovery from rock boring depth of 6ft to 8ft

Split spoon recovery from rock boring depth of 8ft to 10ft

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

Split spoon recovery from rock boring depth of 4ft to 6ft

Split spoon recovery from rock boring depth of 6ft to 8ft

RC-5

Split spoon recovery from rock boring depth of 8ft to 10ft

RC-6

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

Split spoon recovery from rock boring depth of 4ft to 6ft

Split spoon recovery from rock boring depth of 6ft to 8ft

Split spoon recovery from rock boring depth of 8ft to 10ft

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

Split spoon recovery from rock boring depth of 4ft to 6ft

Split spoon recovery from rock boring depth of 6ft to 8ft

Split spoon recovery from rock boring depth of 8ft to 10ft

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

Split spoon recovery from rock boring depth of 4ft to 6ft

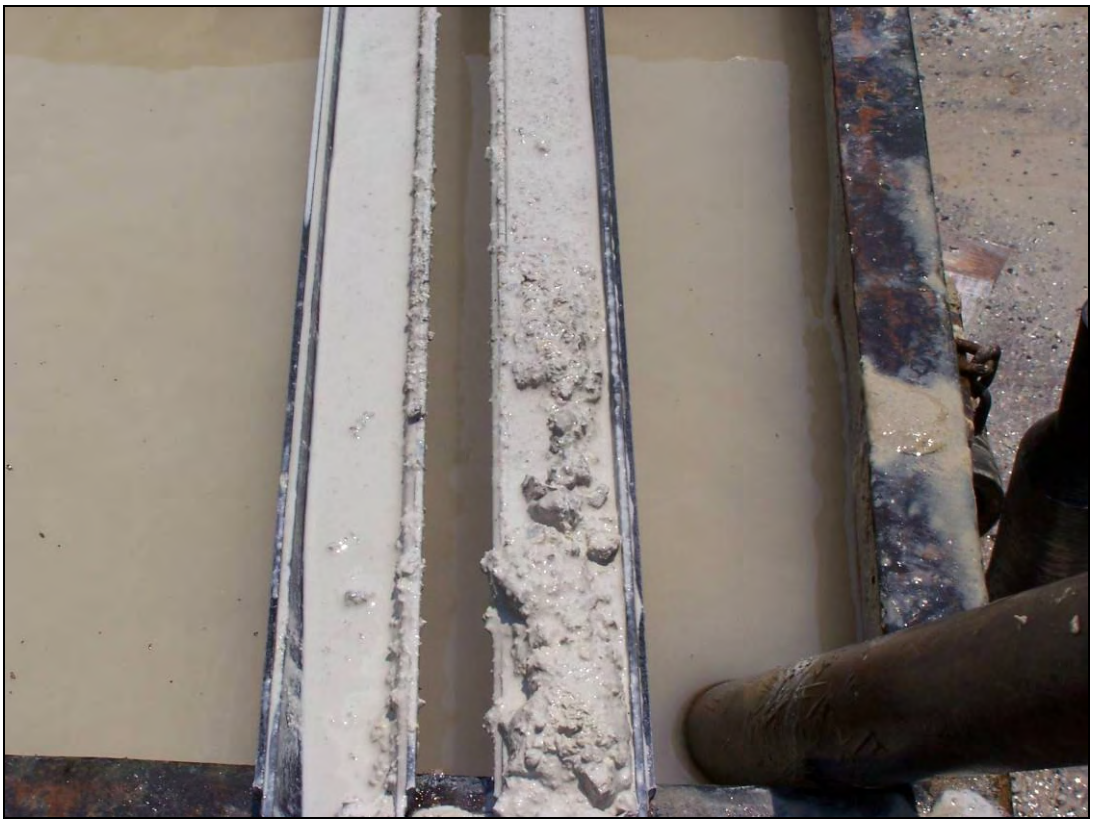
Split spoon recovery from rock boring depth of 6ft to 8ft

Split spoon recovery from rock boring depth of 8ft to 10ft

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

Split spoon recovery from rock boring depth of 4ft to 6ft



Split spoon recovery from rock boring depth of 6ft to 8ft

RC-9

Split spoon recovery from rock boring depth of 8ft to 10ft

Split spoon recovery from rock boring depth of 0ft to 2ft

Split spoon recovery from rock boring depth of 2ft to 4ft

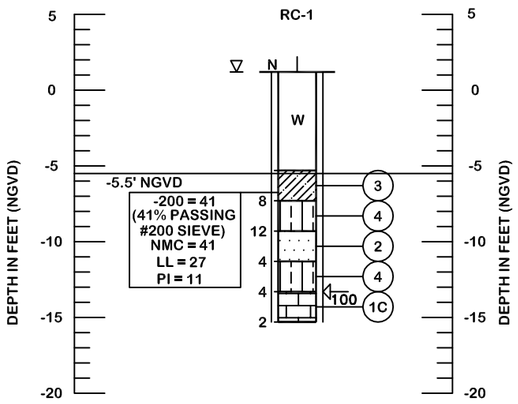
Split spoon recovery from rock boring depth of 4ft to 6ft

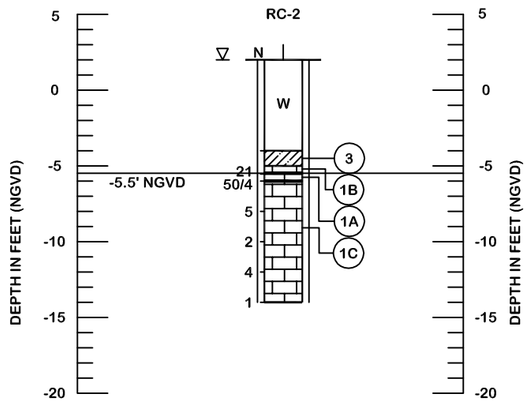
Rock core recovery from rock boring depth of 6ft to 8ft

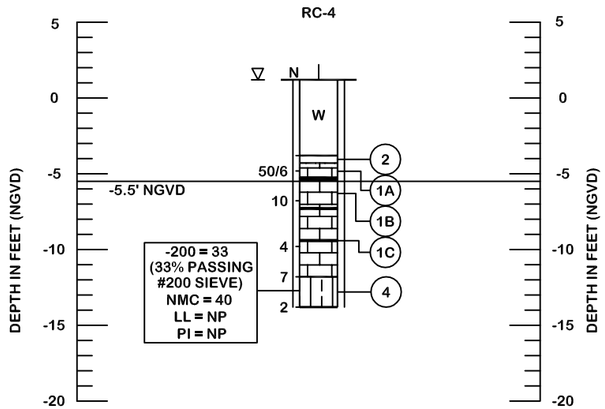
Rock core recovery from rock boring depth of 6ft to 8ft

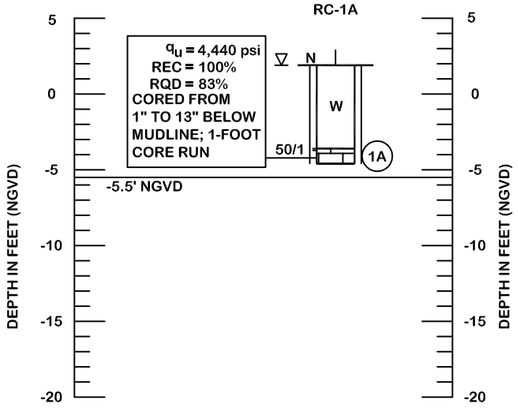
Rock core recovery dried in lab

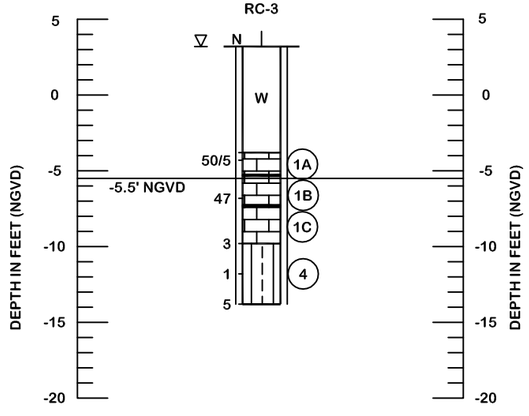
APPENDIX 3

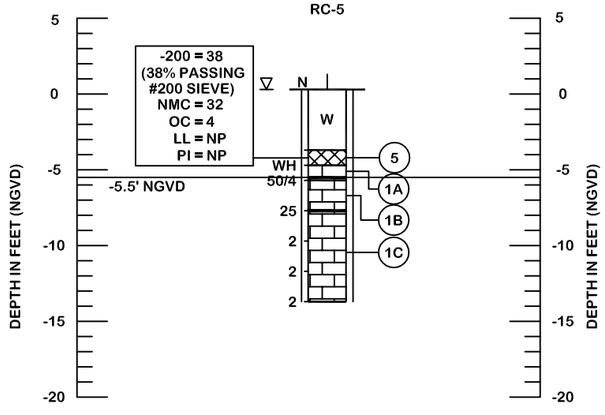












1 WEATHERED LIMESTONE TO CEMENTED SHELL/ LIMESTONE

2 SAND WITH SHELL AND/OR CEMENTED SAND AND/OR LIMESTONE FRAGMENTS (SP)

3 CLAYEY SAND WITH SHELL (SC)

4 SILTY SAND WITH SHELL AND/OR LIMESTONE FRAGMENTS (SM)

5 SILTY SAND WITH ORGANICS (SM)

A - SLIGHTLY WEATHERED LIMESTONE; VERY TO EXTREMELY HARD CONSISTENCY

B - MODERATELY TO HIGHLY WEATHERED LIMESTONE; HARD CONSISTENCY

C - EXTREMELY TO HIGHLY WEATHERED LIMESTONE; SOFT TO VERY SOFT CONSISTENCY

▽	GROUNDWATER TABLE
W	WATER
N	SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED)
SP	UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
50/4	NUMBER OF BLOWS FOR 4 INCHES OF PENETRATION
||	CASING
WH	FELL UNDER WEIGHT OF ROD AND HAMMER
WR	FELL UNDER WEIGHT OF ROD
100	LOSS OF CIRCULATION OF DRILLING FLUID (100%)
-200	PERCENT PASSING #200 SIEVE
NMC	NATURAL MOISTURE CONTENT (%)
OC	ORGANIC CONTENT (%)
LL	LIQUID LIMIT (%)
PI	PLASTICITY INDEX (%)
q_u	UNCONFINED COMPRESSION STRENGTH
REC	PERCENT RECOVERY(%)
RQD	ROCK QUALITY DESIGNATION (%)

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

SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT.)
VERY SOFT	LESS THAN 2
SOFT	2 TO 4
FIRM	4 TO 8
STIFF	8 TO 15
VERY STIFF	16 TO 30
HARD	GREATER THAN 30

VERTICAL SCALE 1"=10'

NOTE: WATER DEPTH DATUM IS THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

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CITY OF NAPLES
280 RIVERSIDE CIRCLE
NAPLES, FLORIDA 34102

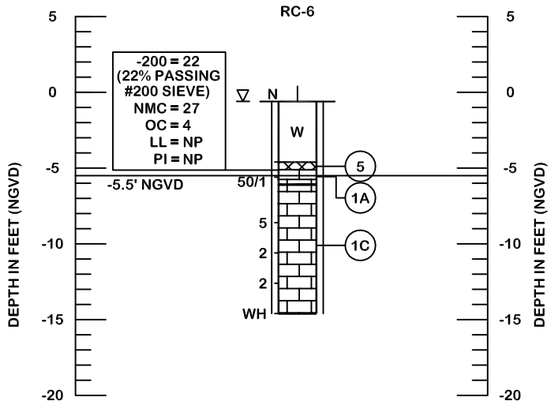
EAST NAPLES BAY DREDGING PROJECT

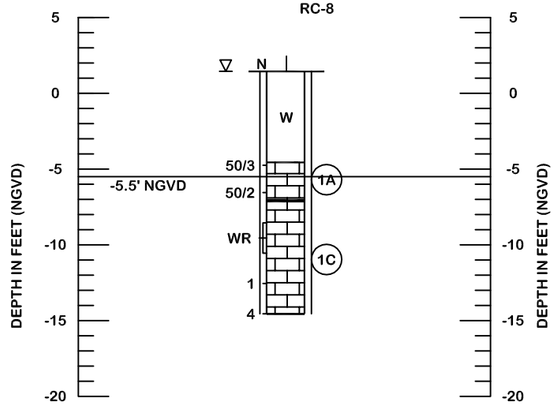
SOIL PROFILES

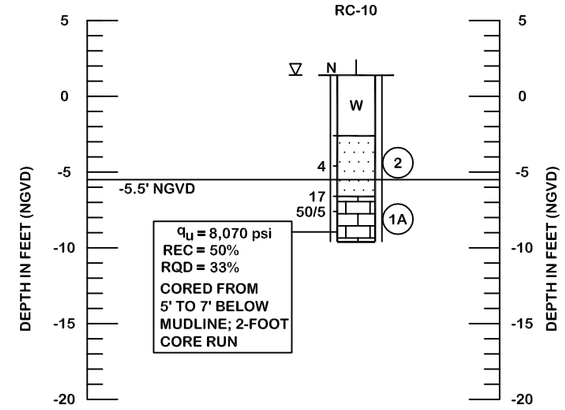
JEFFREY R. TABAR, P.E. 54094
DATE

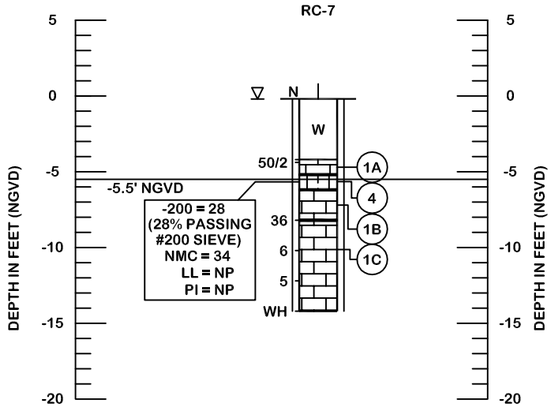
DATE	ISSUED BY	ISSUED FOR

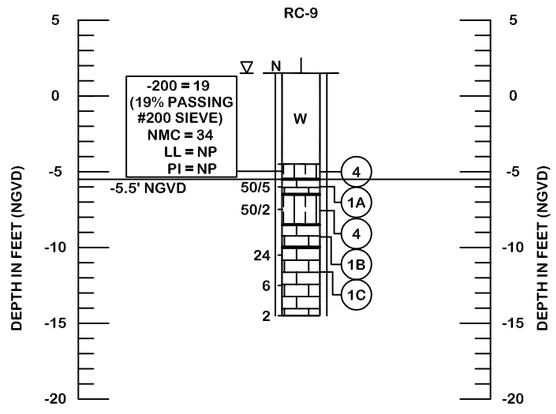
JOB NO.:	009320601
PROJECT ENG:	JRT
DRAWN:	MSS
CHECKED:	BDF
APPROVED:	JRT
SHEET NO.	REV.
1 OF 2	1











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