

NOTICE TO BIDDERS

Board of County Commissioners
Okaloosa County, Florida
OWNER

Separate sealed bids for the Temporary Shoring Support for the Main Island Pump Station Project will be received by the Board of County Commissioners, Okaloosa County, Florida, in the Conference & Training Room #305 located at 302 N. Wilson St, Crestview, FL 32536, until 3:00 pm local time on July 12, 2012 and then publicly opened and read aloud.

A mandatory pre-bid conference is scheduled for 10:00 am local time on, June 27, 2012 in the 3rd Floor Board Room of the Okaloosa County Water and Sewer Administrative Building, located at 1804 Lewis Turner Blvd, Fort Walton Beach, Florida. **You must attend this pre-bid conference in order to submit a bid.**

The Notice, Instructions to Bidders, Bid Proposal, Bid Bond, Performance and Payment Bonds, Specifications, and other Contract Documents may be examined at the following: Okaloosa County Water & Sewer Office located at 1804 Lewis Turner Boulevard, Suite 300, Fort Walton Beach, Florida, 32547.

No Bidder may withdraw his bid within 35 days after the actual date of the opening thereof.

All bids must be in sealed envelopes reflecting on the outside thereof " Temporary Shoring Support for the Main Island Pump Station Project" to be opened at 3:00 o'clock local time on July 12, 2012. The OWNER will consider all bids properly submitted at its scheduled Bid Opening in the Conference & Training Room #305 located at 302 N. Wilson St, Crestview, FL 32536. Bids may be submitted in the Conference & Training Room #305, prior to Bid Opening or delivered to the Clerk of Circuit Court, 302 N. Wilson St., #203, Crestview, FL 32536.

Note: Crestview is NOT a next day delivery site.

There is no obligation on the part of the OWNER to award the bid to the lowest bidder, and the OWNER reserves the right to award the bid to the bidder submitting a responsive bid with a resulting negotiated agreement which is most advantageous and in the best interest of OWNER, and to waive any irregularity or technicality in bids received. OWNER shall be the sole judge of the bid and the resulting negotiating agreement that is in its best interest and its decision shall be final.

Any Bidder failing to mark outside of envelope as set forth herein may not be entitled to have their bid considered.

All bids should be addressed as follows:

Clerk of Circuit Court
ATTN: Gary Stanford
302 N. Wilson St. #203
Crestview FL 32536

//Signed//
Richard Brannon
Purchasing Director

06/08/2012
Date

BOARD OF COUNTY COMMISSIONERS
OKALOOSA COUNTY, FLORIDA

Don Amunds
Chairman

MAIN ISLAND PUMP STATION IMPROVEMENTS PROJECT

PROJECT NO.: 100100.46

CHAIRMAN

DON AMUNDS (DISTRICT 5)

BOARD MEMBERS

BILL ROBERTS (DISTRICT 1)
 DAVE PARISOT (DISTRICT 2)
 WAYNE HARRIS (DISTRICT 3)
 JAMES CAMPBELL (DISTRICT 4)

CLERK

DON C. HOWARD

COUNTY ADMINISTRATOR

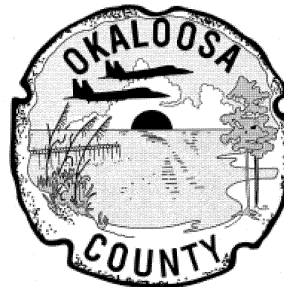
JAMES D. CURRY

OKALOOSA COUNTY WATER AND SEWER

JEFF LITRELL, DIRECTOR

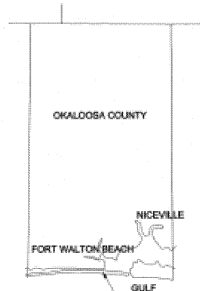
PREPARED FOR

OKALOOSA COUNTY
 BOARD OF COMMISSIONERS



INDEX TO DRAWINGS

SHEET NO.	SHEET DESCRIPTION
	COVER SHEET
Q-1	GENERAL SYMBOLS
D-1	EXISTING SITE / DEMOLITION PLAN
C-1	SITE PLAN / GRADING
C-2	SITE PLAN & PROFILE
M-1	MECHANICAL SYMBOLS
M-2	MECHANICAL PLAN
M-3	PUMP STATION PLAN
M-4	PUMP STATION SECTION
M-5	PUMP STATION SECTION
M-6	MECHANICAL DETAILS
M-7	MECHANICAL DETAILS
S-1	FOUNDATION PLAN & STRUCTURAL NOTES
S-2	SECTIONS & DETAILS
S-3	TEMPORARY SHORING PLAN
E-1	ELECTRICAL LEGEND & SYMBOLS
E-2	ELECTRICAL LEGEND & SYMBOLS
E-3	ABBREVIATIONS & NOTES
E-4	ONLINE DIAGRAM
E-5	ELECTRICAL SITE PLAN
E-6	ELECTRICAL BUILDING FLOOR PLAN
E-7	ELECTRICAL SCHEDULES
E-8	PUMP STATION
E-9	ELECTRICAL FLOOR PLAN AND DETAILS
E-10	SINGLE LINE DIAGRAMS AND DETAILS
E-11	SINGLE LINE DIAGRAMS AND DETAILS
E-12	WIRING DIAGRAM (CONTINUED)
E-13	WIRING DIAGRAM (CONTINUED)
E-14	POLE RISER



PROJECT LOCATION

PROJECT LOCATION

PREPARED BY:



1988 LEWIS TURNER BLVD.
 FORT WALTON BEACH, FL 32547
 PH. 850-244-5800

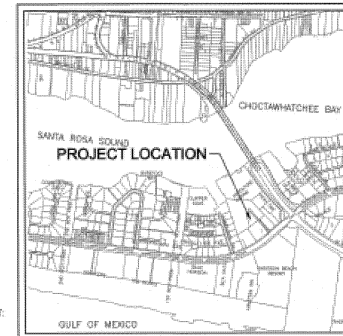


DATE PREPARED:
 MAY, 2012

FOR INFORMATION REGARDING THIS PROJECT, CONTACT:

JOSEPH G. CREWS, P.E.
 FT. WALTON BEACH, FLORIDA
 (850) 244-5800

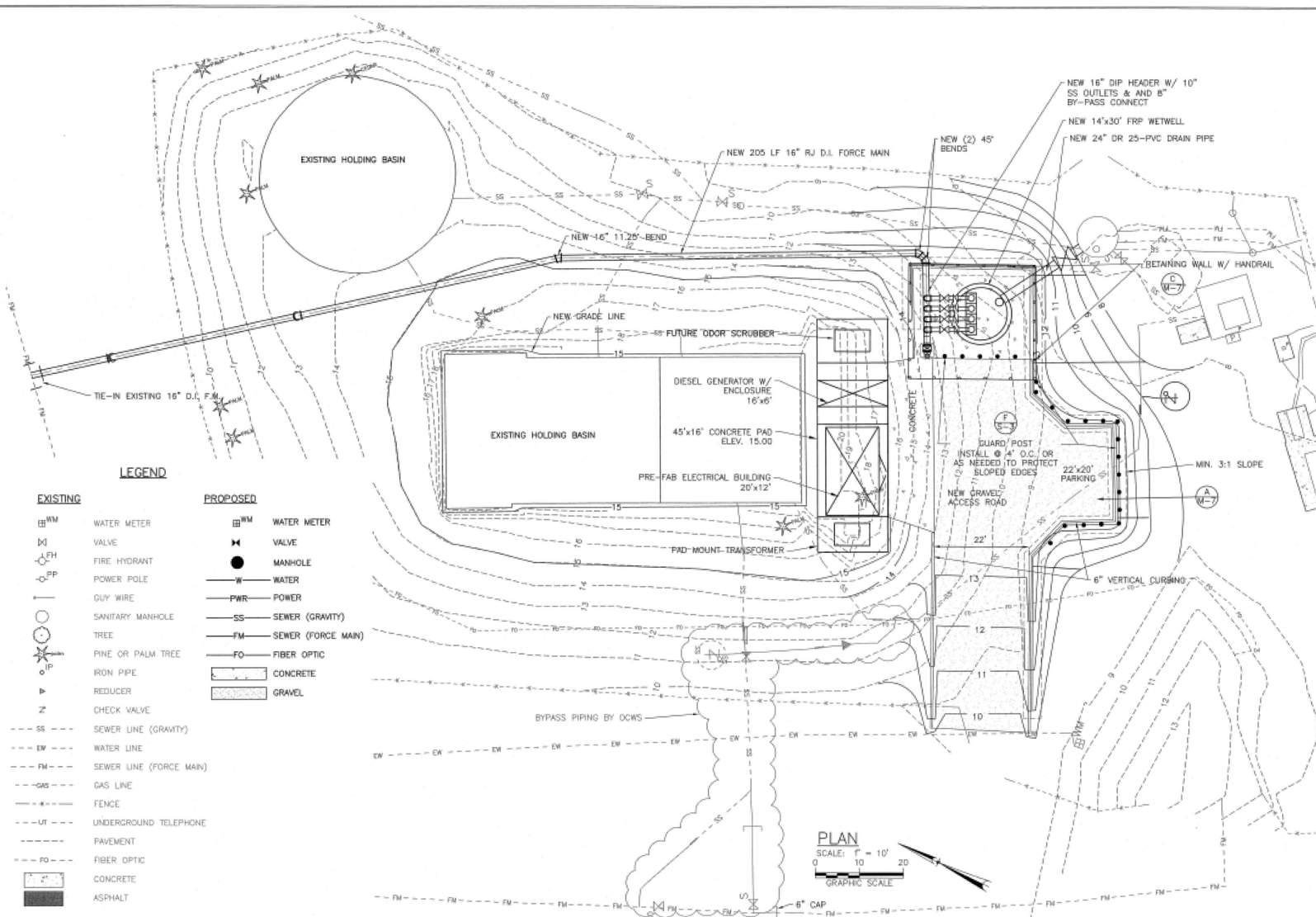
ADDRESS:
 100 BLOCK SANTA ROSA BLVD.
 FT. WALTON BEACH, FL.



VICINITY MAP

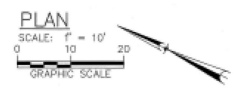
LAT. 30°35'59"N
 LONG. 86°35'50"W

SOURCE OF DOCUMENTS: THIS DOCUMENT AND THE IDEAS AND DESIGN ARE INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, ARE THE PROPERTY OF CONSTANTINE ENGINEERING, INCORPORATED. THIS SHALL NOT BE LOANED, REPRODUCED, COPIED, EITHER WHOLLY OR IN PART, OR BY ANY MEANS, WITHOUT THE WRITTEN PERMISSION OF CONSTANTINE ENGINEERING, INCORPORATED. ANY REPRODUCTION OF THIS DOCUMENT BY THE CLIENT OR OTHERWISE WITHOUT THE WRITTEN PERMISSION OF CONSTANTINE ENGINEERING, INCORPORATED, IS STRICTLY PROHIBITED.



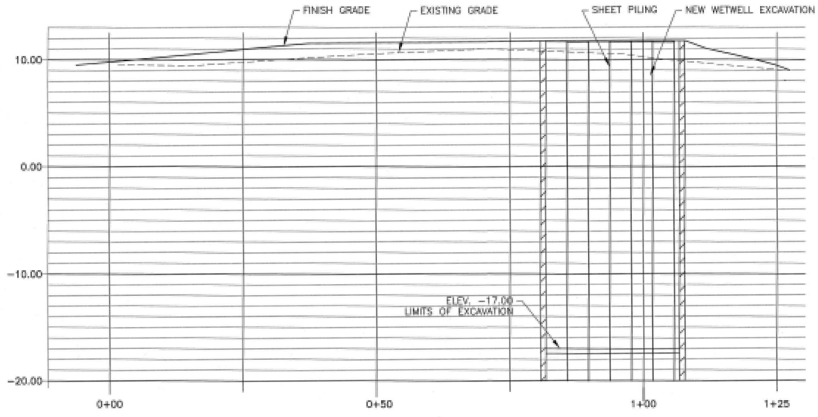
LEGEND

EXISTING		PROPOSED	
	WATER METER		WATER METER
	VALVE		VALVE
	FIRE HYDRANT		MANHOLE
	POWER POLE		WATER
	GUY WIRE		POWER
	SANITARY MANHOLE		SEWER (GRAVITY)
	TREE		SEWER (FORCE MAIN)
	PINE OR PALM TREE		FIBER OPTIC
	IRON PIPE		CONCRETE
	REDUCER		GRAVEL
	CHECK VALVE		
	SEWER LINE (GRAVITY)		
	WATER LINE		
	SEWER LINE (FORCE MAIN)		
	GAS LINE		
	FENCE		
	UNDERGROUND TELEPHONE		
	PAVEMENT		
	FIBER OPTIC		
	CONCRETE		
	ASPHALT		

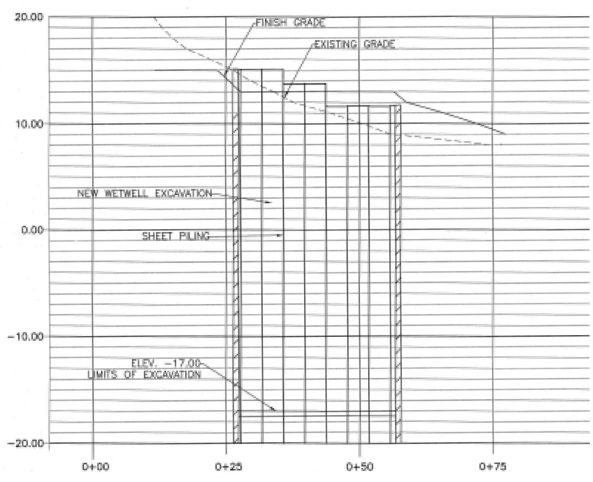


<p>SITE PLAN / GRADING</p> <p>OKALOOSA ISLAND MAIN LIFT STATION IMPROVEMENTS</p>	
<p>13000 LANE, TOWN OF WILCOX, FL 32094 TEL: 904-234-5000 FAX: 904-234-5000</p>	
<p>FILE: SEE LEFT VERTICAL SCALE HORIZONTAL SCALE DRAWING NUMBER: 100100.46</p>	
<p>DATE: MAY 2012 PROJ: 100100.46 DWG: C-1</p>	

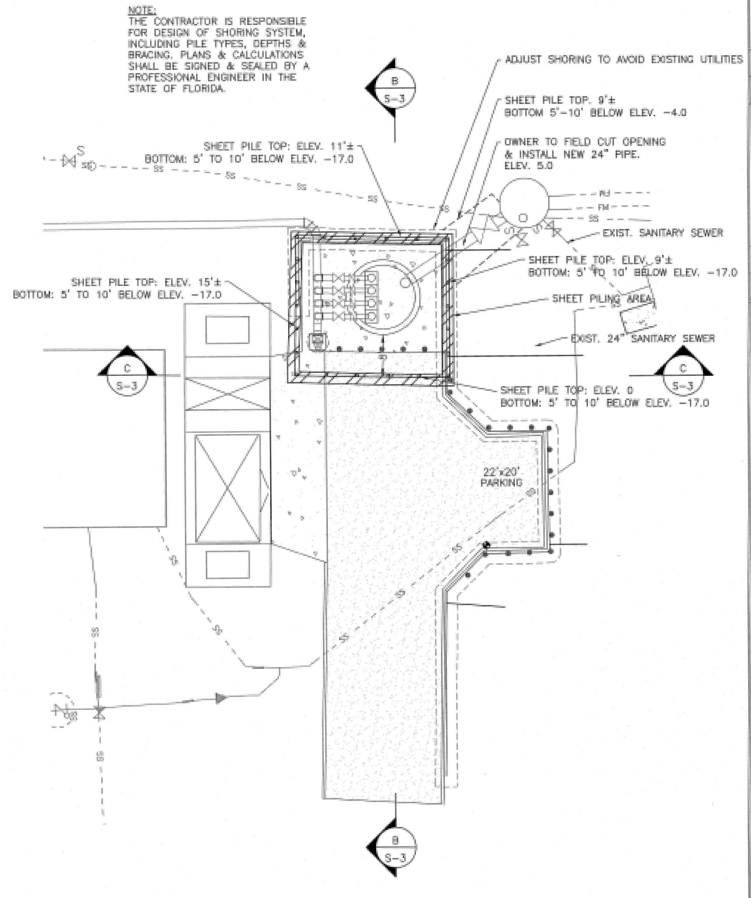
ALL RIGHTS RESERVED. THIS DOCUMENT AND THE ENGINEERING INFORMATION HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CONSTANTINE ENGINEERING. IT IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREIN. IT IS NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF CONSTANTINE ENGINEERING.



SECTION B
 SCALE: 1" = 10' HORIZ.
 1" = 5' VERT.

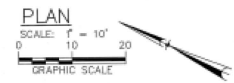


SECTION C
 SCALE: 1" = 10' HORIZ.
 1" = 5' VERT.



NOTE:
 THE CONTRACTOR IS RESPONSIBLE FOR DESIGN OF SHORING SYSTEM, INCLUDING PILE TYPES, DEPTHS & BRACING. PLANS & CALCULATIONS SHALL BE SIGNED & SEALED BY A PROFESSIONAL ENGINEER IN THE STATE OF FLORIDA.

NOTE:
 1. ALL SHEET PILES TO BE REMOVED AFTER BACKFILL.
 2. EXCAVATION OF WETWELL IS TO ELEV. -17.0. SHEETPILE CONTRACTOR TO DETERMINE HOW MUCH DEEPER THAN THAT & ANY BRACING THAT MAY BE REQUIRED.



TEMPORARY SHORING PLAN
 OKALOOSA ISLAND
 MAIN LIFT STATION
 IMPROVEMENTS



Constantine Engineering
 2340 E. WILSON BLVD., SUITE 200
 TAMPA, FL 33629
 TEL: 813-244-5800
 FAX: 813-244-5800

FILE	SEE LEFT
VERIFY SCALE	
DATE	MAY, 2012
PROJ.	100100.46
DWG.	S-3

Geotechnical Engineering Report

Okaloosa County Lift Station

Fort Walton Beach, Florida

November 18, 2011

Project No. EA115029

Prepared for:

Constantine Engineering

Fort Walton Beach, Florida

Prepared by:

Terracon Consultants, Inc.

Pensacola, Florida

Offices Nationwide
Employee-Owned

Established in 1965
terracon.com

Terracon

Geotechnical ■ **Environmental** ■ **Construction Materials** ■ **Facilities**



N



Date of Aerial: Feb. 22, 2007
© 2011 Google

Project Mgr:	WAS	Project No.:	EA115025	 Terracon Consulting Engineers and Scientists 8605 NORTH DIXIE HIGHWAY FORT WALTON BEACH, FL 32549 PH: (904) 477-0984 FAX: (904) 477-0984	BORING LOCATION PLAN GEOTECHNICAL ENGINEERING REPORT OKALOOSA COUNTY LIFT STATION SANTA ROSA BOULEVARD FORT WALTON BEACH FLORIDA		FIG. No.
Drawn by:	WAS	Scale:	1" = 60'±		A-2		
Checked by:	BFG	File No.:	EA115025-201.dwg				
Approved by:	WAS	Date:	November 2011				

BORING LOG NO. B-1

PROJECT: Okaloosa County Lift Station	CLIENT: Constantine Engineering
SITE: Fort Walton Beach, Florida	

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (ft)	GROUNDWATER OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SHEAR STRENGTH			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
						TEST TYPE	UNDRAINED SHEAR STRENGTH (psf)	STRAIN (%)			LL-PL-P	PERCENT FINES
2.0	FILL SAND Gray-Brown											
	FINE SAND Light Brown, Loose							3				
	-- Gray-Brown, Medium Dense	0	▽		4-3-4 N=7			3				
					4-5-6 N=11			25				1
					7-7-6 N=12			20				
	-- Very Light Gray											
		15			5-8-9 N=17			23				1
		20			6-6-8 N=14							
	-- Gray	25			6-8-13 N=21							2

TERRACON SMART LOG HEADERS EA115029-03 COLLET STA TON GP4 TERRACON 2011 09PT GDT 11/6/11

Advancement Method: Mud Rotary Abandonment Method: Grout Sealed	The stratification lines represent the approximate boundary lines between soil and rock types; In-situ, the transition may be gradual. See Attached General Notes for explanation of symbols and terms.	Notes: Boring Started: 10/17/2011 Boring Complete: 10/17/2011 Drill Rig: Mud Bug Driller: Mark C Project No.: EA115029 Exhibit: A-3
GROUNDWATER OBSERVATIONS ▽ Groundwater initially observed		

BORING LOG NO. B-1

PROJECT: Okaloosa County Lift Station	CLIENT: Constantine Engineering
SITE: Fort Walton Beach, Florida	

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (ft)	GROUNDWATER OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SHEAR STRENGTH			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
						TEST TYPE	UNDRAINED SHEAR STRENGTH (psi)	STRAIN (%)			LL-PL-P		
	<p>FINE SAND Light Brown, Loose <i>(continued)</i></p> <p style="text-align: center;">-- Dark Red-Brown</p> <p style="text-align: center;">-- Brown</p> <p style="text-align: center;">-- Light Gray-Brown</p>	30			9-9-10 N=18								
		35										3	
		40											
		45										2	
		50											

TERRACON SMART LOG-HEADERS EA115029-03-CO-LIFT STA TON.GPJ TERRACON/2011/SMART.GDT 11/6/11

Advancement Method: Mud Rotary	The stratification lines represent the approximate boundary lines between soil and rock types; In-situ, the transition may be gradual. See Attached General Notes for explanation of symbols and terms.	Notes:	
Abandonment Method: Grout Sealed			
GROUNDWATER OBSERVATIONS <input checked="" type="checkbox"/> Groundwater initially observed		Boring Started: 10/17/2011	Boring Complete: 10/17/2011
		Drill Rig: Mud Bug	Driller: Mark C
		Project No.: EA115029	Exhibit A-3

BORING LOG NO. B-1

PROJECT: Okaloosa County Lift Station	CLIENT: Constantine Engineering
SITE: Fort Walton Beach, Florida	

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (ft)	GROUNDWATER OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SHEAR STRENGTH			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
						TEST TYPE	UNDRAINED SHEAR STRENGTH (psf)	STRAIN (%)			LL-PL-P		
	<p><u>FINE SAND</u>, Light Brown, Loose <i>(continued)</i></p> <p style="text-align: center;">-- Light Gray</p>	55			19-21-20 N=41								
	60.0 Boring Terminated at 60 Feet	60			17-19-19 N=38								

Advancement Method: Mud Rotary	The stratification lines represent the approximate boundary lines between soil and rock types; In-situ, the transition may be gradual. See Attached General Notes for explanation of symbols and terms.	Notes:	
Abandonment Method: Grout Sealed			
GROUNDWATER OBSERVATIONS <input checked="" type="checkbox"/> Groundwater initially observed		Boring Started: 10/17/2011 Drill Rig: Mud Bug Project No.: EA115029	Boring Complete: 10/17/2011 Driller: Mark C Exhibit: A-3

TERRACON SMART LOG-HEADERS EA115029-OK CO LIFT STA TON GP1 TERRACON 2011 SEPT GDT 11/6/11

BORING LOG NO. B-3

PROJECT: Okaloosa County Lift Station	CLIENT: Constantine Engineering
SITE: Fort Walton Beach, Florida	

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (ft)	GROUNDWATER OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SHEAR STRENGTH			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS	
						TEST TYPE	UNDRAINED SHEAR STRENGTH (psf)	STRAIN (%)			LL-PL-PH	PERCENT FINES
	FILL SAND With Gravel, Gray-Brown	2.0										
	FINE SAND Light Brown, Loose											
	-- Medium Dense	4			4-5-4 N=9			3				
	-- Brown	6			6-5-6 N=11			3				0
	-- Very Light Gray	14			7-11-12 N=23			22				
	-- Gray	20			8-10-10 N=20							3
		24			6-8-11 N=19							

TERRACON SMART LOG HEADERS EA115029-03-CO LIFT STA TON GSA TERRACON 2011 09PT GDT 11/6/11

Advancement Method: Mud Rotary Abandonment Method: Grout Sealed	The stratification lines represent the approximate boundary lines between soil and rock types; In-situ, the transition may be gradual. See Attached General Notes for explanation of symbols and terms.	Notes: Boring Started: 10/17/2011 Boring Complete: 10/17/2011 Drill Rig: Mud Bug Driller: Mark C Project No.: EA115029 Exhibit: A-3
GROUNDWATER OBSERVATIONS Groundwater initially observed		

BORING LOG NO. B-3

PROJECT: Okaloosa County Lift Station

CLIENT: Constantine Engineering

SITE:
Fort Walton Beach, Florida

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (ft)	GROUNDWATER OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SHEAR STRENGTH			WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS		PERCENT FINES
						TEST TYPE	UNDRAINED SHEAR STRENGTH (psf)	STRAIN (%)			LL-PL-PH		
	FINE SAND Light Brown, Loose <i>(continued)</i>												
	-- Gray-Brown	30			11-14-17 N=31			22					3
	-- Very Light Gray	35			11-11-17 N=28								
	-- Red-Brown to Brown	40.0			9-11-20 N=31								
	Boring Terminated at 40 Feet	40											

TERRACON SMART LOG-HEADERS EA115029-OK-CO-LIFT STA TON GP4 TERRACON 2011 SEP 15 11:16:11

<p>Advancement Method: Mud Rotary</p> <p>Abandonment Method: Grout Sealed</p>	<p>The stratification lines represent the approximate boundary lines between soil and rock types; In-situ, the transition may be gradual. See Attached General Notes for explanation of symbols and terms.</p>	<p>Notes:</p>
<p>GROUNDWATER OBSERVATIONS</p> <p><input checked="" type="checkbox"/> Groundwater initially observed</p>		
		<p>Boring Started: 10/17/2011 Boring Complete: 10/17/2011</p> <p>Drill Rig: Mud Bug Driller: Mark C</p> <p>Project No.: EA115029 Exhibit: A-3</p>

Field Exploration Description

The field exploration consisted of performing two (2) SPT borings (Borings B-1 and B-3) to approximate depths of between 60 and 40 feet below the existing ground surface. Planned boring B-2 was not performed due to access difficulties. The boring locations were laid out at the project site by Terracon personnel from a site plan provided by Constantine Engineering. The locations indicated on the attached diagram are approximate and were measured by pacing distances and estimating right angles. The locations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

The SPT soil borings were drilled with an ATV-mounted, rotary drilling rig equipped with a automatic hammer. The boreholes were advanced with mud rotary techniques. Soil samples were obtained by the split spoon sampling procedure in general accordance with the Standard Penetration Test (SPT) procedure. In the split spoon sampling procedure, the number of blows required to advance the sampling spoon the last 12 inches of an 18-inch penetration or the middle 12 inches of a 24-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N). This value is used to estimate the in-situ relative density of cohesionless soils and the consistency of cohesive soils. The sampling depths and penetration distance, plus the standard penetration resistance values, are shown on the boring logs.

Portions of the samples from the borings were sealed to reduce moisture loss, and samples were taken to our laboratory for further observation and classification. Upon completion, the boreholes were backfilled with the site soil.

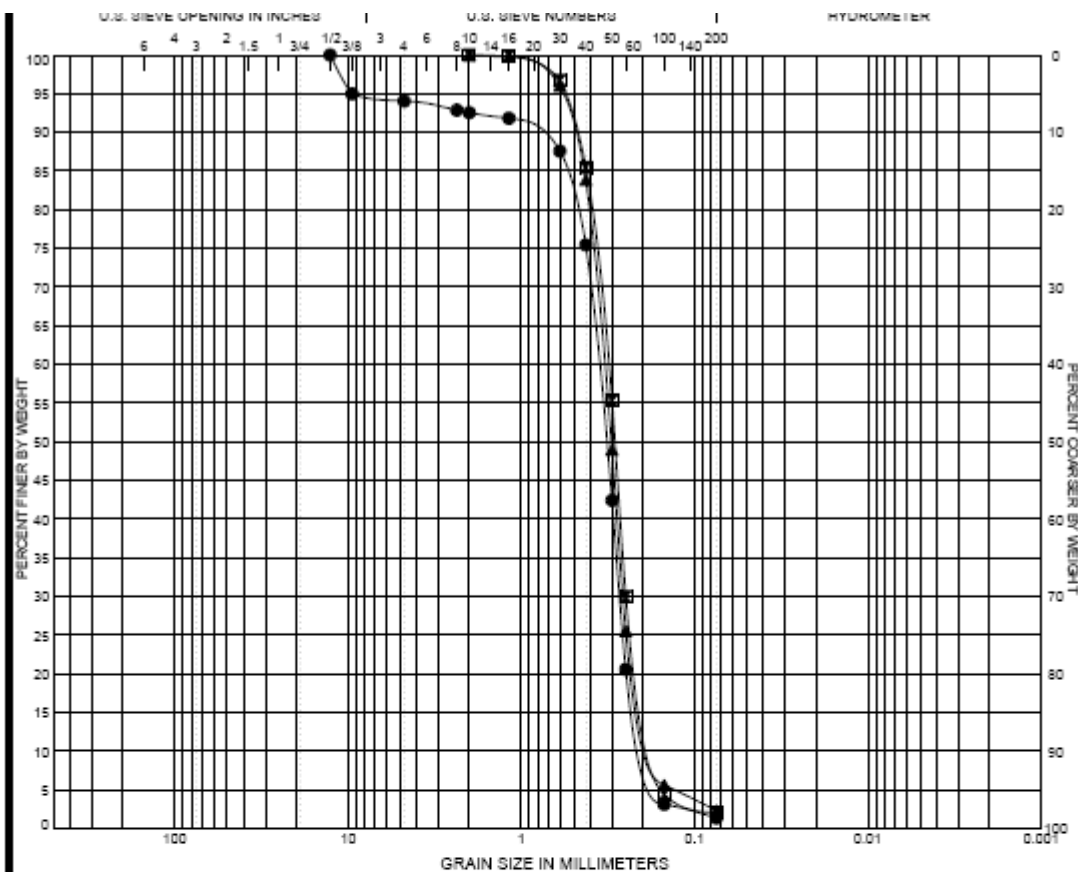
Field logs of each boring were prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the field logs and include modifications based on laboratory observation of the samples.

APPENDIX B
SUPPORTING INFORMATION

Laboratory Testing

During the field exploration, a portion of each recovered sample was sealed in a plastic bag and transported to our laboratory for further visual observation and laboratory testing. Selected samples retrieved from the borings were tested for moisture (water) content, fines content (soil passing a US standard #200 sieve), and grain size analysis. Those results are included in this report and on the respective boring logs. The visual-manual classifications were modified as appropriate based upon the laboratory testing results.

The soil samples were classified in general accordance with the appended General Notes and the Unified Soil Classification System based on the material's texture and plasticity. The estimated group symbol for the Unified Soil Classification System is shown on the boring logs and a brief description of the Unified Soil Classification System is included in Appendix C. The results of our laboratory testing are presented on the corresponding borings logs.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SAMPLES	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
● B-1	6 - 8	0.0	6.0	92.7		1.4		SP
■ B-1	23.5 - 25	0.0	0.0	97.9		2.1		SP
▲ B-1	43.5 - 45	0.0	0.0	97.7		2.3		SP

GRAIN SIZE			
D ₉₀	0.361	0.317	0.335
D ₅₀	0.27	0.25	0.259
D ₁₀	0.183	0.168	0.168
COEFFICIENTS			
C _c	1.10	1.18	1.19
C _u	1.57	1.89	2.00

SIEVE (size)	PERCENT FINER		
	●	■	▲
1.6 in	100.0		
1.0 in	100.0		
3/4 in	100.0		
1/2 in	100.0		
3/8 in	94.88		
#4	94.04		
#8	92.88		
#10	92.66	100.0	100.0
#20	75.44	86.48	83.82
#40	20.68	28.89	25.68
#60	3.16	4.46	6.86
#100	1.38	2.11	2.36

SOIL DESCRIPTION
 ● POORLY GRADED SAND(SP)
 ■ POORLY GRADED SAND(SP)
 ▲ POORLY GRADED SAND(SP)

REMARKS
 ●
 ■
 ▲



9900 North Davis Highway | Pensacola, Florida 32514

GRAIN SIZE DISTRIBUTION ASTM D422

Project: Okaloosa County Lift Station
 Location:
 Project Number: EA115029
 Client: Constantine Engineering

GRAIN SIZE USCS: EA115029 OK CO. LIFT STATION 09/11 TERRACON 001 SEPT 09 11:09:11

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS: Split Spoon - 1-3/8" I.D., 2" O.D., unless otherwise noted	HS: Hollow Stem Auger
ST: Thin-Walled Tube - 2" O.D., unless otherwise noted	PA: Power Auger
RS: Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA: Hand Auger
DB: Diamond Bit Coring - 4", N, B	RB: Rock Bit
BS: Bulk Sample or Auger Sample	WB: Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL: Water Level	WS: While Sampling	N/E: Not Encountered
WCI: Wet Cave in	WD: While Drilling	ESH: Estimated Seasonal High Groundwater
DCI: Dry Cave in	BCR: Before Casing Removal	ESL: Estimated Seasonal Low Groundwater
AB: After Boring	ACR: After Casing Removal	

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

<u>Unconfined Compressive Strength, Qu, psf</u>	<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Consistency</u>
< 500	0 - 1	Very Soft
500 - 1,000	2 - 4	Soft
1,001 - 2,000	4 - 8	Medium Stiff
2,001 - 4,000	8 - 15	Stiff
4,001 - 8,000	15 - 30	Very Stiff
8,000+	> 30	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

<u>Standard Penetration or N-value (SS) Blows/Ft.</u>	<u>Relative Density</u>
0 - 3	Very Loose
4 - 9	Loose
10 - 29	Medium Dense
30 - 49	Dense
> 50	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

<u>Descriptive Term(s) of other Constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

<u>Descriptive Term(s) of other Constituents</u>	<u>Percent of Dry Weight</u>
Trace	< 5
With	5 - 12
Modifiers	> 12

PLASTICITY DESCRIPTION

<u>Term</u>	<u>Plasticity Index</u>
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification	
				Group Symbol	Group Name ^B
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels:	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F
		Less than 5% fines ^G	$Cu < 4$ and/or $1 > Cc > 3$ ^F	GP	Poorly graded gravel ^F
		Gravels with Fines: More than 12% fines ^G	Fines classify as ML or MH	GM	Silty gravel ^{F,ML}
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands:	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I
		Less than 5% fines ^D	$Cu < 6$ and/or $1 > Cc > 3$ ^F	SP	Poorly graded sand ^I
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{D,ML}
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silt and Clays: Liquid limit less than 50	Inorganic:	$Pi > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}
			$Pi < 4$ or plots below "A" line ^J	ML	Silt ^{K,L,M}
		Organic:	Liquid limit - oven dried < 0.75	OL	Organic clay ^{K,L,M,H} Organic silt ^{K,L,M,O}
	Silt and Clays: Liquid limit 50 or more	Inorganic:	Pi plots on or above "A" line	CH	Fat clay ^{K,L,M}
			Pi plots below "A" line	MH	Elastic Silt ^{K,L,M}
		Organic:	Liquid limit - oven dried < 0.75	OH	Organic clay ^{K,L,M,P} Organic silt ^{K,L,M,O}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor		PT	Peat	

^A Based on the material passing the 3-in. (75-mm) sieve

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $Pi \geq 4$ and plots on or above "A" line.

^O $Pi < 4$ or plots below "A" line.

^P Pi plots on or above "A" line.

^Q Pi plots below "A" line.

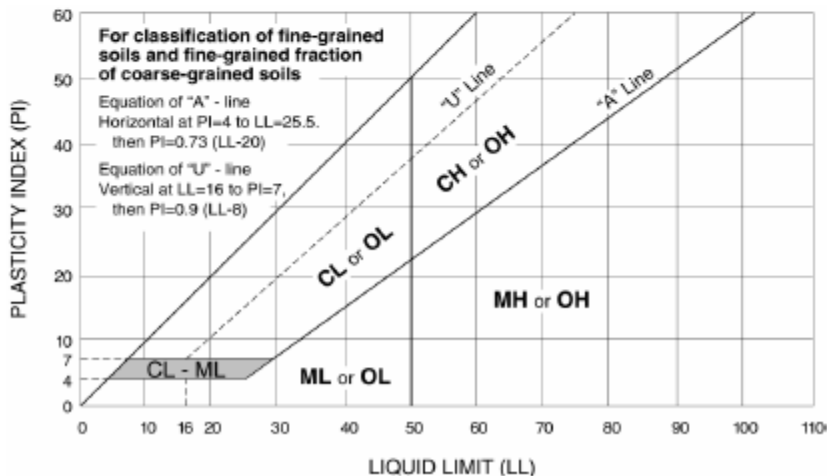


Exhibit C-2