FINAL
POND SITING REPORT

For

US 301 (SR 43) Project Development and Environment (PD&E) Study
From Falkenburg Road to Causeway Boulevard
WPI SEG. NO.: 421140-6
Hillsborough County

August 2008

Prepared for:

Hillsborough County

In Cooperation With

Florida Department of Transportation – District 7

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1.0 EXECUTIVE SUMMARY

A Project Development and Environment (PD&E) Study has been conducted to evaluate capacity improvements for a 0.75 mile section of US Highway 301 from Falkenburg Road to Causeway Boulevard in Hillsborough County, Florida. The proposed improvements will include adding one through lane in each direction to the existing four-lane divided facility.

This Pond Siting Report documents the drainage improvements necessary to facilitate the increase in impervious area to US Highway 301 as well as the procedures used to evaluate the final recommendation. This information is preliminary and subject to change as the design process proceeds until a final design is approved.

Stormwater computations for this project account for the surface runoff from the project corridor. Stormwater runoffs from off-site contributing areas are identified in this report and will be accommodated within the roadside swales as they are in the existing condition.

The existing right-of-way (R/W) is wide enough to accommodate the proposed lane additions. R/W width varies from 200-feet to 249-feet through this segment of US Highway 301. The improvements are one 12-foot through lane in each direction. The median and inside 8-foot shoulders will remain intact, as will the two existing lanes in each direction. One 12-foot wide through lane and a 12-foot wide shoulder, 5 feet of which is paved, will be added to the outside for the existing lanes. The existing two lanes in each direction will be milled and re-surfaced. The outside roadside swales will be re-graded. The existing 5-foot wide sidewalk on either side of the R/W from Causeway Boulevard south to Wes Kearney Way will remain intact.

Three options were explored to provide the necessary stormwater management: 1) an offsite pond, 2) wet detention within roadside swales and 3) dry detention within roadside swales. The offsite pond option would require a 1-acre pond site. The wet detention option would require gravity walls along the entire corridor, so this option was not considered a viable option. The recommended alternative is dry detention utilizing the roadside swales.

Commitments

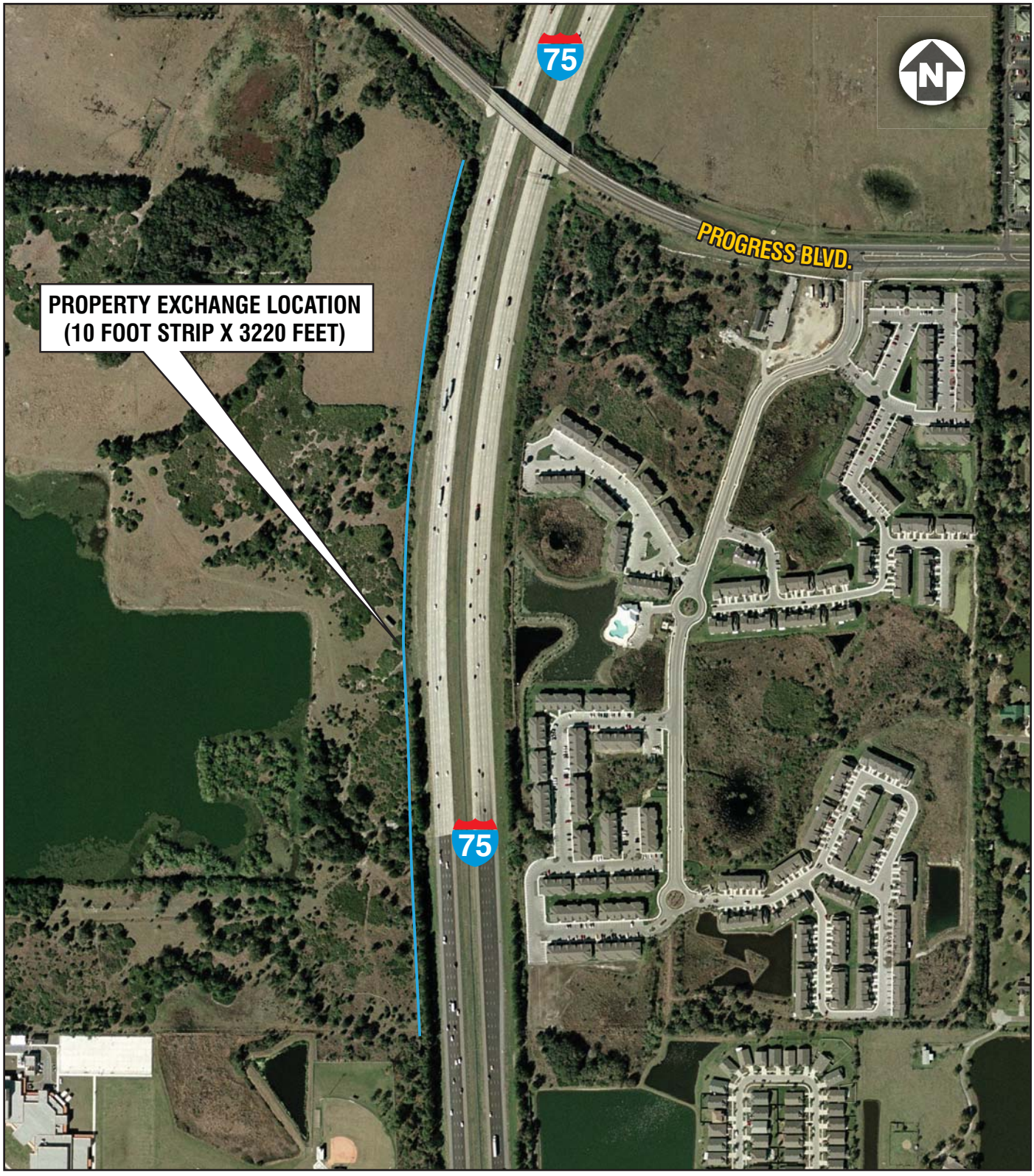
Hillsborough County is committed to the following:

- If construction activities are anticipated to occur in an area with contamination concerns, a site assessment will be performed to the degree necessary prior to final design approval by FDOT to determine levels of contamination, evaluate clean-up options and associated costs. In the event construction is proposed within an area of known contamination, the contractor will be required to implement avoidance or remediation measures required by the FDOT.
- The developer (Centex Homes) has agreed to exchange property with FDOT for the use of R/W within US Highway 301 for water quality treatment. This property is 0.74 acres consisting of a 10-foot wide, 3,220 feet-long strip, adjacent to the existing west limited access R/W of I-75 (SR 93) and just south of Progress Boulevard (SR 676) (see *Figure 1-1*). Hillsborough County will facilitate this exchange.

Recommendations

Based on the results of the environmental and engineering analysis, interagency coordination, and the public hearing, the alternative recommended for implementation is the Build Alternative, which consists of widening US Highway 301 within the project limits to 6 lanes (3 lanes in each direction). The Build Alternative will complete the important link of US Highway 301 in the north-south roadway transportation system, and increasing the facility from four to six lanes will enhance operation and improve safety. The improvements will also benefit emergency evacuation.

A more detailed description of the improvements is provided in Attachment 1, "Project Description," Section 2.1.2, Proposed Improvements.



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AERIAL MAP

PROPERTY EXCHANGE LOCATION
I-75 and PROGRESS BLVD.
HILLSBOROUGH COUNTY, FL

SCALE:	PROJ. NO.:	DATE:	FIGURE:
1:500	048805007	August 2008	1-1

2.0 INTRODUCTION

A PD&E Study has been conducted to evaluate capacity improvements for US Highway 301 from Falkenburg Road to Causeway Boulevard in Hillsborough County, Florida. The project length is approximately 0.75 miles. The improvements include adding one through lane in each direction to the existing four-lane, divided facility and 12 foot outside shoulders, 5 feet of which is paved.

2.1 Purpose

The objectives of the PD&E Study is to evaluate capacity improvements to US Highway 301. This Pond Siting Report documents the results of the engineering drainage analyses and the drainage improvements necessary to facilitate the proposed increase in impervious area to US Highway 301.

2.2 Project Description

US Highway 301 is a north/south facility with a functional classification of an urban principal arterial roadway according to the FDOT straight-line diagram. The corridor of interest traverses an array of urban land uses including commercial development inter-mixed with parcels of vacant land and residential uses. There are existing wetlands systems both within and adjacent to the existing right-of-way.

The project corridor lies entirely within Hillsborough County and is located in Section 31, Township 29 S, and Range 20 E.

Stormwater computations for this project account for the surface runoff from the project corridor. Stormwater runoff from off-site contributing areas are identified in this report and will be accommodated within the roadside swales as they are in the existing condition.

See *Figures 2-1*, *2-2* and *2-3* for the site location.

3.0 ROADWAY

3.1 Existing Typical Section

The existing R/W width varies from 200-feet to 249-feet through this segment of US Highway 301. The typical section (see *Figure 3-1*) consists of two 12-foot lanes in each direction with 8-foot shoulders, 4 feet of which is paved, on either side. The northbound and southbound roadways are separated by a 41-foot grassed median containing ditch bottom inlets for conveyance of stormwater. Grassed swales on either side of the roadway serve as part of the roadway stormwater management system. A 5-foot sidewalk exists on either side of the R/W from Causeway Boulevard south to Wes Kearney Way.

Sources: Aerial Express. 2003 AE, LLC. 2003 GDT, Inc.
Southwest Florida Water Management District. GIS Data.

NOTE:
This information is preliminary and subject to change until the final design is approved.

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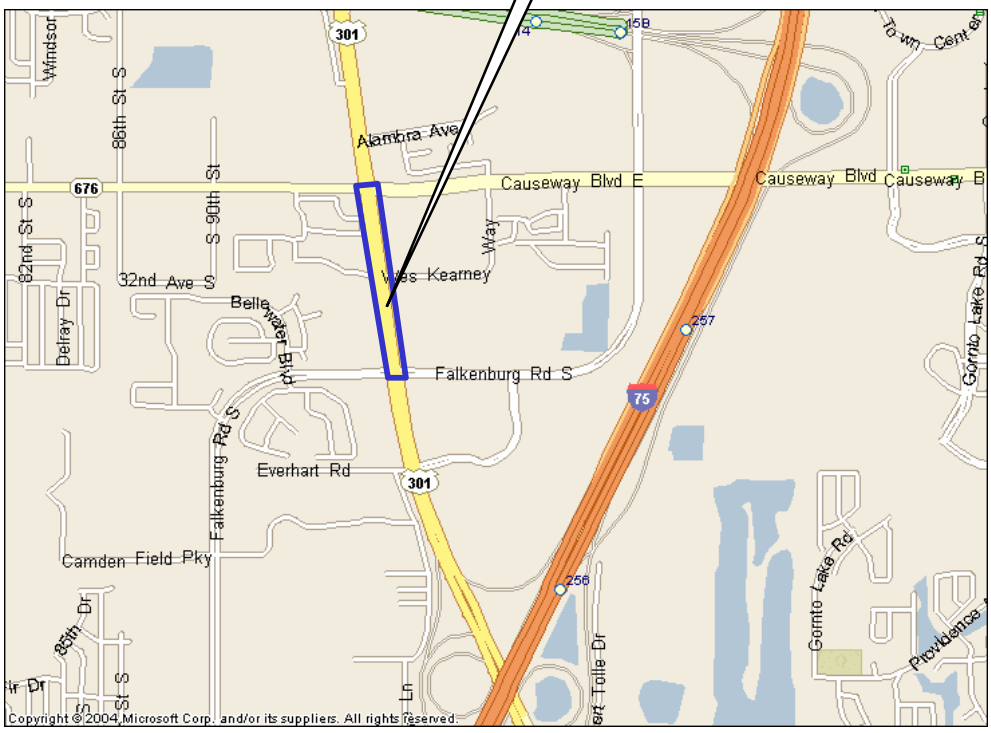
SITE AERIAL MAP

US 301 Falkenburg Road to Causeway Blvd.
WPI Seg No. 421140-6
Hillsborough County, FL

SCALE:	PROJ. NO.:	DATE:	FIGURE:
1:9,000	048805007	October 2006	2-1



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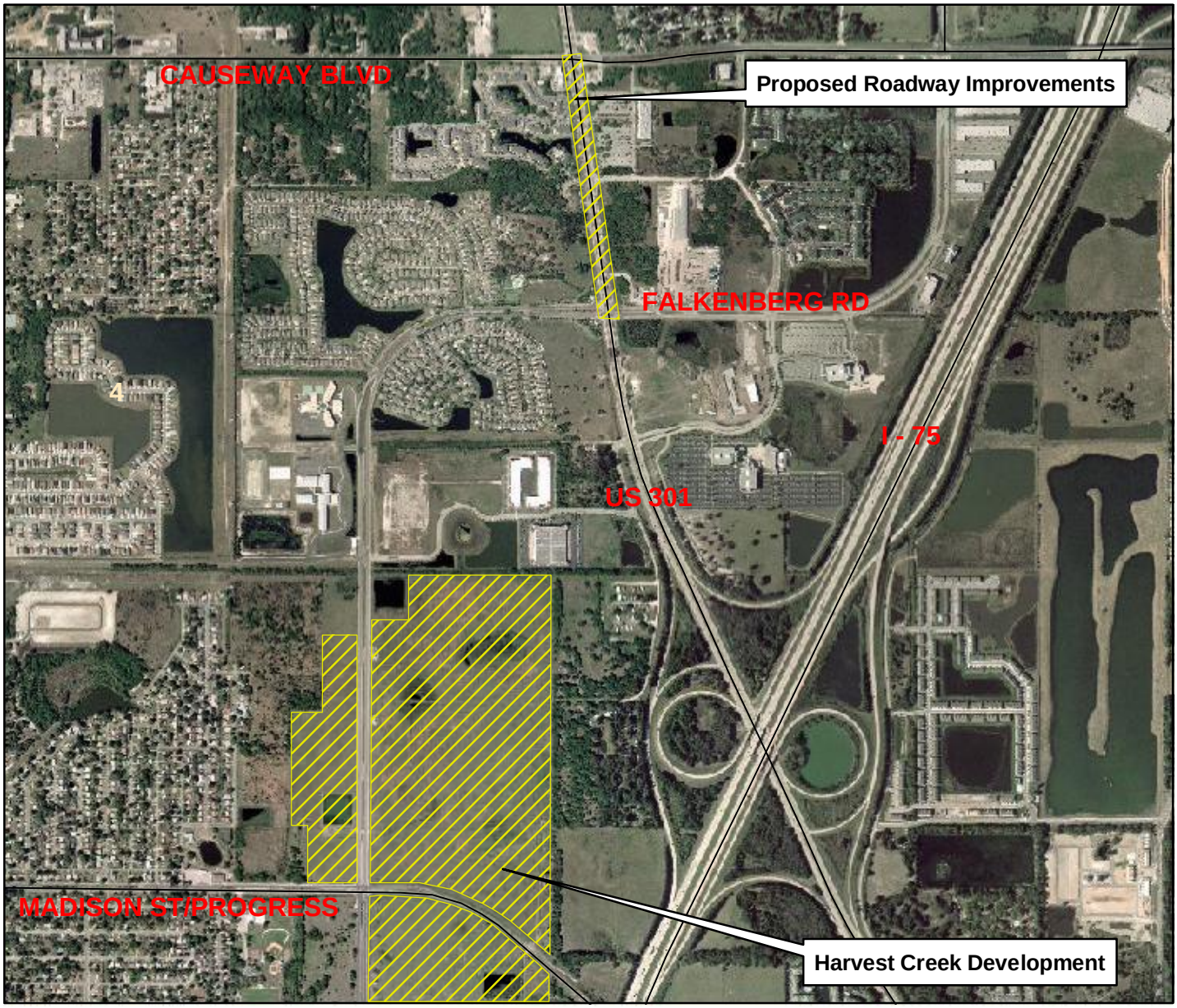
SITE LOCATION MAP

US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

SCALE:	PROJ. NO.:	DATE:	FIGURE:
NTS	048805007	October 2006	2-2



Sources: Aerial Express. 2003 AE, LLC. 2003 GDT, Inc.
Southwest Florida Water Management District. GIS Data.

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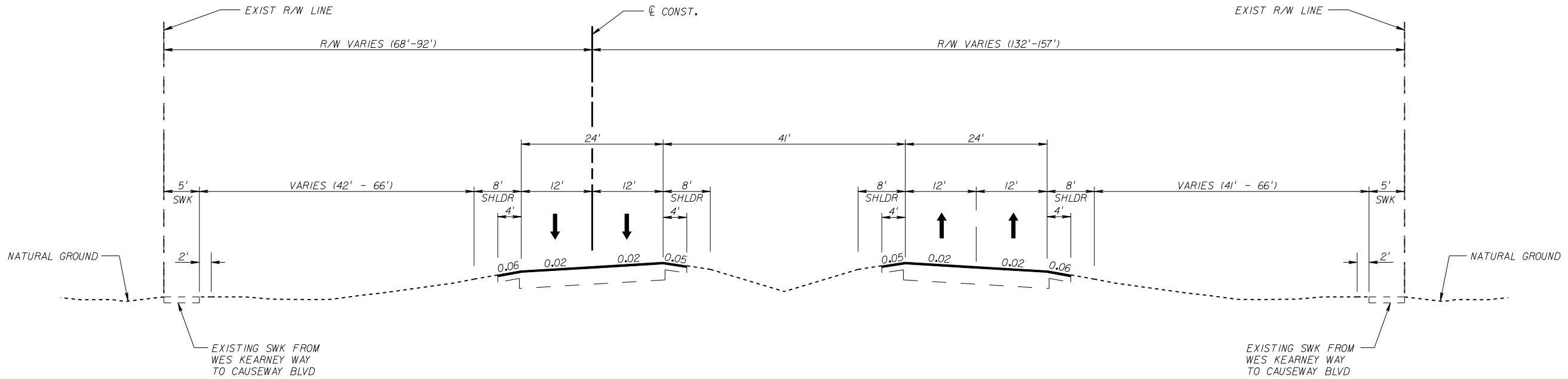
Site Location Map

US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

SCALE:	PROJ. NO.:	DATE:	FIGURE:
NTS	048805007	January 2007	2-3

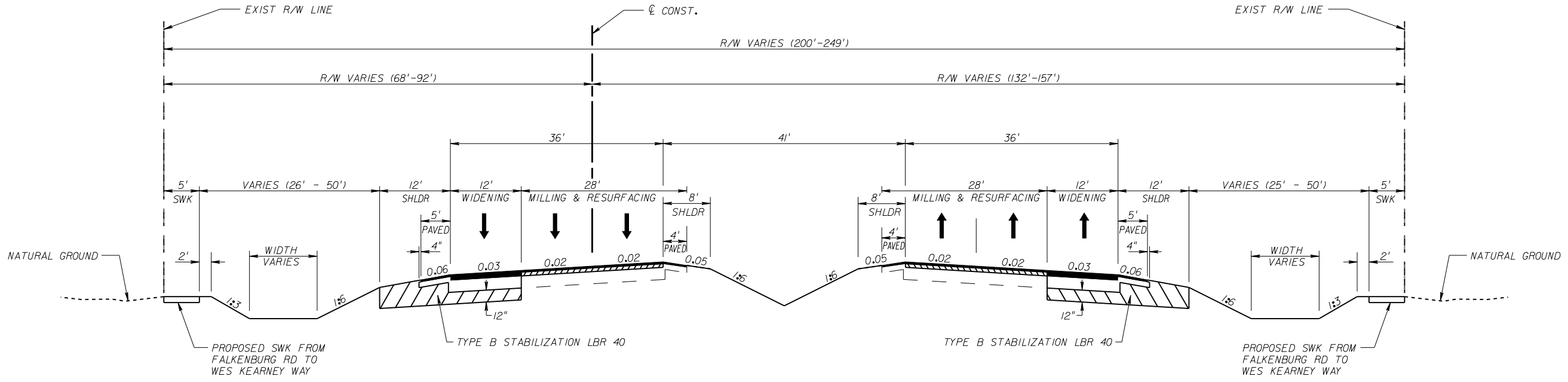


DESIGN SPEED = 55 MPH
POSTED SPEED = 50 MPH

EXISTING TYPICAL SECTION

US 301 (SR 43)

FROM FALKENBURG RD TO CAUSEWAY BLVD



DESIGN SPEED = 55 MPH
POSTED SPEED = 50 MPH

PROPOSED TYPICAL SECTION

US 301 (SR 43)

FROM FALKENBURG RD TO CAUSEWAY BLVD

NOTE:
THIS INFORMATION IS PRELIMINARY AND SUBJECT TO CHANGE UNTIL THE FINAL DESIGN IS APPROVED.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	WPI SEGMENT NO.
43	HILLSBOROUGH	421140-6

$USER$ $DATE$ $TIME$ $FILE$

TYPICAL SECTIONS

FIGURE NO. 3-1

3.2 Proposed Typical Section

The recommended typical section for the Build Alternative consists of six 12-foot travel lanes, three lanes in each direction, a 41-foot grass median, 12-foot outside shoulders (5 feet of which is paved) and 5-foot sidewalks will be added near the right-of-way (R/W) line from Falkenburg Road to Wes Kearney Way, thereby making the sidewalks continuous on both sides of the road for the length of the project. The existing 8-foot wide inside shoulders, 4 feet of which are paved, will be retained. The existing roadside swales will be re-graded for stormwater treatment. The R/W width varies from 200 to 249 feet.

4.0 EXISTING DRAINAGE CONDITIONS

The US Highway 301 project lies entirely within the Alafia River Basin (see *Figure 4-1*). The project corridor lies entirely within the Delaney Creek Basin according to Hillsborough County and Florida Department of Environmental Protection (FDEP) (see *Figure 4-2*).

Existing drainage patterns were identified using the most current contour information available through the United States Geologic Service (USGS) Quadrangle Maps (see *Figure 4-3*) and the SWFWMD 1-ft Contour Aerials (see *Appendix A*). The date for the SWFWMD 1-ft aerial contour map is August 1986. Due to the dated nature of these source documents, a field review was performed to more accurately determine the current field conditions.

According to the online (09/25/06) State of Florida F.A.C., Chapters 62-302.400 and 700, there are no surface waters requiring special water quality criteria within or along the project corridor. There are no issued ERP/Stormwater permits for this section of US Highway 301.

According to the SWFWMD aerial, there is one existing outfall point within this section of roadway located approximately at Station 1073+00. This segment of roadway currently outfalls directly into Delaney Creek. Another outfall exists at Falkenburg Road consisting of the roadway drainage network that flows to the west.

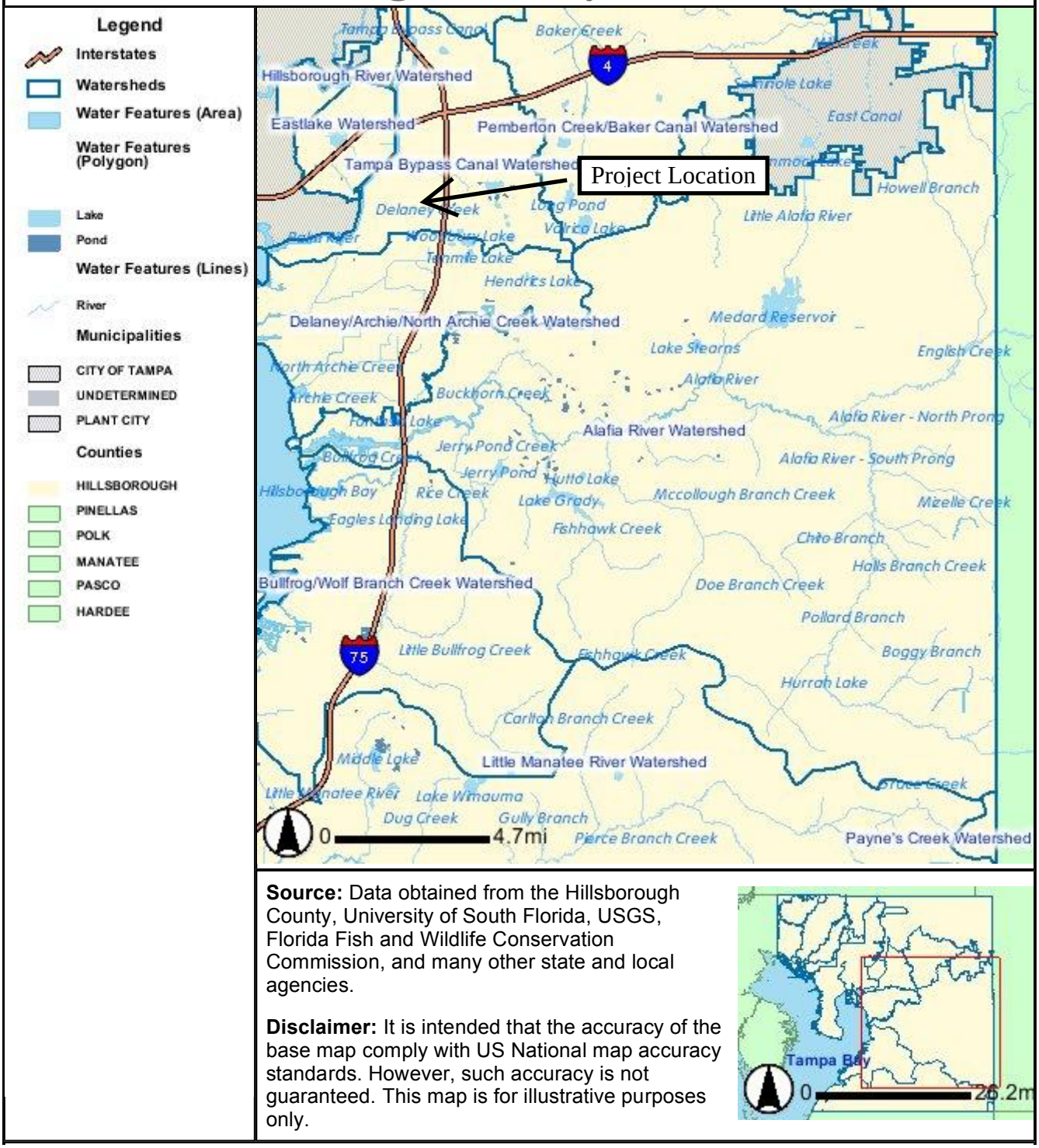
5.0 EXISTING DRAINAGE STRUCTURES

A double 36-inch pipe cross drain exists along this section of US Highway 301 located approximately at station 1064+00.

There are several side drains whose sizes to range from 18-inch reinforced concrete pipe (RCP) to 48-inch RCP. *Table 5-1* contains the existing drainage structure data for each of the side drains within the project corridor. A recent field review (09/12/06) found no visible failures; however, many were not entirely visibly due to extremely heavy brush and high water levels.

The FDOT District Seven Maintenance Office did not have as-built drawing for this section of US Highway 301; therefore, the existing drainage structures could not be verified. Structure size, type and locations are based on both field estimates and research of existing SWFWMD and FDOT permits along US Highway 301.

Hillsborough County Water Atlas



Source: Data obtained from the Hillsborough County, University of South Florida, USGS, Florida Fish and Wildlife Conservation Commission, and many other state and local agencies.

Disclaimer: It is intended that the accuracy of the base map comply with US National map accuracy standards. However, such accuracy is not guaranteed. This map is for illustrative purposes only.

NOTE:
This information is preliminary and subject to change until the final design is approved.

Figure 4-1
SWFWMD Alafia River Basin
US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

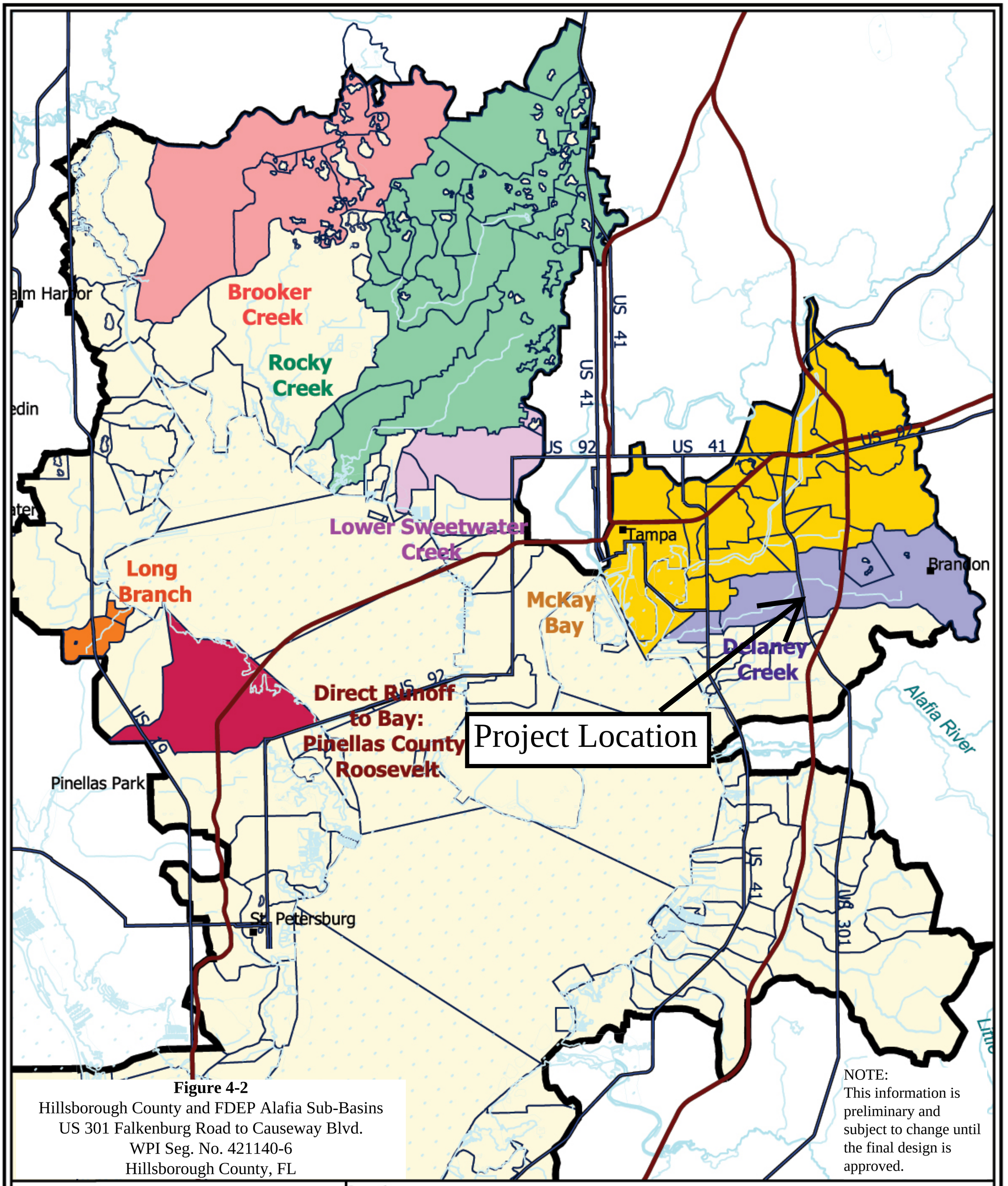


Figure 4-2
Hillsborough County and FDEP Alafia Sub-Basins
US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

NOTE:
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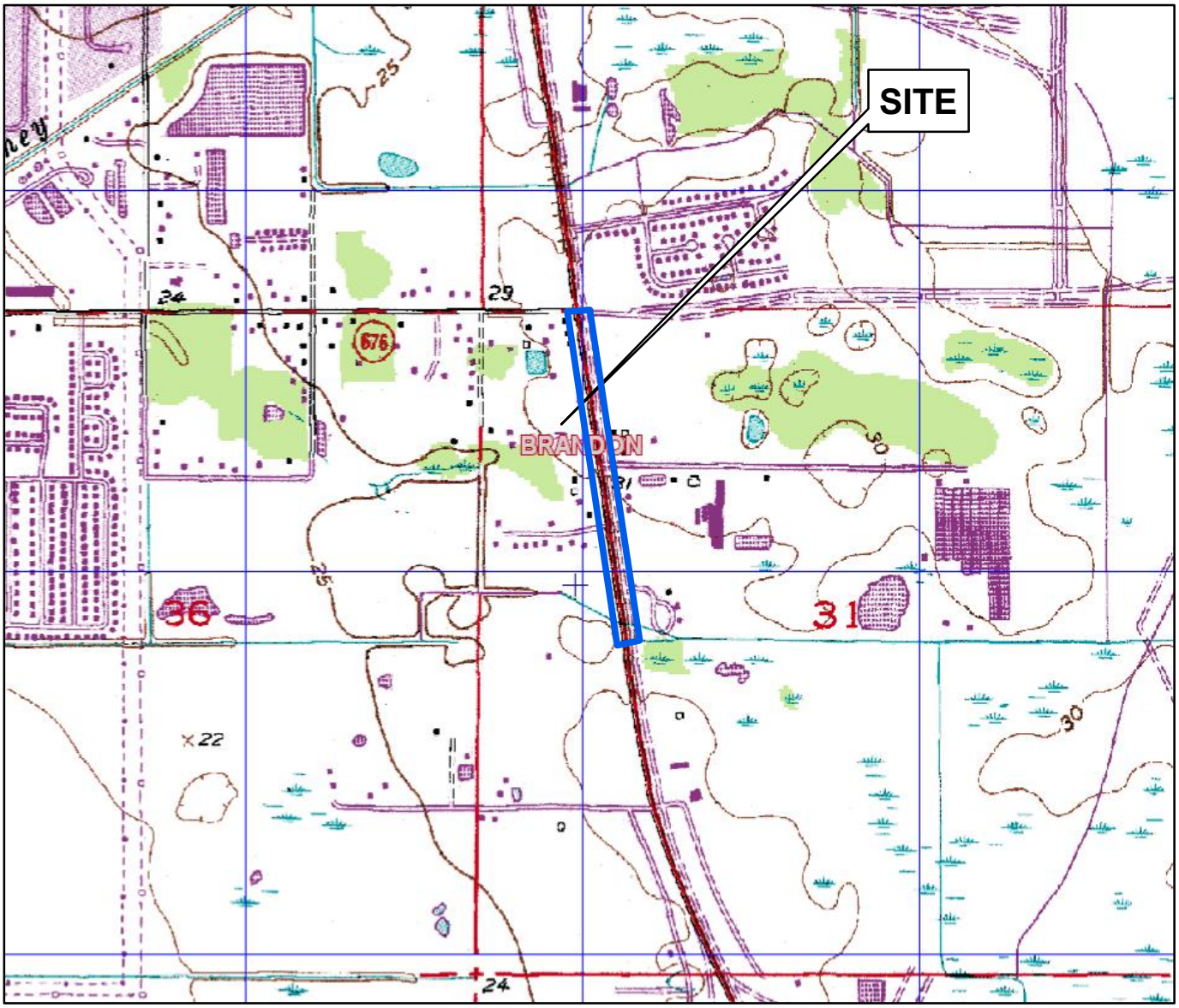

Source: 3-D TopoQuads. 1990 DeLorme Yarmouth ME 04096. Source Data: USGS.

Section 31, Township 29 S, Range 20 E

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1987 USGS QUADRANGLE MAP

US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

SCALE:	PROJ. NO.:	DATE:	FIGURE:
1:4,169	048805007	October 2006	4-3

Table 5-1 Existing Drainage Structures

Structure	Structure Type	Approximate Station	Side	Size	Structure	Structure Type	Approximate Station	Side	Size
ST-1	MES	1061+81.10	L	18”	ST-17	Catch Basin	1074+01.61	R	18”
ST-2	MES	1061+66.78	R	42”	ST-18	MES	1074+47.79	L	18”
ST-3	MES	1063+39.59	R	42”	ST-19	MES	1075+67.25	R	36”
ST-4	Catch Basin	1063+68.16	R	36”	ST-20	MES	1075+70.01	L	Unknown
ST-5	MES	1063+99.19	L	36”	ST-21	MES	1076+53.13	R	36”
ST-6	Endwall	1064+00.75	R	30”	ST-22	MES	1076+55.90	L	Unknown
ST-7	Outfall Structure	1064+00.75	R	30”	ST-23	MES	1079+92.01	R	24”
ST-8	MES	1065+82.58	R	30”	ST-24	MES	1080+77.89	R	24”
ST-9	Manhole	1065+99.37	L	36”	ST-25	MES	1082+13.88	R	24”
ST-10	MES	1066+68.47	R	30”	ST-26	Catch Basin	1082+66.80	R	12”
ST-11	Catch Basin	1067+36.48	R	18”	ST-27	MES	1082+99.77	R	24”
ST-12	MES	1071+17.11	L	18”	ST-28	MES	1085+36.32	L	15”
ST-13	MES	1072+03.00	L	18”	ST-29	MES	1085+98.80	L	18”
ST-14	MES	1073+02.11	R	24”	ST-30	MES	1085+99.45	R	24”
ST-15	MES	1073+61.90	L	18”	ST-31	MES	1086+84.68	L	18”
ST-16	MES	1073+87.99	R	24”	ST-32	MES	1086+85.33	R	24”

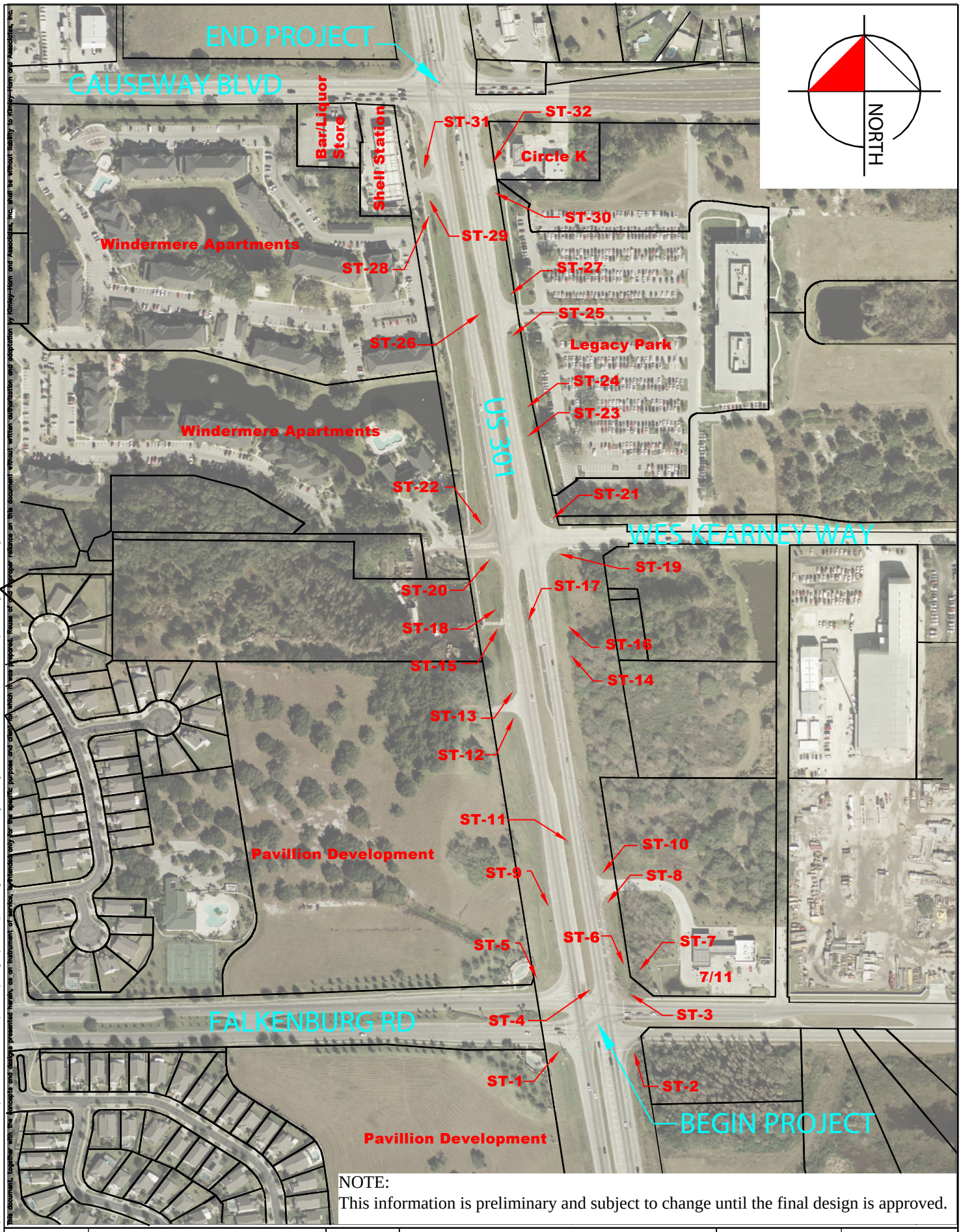
NOTE: This information is preliminary and subject to change until the final design is approved.

Figure 5-1 gives a graphical depiction of the approximate location of the on-site existing drainage structures.

6.0 EXISTING PROJECT CORRIDOR LAND USE AND HYDROLOGY

The project corridor and adjacent areas are comprised of the following land use classifications (see *Figure 6-1*):

- Multiple Dwelling Unit, High Rise – Three Stories or More Florida Land Use, Cover and Forms Classification System (FLUCFCS 134)
- Commercial and Services (FLUCFCS 140)
- Professional Services (FLUCFCS 143)
- Undeveloped Land with Urban Areas (FLUCFCS 191)
- Upland Forests (FLUCFCS 400)
- Divided Highways – Federal-State (FLUCFCS 8142)
- County Maintained (FLUCFCS 8144)



NOTE:
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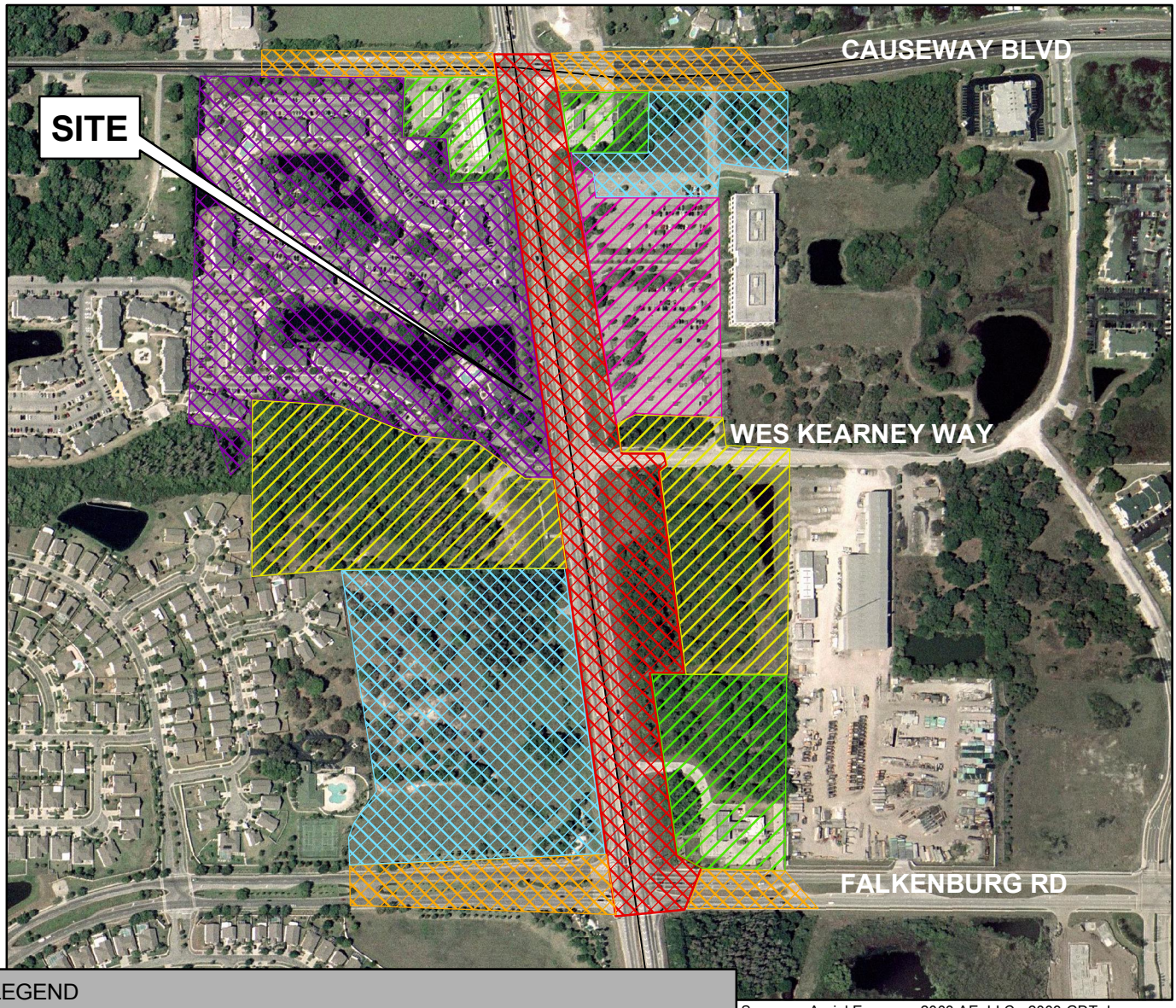
Drawing name: H:\048805-Centex Homes\007 - 301 SEIR\CADD\Image\Aerial\Existing Structures.dwg Layout1 Dec 14, 2006 5:29pm by bobbi.claybrooke

SCALE NTS DESIGNED BY DRAWN BY CHECKED BY	Kimley-Horn and Associates, Inc. © 2006 KIMLEY-HORN AND ASSOCIATES, INC. 10117 Princess Palm Avenue, Suite 300, Tampa, FL 33610 PHONE (813) 620-1460 FAX (813) 620-1542 WWW.KIMLEY-HORN.COM CA 00000696	DATE 09/11/06 PROJECT NO. 048805007	US 301 Falkenburg Road to Causeway Blvd. WPI Seg. No. 421140-6 Hillsborough County, FL	DESIGN ENGINEER: J. Richard Claybrooke FLORIDA P.E. LICENSE NUMBER: 51329	Figure 5-1 Existing Drainage Structure Map



LEGEND

- 134 = Multiple Dwelling Unit, High Rise (3 stories or more)
- 140 = Commercial and Services
- 143 = Professional Services
- 191 = Undeveloped Land with Urban Areas
- 400 = Upland Forest
- 8142 = Divided Highways (Federal-State)
- 8144 = County Maitained

Sources: Aerial Express. 2003 AE, LLC. 2003 GDT, Inc. Southwest Florida Water Management District. GIS Data. FDOT Florida Land Use, Cover and Forms Classification System, Handbook. January 1999.

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FLUCFCS MAP

US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

SCALE:	PROJ. NO.:	DATE:	FIGURE:
1:6,253	048805007	October 2006	6-1

SCS Curve Number (CN) values for the various ground covers within the project corridor include (see *Figures 6-2* and *6-3*):

- Grass (Grass – good > 75%): CN = 80.0
- Woods (fair): CN = 79.0
- Woods (poor): CN = 83.0
- Paved Road w/ open ditches: CN = 93.0
- Surface Water: CN = 100.00

The analysis for this project will be in accordance with the SCS Antecedent Moisture Condition II procedure; where "B/D" Soils are evaluated as "D" soils.

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

NOTE:
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(210-VI-TR-55, Second Ed., June 1986)

Figure 6-2
SCS Curve Number Values - Urban Areas
US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

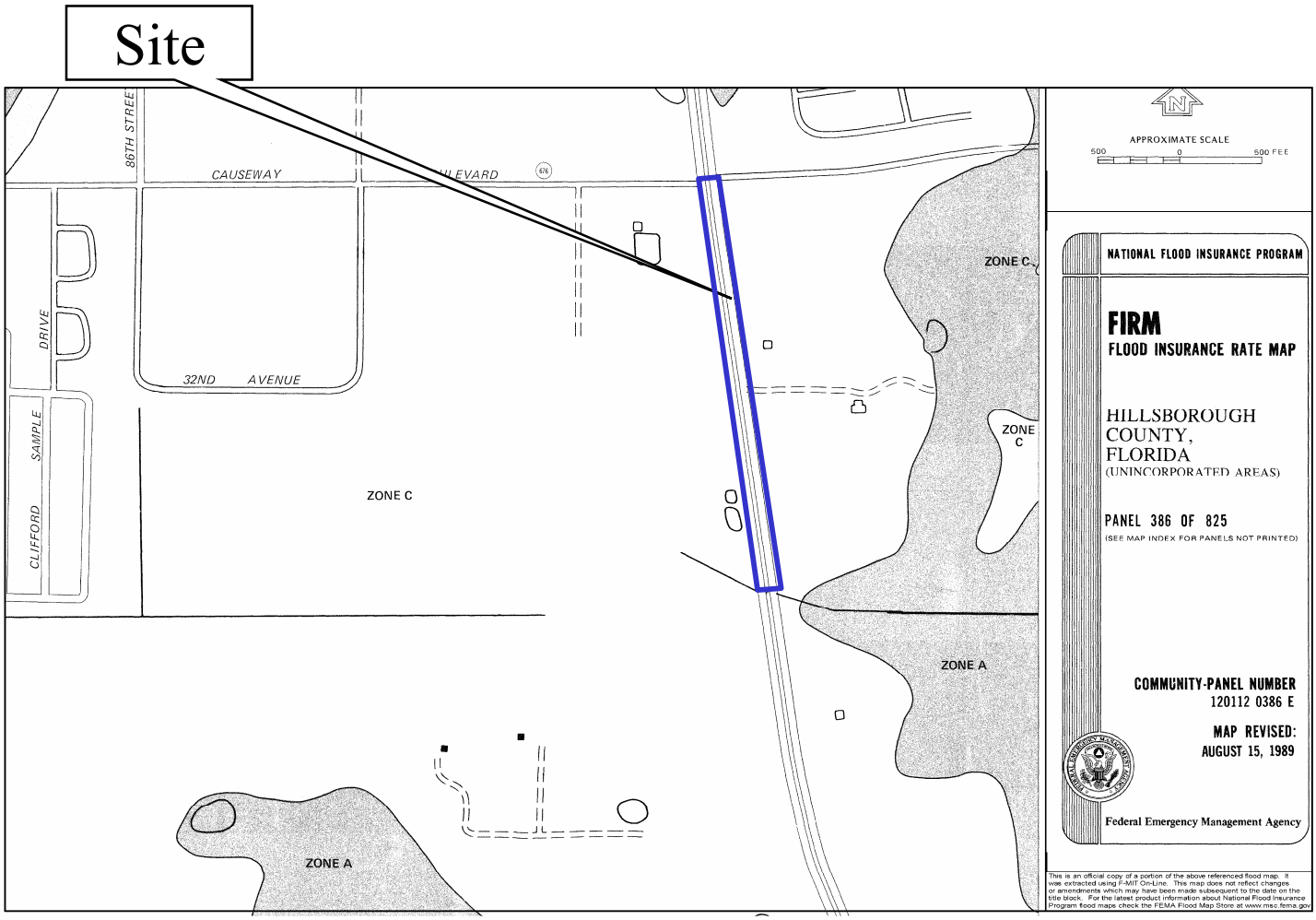
NOTE:
This information is preliminary and subject to change until the final design is approved.

Figure 6-3
SCS Curve Number Values - Other Agricultural Land
US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

7.0 FLOODPLAINS AND REGULATORY FLOODWAYS

Figure 7-1 depicts the Federal Emergency Management Agency (FEMA) floodplain data that was reviewed for this project; FEMA Flood Insurance Rate Maps (FIRM) for Hillsborough County Community Panel Number; 120112 0386 E (Map Dated August 15, 1989). A FEMA Firmette (FIRM) Map for the project corridor has been included as *Figure 7-1*.

The entire project corridor is within FEMA designated Flood Zone C. Flood Zone C denotes areas of minimal flooding. Therefore, no floodplain compensation will be required for the roadway improvements.



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LEGEND

Zone C – Areas of Minimal Flooding.

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Fax: (813) 620-1542

FEMA Flood Insurance Rate Maps

US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

SCALE:	PROJ. NO.:	DATE:	FIGURE:
As Shown	048805007	October 2006	7-1

8.0 LOCAL DRAINAGE ISSUES

There are specific local issues, both physical and regulatory, that require special attention due to their potential impact on this project and more specifically the proposed stormwater management system that will be designed for US Highway 301. These issues are:

8.1 Stormwater Management Facilities

The proposed stormwater management facility will meet the design criteria of the SWFWMD, Hillsborough County and the FDOT. These design criteria will be based on the soil and subsurface hydrogeology adjacent to and along the project corridor.

8.2 Commingled Stormwater Runoff

ERP Stormwater Quality Permitting Requirements: The design will need to address SWFWMD water quality rules governing the commingling of onsite (US Highway 301) and offsite stormwater runoff when sizing the stormwater facility. SWFWMD requires stormwater facilities to be sized to treat both the onsite and offsite stormwater runoff when the runoff cannot be separated. Additionally, where roadside ditches capture onsite and offsite stormwater runoff and provide functional water quality treatment, the project improvements (such as piping) shall not result in a net loss of treatment. Should said loss occur, water quality compensation may be required. (Reference SWFWMD BOR 5.8.b.2)

8.3 Special Basin Requirements

The Delaney Creek Basin no longer requires special Pre/Post-development discharge requirements for stormwater ponds discharging within its limits (see *Appendix B*). Delany Creek has been "delisted" from the 1998 303(d) list for the Tampa Bay Group 1 Basin as defined by the FDEP. Additionally, this segment of road does not fall within a peak or volume sensitive area as defined by Hillsborough County (see *Figure 8-1*).

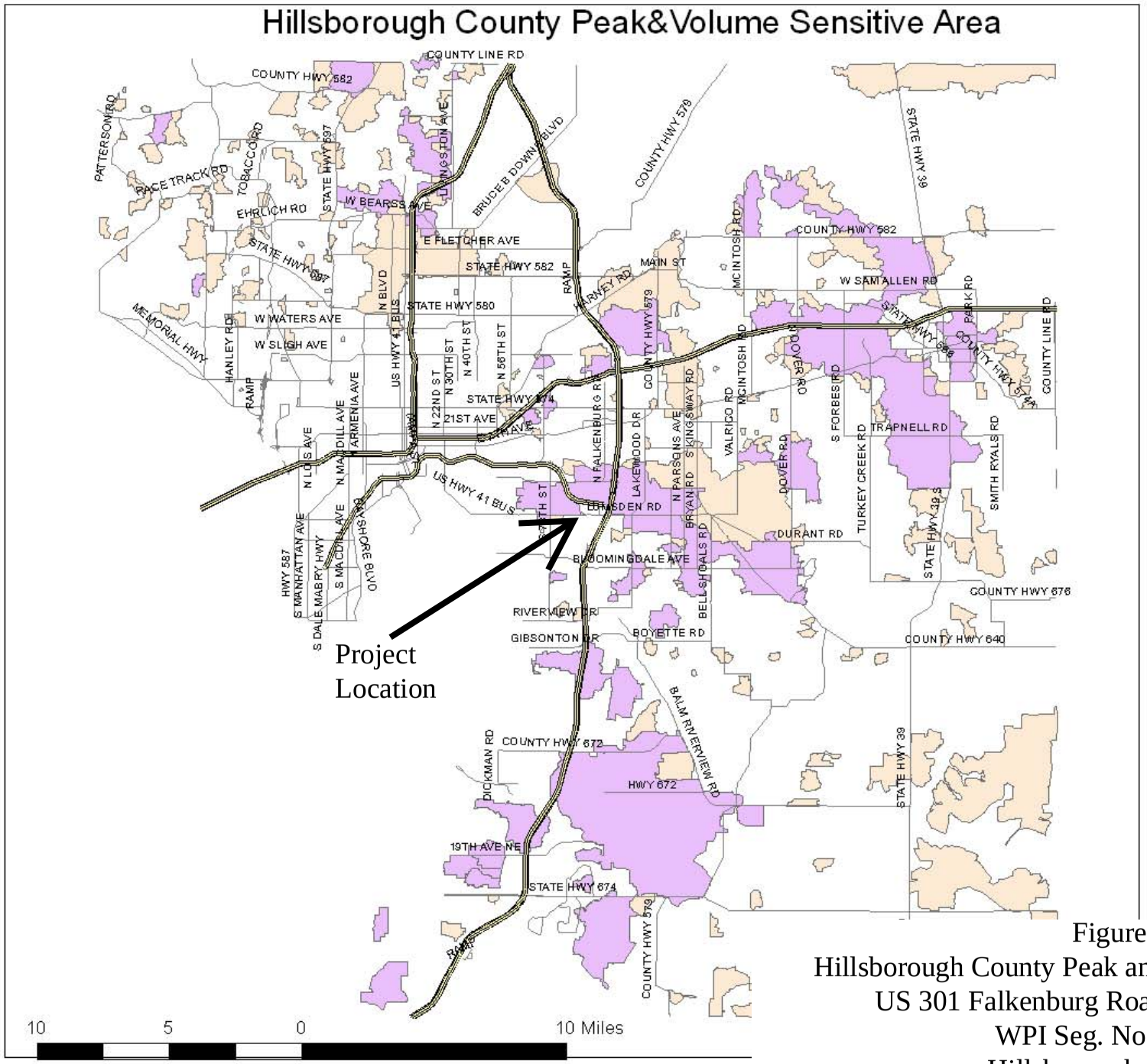

Figure 8-1
Hillsborough County Peak and Volume Sensitive Areas
US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

NOTE:
This information is preliminary and subject to change until the final design is approved.

9.0 SOILS

According to the United States Department of Agriculture (USDA), SCS Hillsborough County Soil survey, the prevalent soils are Malabar fine sand, Myakka fine sand, Ona fine sand, and Smyrna fine sand. *Figure 9-1* shows the Hillsborough County, USDA SCS Soils Map for the US Highway 301 Project.

The following are the definitions of those soils identified within the US Highway 301 project corridor:

- Malabar fine sand (27) – This soil is nearly level and poorly drained. It is in low-lying sloughs and shallow depressions on the flatwoods. The slope is 0 to 2 percent. Typically, this soil has a surface layer of dark gray fine sand about 4 inches thick. The subsurface layer, to a depth of about 12 inches, is light brownish gray fine sand. In most years, a seasonal high water table (SHWT) fluctuates from the soil surface to a depth of about 10 inches for 2 to 6 months. Permeability is rapid in the surface and subsurface layers, slow in the subsoil, and moderately rapid or rapid in the substratum. The available water capacity is very low or low. The depressions are subject to shallow flooding during heavy rains. The hydrologic soil group (HSG) for this soil is B/D.

  Myakka fine sand (29) – This soil is nearly level and poorly drained. It is on broad plains on the flatwoods. The slope is 0 to 2 percent. Typically, this soil has a surface layer of very dark gray fine sand about 5 inches thick. The subsurface layer, to a depth of about 20 inches, is gray fine sand. In most years, a seasonal high water table fluctuates from the soil surface to a depth of 10 inches for 1 to 4 months and recedes to a depth of 40 inches during prolonged dry periods. Permeability is rapid in the surface and subsurface layers, moderate or moderately rapid in the subsoil and rapid in the substratum. The available water capacity is low. The HSG for this soil is B/D.
- Ona fine sand (33) – This soil is nearly level and poorly drained. It is on broad plains on the flatwoods. The slope is 0 to 2 percent. Typically, this soil has a surface layer of very dark gray fine sand about 4 inches thick. The upper part of the subsoil, to a depth of about 8 inches, is black fine sand. The lower part, to a depth of about 22 inches, is a very dark brown fine sand. In most years, a seasonal high water table fluctuates from the soil surface to a depth of 10 inches for more than 2 months and recedes to a depth of 10 to 40 inches for 6 months or more. Permeability is rapid in the surface layer, moderate or moderately rapid in the subsoil, and rapid in the substratum. The available water capacity is low or moderate. The HSG for this soil is B/D.

Sources: Aerial Express. 2003 AE, LLC. 2003 GDT, Inc.
Southwest Florida Water Management District. GIS Data.
USDA/SCS Soil Survey of Hillsborough County, Florida. May 1989.

LEGEND
27 = Malabar fine sand, 0 to 2 percent slope
29 = Myakka fine sand, 0 to 2 percent slope
33 = Ona fine sand, 0 to 2 percent slope
52 = Smyrna fine sand, 0 to 2 percent slope

NOTE:
This information is preliminary and subject to change until the final design is approved.

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USDA/SCS SOILS MAP

US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

SCALE:	PROJ. NO.:	DATE:	FIGURE:
1:8,000	048805007	October 2006	9-1

- Smyrna fine sand (52) – This soil is nearly level and poorly drained. It is on broad, low-lying, convex swells on the flatwoods. The slope is 0 to 2 percent. Typically, the soil has a surface layer of very dark gray fine sand about 4 inches thick. The subsurface layer, to a depth of about 12 inches, is gray fine sand. In most years, a seasonal high water table fluctuates from the soil surface to a depth of 10 inches for more than 2 months and recedes to a depth of 10 to 40 inches for 6 months or more. Permeability is rapid in the surface and subsurface layers, moderate or moderately rapid in the subsoil, and rapid in the substratum. The available water capacity is low. The HSG for this soil is B/D.

A site-specific geotechnical analysis was performed. Groundwater locations and percolation rates were established. A copy of this report is included in *Appendix D*.

10.0 PROPOSED ANALYSIS APPROACH

The following sections describe in detail the approach used in sizing and locating a potential stormwater facility for this project. The sizing analysis is based on the permitting requirements for water quality and water quantity, additional requirements by other jurisdictional agencies, site-specific characteristics, design guidelines specific to FDOT-7, a literature review, and a field review. The analysis included a review of the available documentation:

- Aerial photographs
- USGS Quadrangle Map
- SWFWMD – 1-ft aerial contour maps
- USDA SCS Soils Map – Hillsborough County, Florida
- State of Florida GIS data
- FEMA FIRM – Hillsborough County, Florida
- Compiled field review notes and photos.

The analysis included referencing the following design documentation sources:

- FDOT Drainage Manual, January 2005
- FDOT Stormwater Management Facility Handbook, January 2004
- FDOT Hydrology Handbook, January 2004
- FDOT PD&E Manual, Part 2, Chapter 24 – Floodplains, April 1998
- TR-55 Urban Hydrology for Small Watersheds
- SWFWMD – Rule 40D, Basis of Review

11.0 STORMWATER MANAGEMENT FACILITIES

For this project, the preferred method for water quality and attenuation will be accomplished within the roadside swales as dry retention.

Based on the geotechnical report, the SHWT table was estimated to range from 0.5 to 4.5 feet below grade. Within the swale areas, the SHWT was close to 4 feet deep. With the swale areas water table at this depth, wet detention in the roadside swales would be too deep to physically create enough storage based on the roadway geometric constraints. Vertical walls were investigated at the front of the sidewalks, but stages were overtopping the sidewalk during the critical analysis. This option was abandoned at this point.

Dry retention within the roadside swales and an offsite pond were further analyzed. The wet pond was sized based on wet detention criteria. The dry detention swales used the 50% water quality volume credit.

12.0 STORMWATER PERMITTING REQUIREMENTS

12.1 SWFWMD Treatment Criteria

SWFWMD specifies water quality treatment of 1-inch of runoff from the directly connected impervious area (DCIA); this includes the new lane additions as well as the existing lanes within this segment of roadway. The pond is designed to accept onsite runoff only.

The total DCIA of US Highway 301 between Causeway Boulevard and Falkenburg Road, including the new lane additions, is 9.38 acres. Therefore, the required wet detention water quality treatment volume would be:

$$9.38\,\text{acres} * 1\,\text{inch} * \frac{1\,\text{foot}}{12\,\text{inch}} = 0.78\,\text{ac-ft}$$

The dry detention volume would be 50% less or 0.39 acre-foot.

12.2 SWFWMD Attenuation Criteria

SWFWMD specifies that the post-developed discharge for the 25-year / 24-hour storm event will be required to match the pre-developed discharge for the 25-year / 24-hour storm event.

25-year / 24-hour storm P = 8.00 inches

(See *Figure 12-1*)

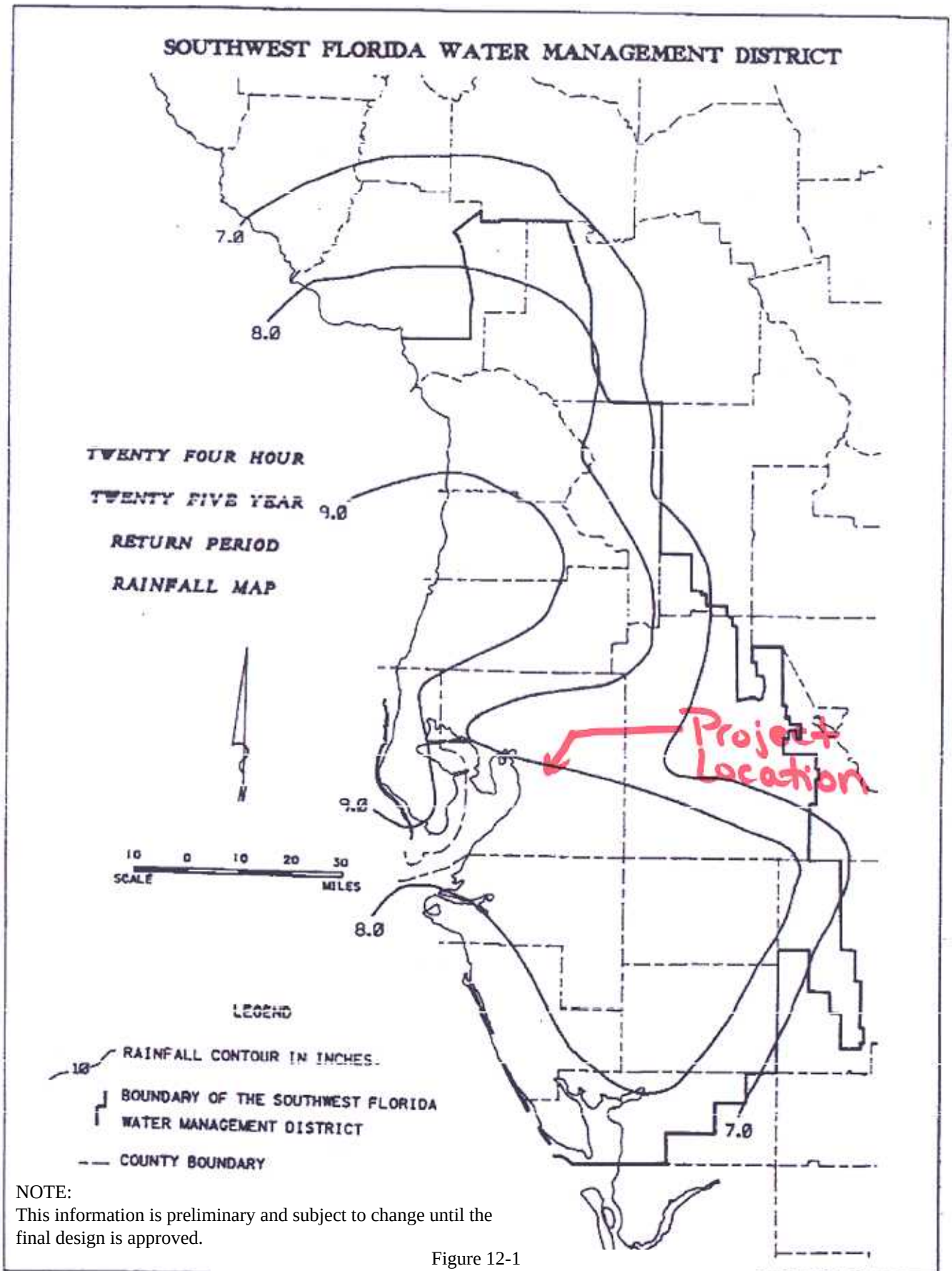
**The proposed Stormwater management system will need to be submitted to Hillsborough County (Contact: Mr. Mark Arnold, 813.276.8339) for review of outfall locations and discharge rates.

12.3 FDOT Attenuation Criteria

F.A.C. 14-86 Critical Duration Analysis for all pond facilities.

12.4 Erosion Control

Use of Best Management Practices (BMP's) as required.



NOTE:
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Figure 12-1
SWFWMD 25 Year/24 Hour Rainfall Map
US 301 Falkenburg Road to Causeway Blvd.
WPI Seg. No. 421140-6
Hillsborough County, FL

13.0 STORMWATER OUTFALLS

- Utilize an open swale system to convey the controlled discharge from the offsite water detention facility to the Delaney Creek on the west side of US Highway 301.
- The dry detention areas would discharge using the existing outfalls.

14.0 FDOT DISTRICT SEVEN – POND SITING GUIDELINES

The following items apply to identifying pond sites within the project corridor for this project:

- FDOT-7 does not consider potential pond alternatives that are in the 100-year floodplain.
- FDOT-7 requires that a pond site be limited to only the actual property area required to meet permitting rules (i.e. no excess, no complete takes unless warranted).
- FDOT-7 does not consider pond site alternatives that propose the use of underdrain systems.
- All access easements required for each pond site shall be clearly identified so cost estimates could be provided accordingly. Each pond site will be shown on a separate sheet for the submittal to R/W for cost estimates.
- Generally, FDOT-7 does not consider pond site alternatives with liners. However, Ms. Arasteh (FDOT-7 District Drainage Engineer), approved the consideration of lined stormwater management facilities based on the following site specific information:
- Site-specific hydraulic constraints.
- Site-specific high ground water table conditions.
- Limited pond site alternatives.
- Outfall locations.

15.0 POND SITING CRITERIA (IF PONDS ARE UTILIZED)

- The potential pond site was identified based on available properties adjacent to the existing R/W.
- Pond sites will be located away from US Highway 301 frontage where practical.
- Sites where hazardous materials have been documented or where the potential for contamination exists will be avoided where practical. However, proposed pond sites with a high risk for contamination will not be eliminated as a potential alternative based solely on that criterion.
- Piped conveyance to the pond sites from the roadway and from the pond sites to the outfall points will be minimized. Existing offsite storm drain pipe runs will be evaluated for use to avoid temporary construction easements, utility impacts, and to avoid purchasing properties over securing maintenance easements.

16.0 OFFSITE WET DETENTION POND OPTION

Figure 16-1 shows the location of the pond site that would be required if the recommended alternative is to utilize offsite ponds. This site lies on the east side of US Highway 301, just south of Windermere Lake Drive and adjacent to the existing R/W. Centex Homes would be responsible for the acquisition of the property, which would be turned over to the FDOT as R/W at the completion of construction.

It is proposed that stormwater runoff from US Highway 301 between Causeway Boulevard and Falkenburg Road be directed to this pond location via the existing roadside swales. Swales would be re-graded to provide positive conveyance of stormwater to the proposed pond. The pond would provide both water quality treatment and attenuation.

Based upon drainage calculations, shown in *Appendix C*, and the stormwater treatment calculations, shown in Section 12, the proposed stormwater pond would need to provide 0.94 ac-ft of volume (0.16 ac-ft of attenuation and 0.78 ac-ft of treatment).

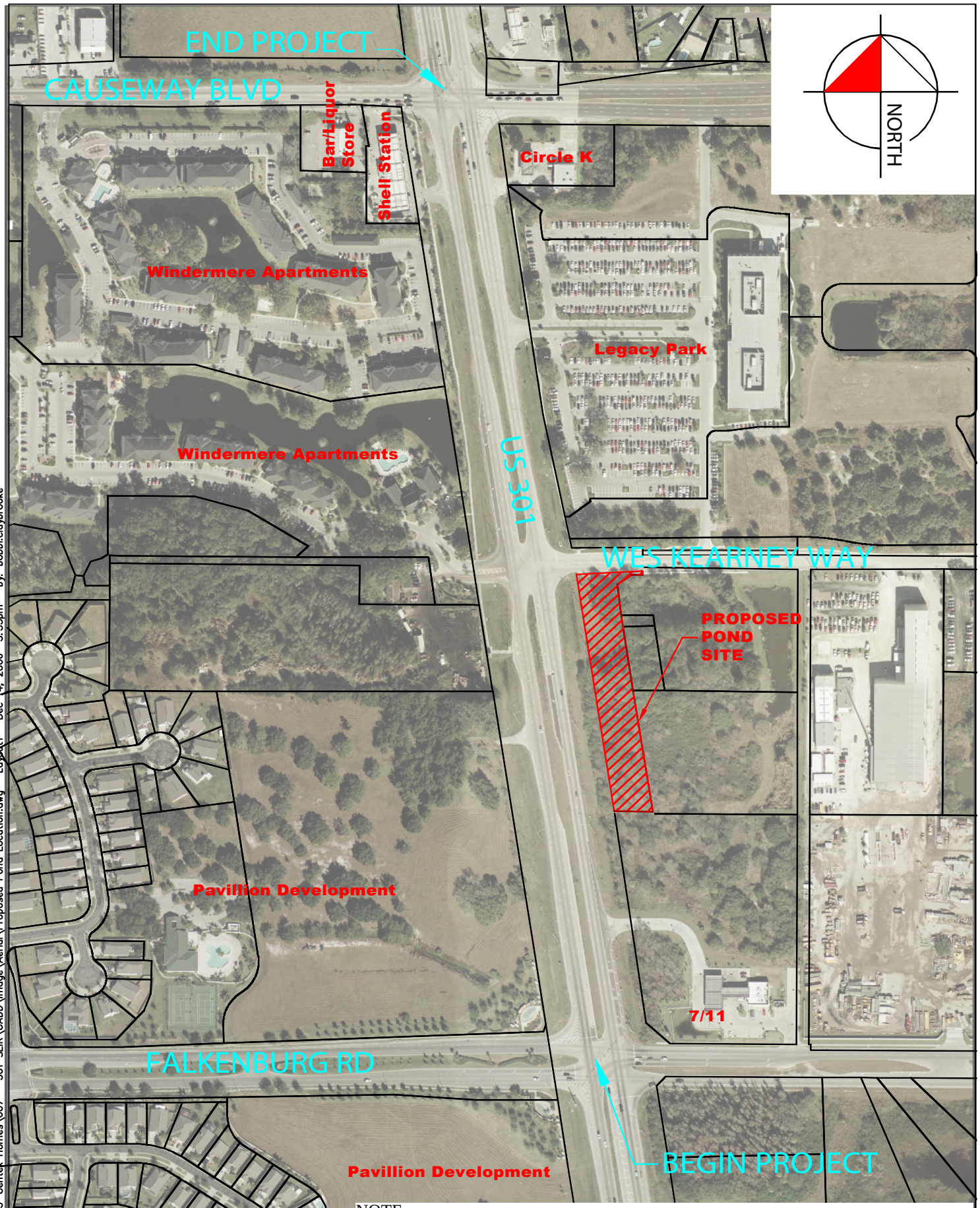
The above information, the proposed stormwater pond would have approximately 1 foot of volume above SHW. Therefore, the average pond size would need to be approximately one acre.

$$\frac{0.94\,\text{ac - ft}}{1\,\text{ft}} = 0.94\,\text{acres}$$

Figure 16-2 shows the typical pond cross section. With the added area for maintenance berms and ties to existing grades, the total pond area becomes approximately 1.5 acres. The proposed pond site location, depicted in *Figure 16-1*, is approximately 6.35 acres in size with approximately 4 acres +/- upland area for the proposed pond.

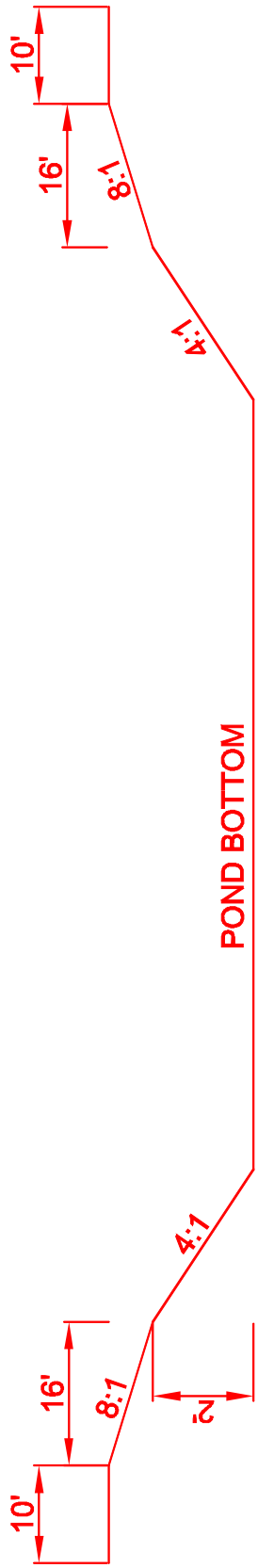
The proposed stormwater pond would then outfall via a closed conduit system to Delaney Creek on the west side of US Highway 301.

The proposed pond is located adjacent to an existing wetland system; however, no permanent wetland impacts are proposed for this project.



NOTE:
This information is preliminary and subject to change until the final design is approved.

SCALE NTS DESIGNED BY DRAWN BY CHECKED BY	Kimley-Horn and Associates, Inc. © 2006 KIMLEY-HORN AND ASSOCIATES, INC. 10117 Princess Palm Avenue, Suite 300, Tampa, FL. 33610 PHONE (813) 620-1460 FAX (813) 620-1542 WWW.KIMLEY-HORN.COM CA 00000696	DATE 09/11/06 PROJECT NO. 048805007	Proposed Pond Site Locations US 301 Falkenburg Road to Causeway Blvd. WPI Seg. No. 421140-6 Hillsborough County, FL	Figure Number 16-1



NOTE:
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Drawing name: H:\048805-Centex Homes\007 - 301 SEIR\CADD\Image\Aerial\Proposed Pond Location.dwg Layout2 Dec 14, 2006 6:00pm by: bobbi.claybrooke

SCALE NTS DESIGNED BY DRAWN BY CHECKED BY	Kimley-Horn and Associates, Inc. © 2006 KIMLEY-HORN AND ASSOCIATES, INC. 10117 Princess Palm Avenue, Suite 300, Tampa, FL. 33610 PHONE (813) 620-1460 FAX (813) 620-1542 WWW.KIMLEY-HORN.COM CA 00000696	DATE 09/11/06 PROJECT NO. 048805007	Typical Pond Section US 301 Falkenburg Road to Causeway Blvd. WPI Seg. No. 421140-6 Hillsborough County, FL	DESIGN ENGINEER: J. Richard Claybrooke FLORIDA P.E. LICENSE NUMBER: 51329	SHEET NUMBER 16-2

17.0 DRY RETENTION SWALE OPTION

The dry retention swale option will entail setting the swale bottom a minimum of one (1) foot above the SHWT, based on site specific water table information. The front slope would be set to 1:4 inside the clear zone and 1:3 outside the clear zone. The slope beyond the swale to the sidewalk will be at 1:2 and 1:2 to tie to existing ground. The west side adjacent to the Pavillion Development, from Falkenburg Road to the first driveway north will have to be raised to match future Pavillion grades. The proposed grade is estimated to be 31.0 feet based on permit plans on file at SWFWMD. Sidewalks will be located at the right-of-way on both sides of the project where there are currently no sidewalks. The raised area along the Pavillion side will be allowed by the property owner. This will allow the fill slope to encroach onto the Pavillion property as the Pavillion property develops. The swales will retain the required volume and overflow to the outfall. Recovery of the required volume will need to be demonstrated either by percolation or through a bleeder device such as an orifice. The bleeder can be set no lower than the SHWT elevation.

All stormwater permitting requirements will be provided within the roadway swales, and will be contained within existing roadway R/W.

Appendix A
SWFWD Contour Map

COMPILED BY PHOTOGRAMMETRIC METHODS
BY
ABRAMS
AERIAL SURVEY CORPORATION OF FLORIDA
ST. PETERSBURG, FLORIDA

LEGEND

HORIZONTAL CONTROL U.S.C.&G.S.	△
FLORIDA STATE DEPT OF TRANSPORTATION	○
TRAVERSE STATIONS	FFG 8 ○
VERTICAL CONTROLS	FFG-7 97.61 ×
SECTION CORNERS	10 | 11 / 15 | 14
CONTOURS	25
DEPRESSION CONTOURS	25
SPOT ELEVATIONS	50.4

KEY MAP

NOTE ACCURACY: IT IS INTENDED THAT THIS MAPPING COMPLY WITH U.S. NATIONAL MAP ACCURACY STANDARDS. HOWEVER, SUCH ACCURACY OR ANY OTHER LEVEL OF ACCURACY, IS NOT GUARANTEED BY THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT.

THE LAND LINE INFORMATION SHOWN HEREIN IS COMPILED FROM THE BEST AVAILABLE DATA AND DOES NOT NECESSARILY REPRESENT TRUE LAND LINE LOCATION.

DASHED CONTOURS AND UNDERLINED ELEVATIONS INDICATE STANDARD VERTICAL ACCURACY REDUCED BY TREE COVER.

THIS SHEET MAY NOT BE REPRODUCED, IN PART OR IN FULL, WITHOUT SPECIFIC APPROVAL OF THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT. 2379 BROAD STREET, BROOKSVILLE, FL. 33512-9712

GRIDS BASED ON FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE

ELEVATIONS BASED ON U.S.C. & G.S. DATUM

N

200 0 200 400 600
SCALE 1" = 200' CONTOUR INTERVAL 1'

DATE OF BASE PHOTOGRAPHY DECEMBER 1985
DATE OF MAPPING PHOTOGRAPHY AUGUST 1986

SOUTHWEST FLORIDA
WATER MANAGEMENT DISTRICT

ALAFIA RIVER BASIN
ARCHIE CREEK

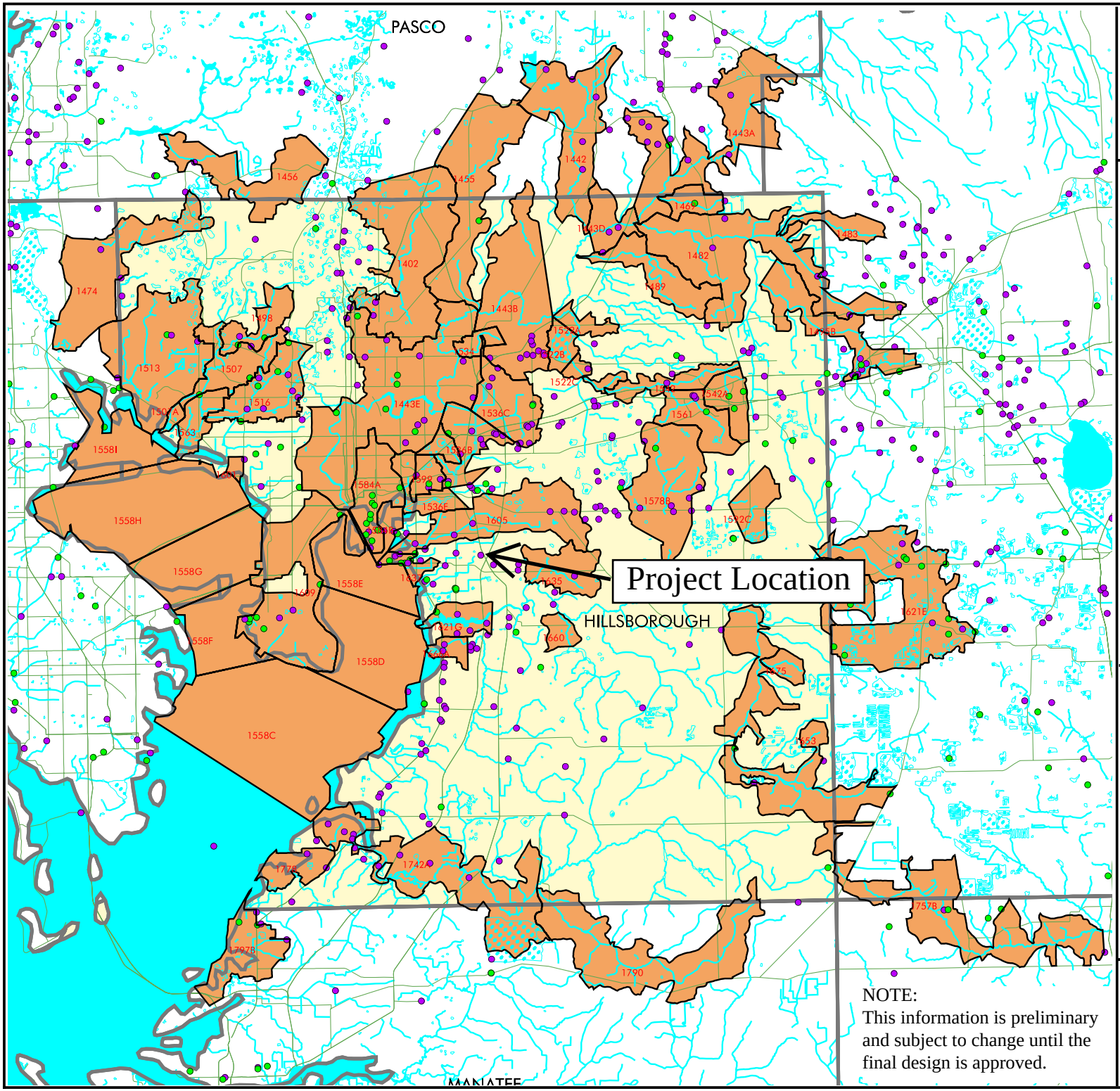
AERIAL PHOTOGRAPHY WITH CONTOURS

SWFWMD PROPERTY NO. 200.11

SHEET NO. 31-29-20

S.S.S.C. 2068

Appendix B
FDEP Basin Classification Information



1998 303(d) Listed Water Segements in Hillsborough County

Map prepared January 5, 2002 by the Bureau of Watershed Management, Division of Water Resource Management. This map is a representation of ground conditions and is not intended for delineations or analysis of the features shown. For more information or copies, contact Holli Brandt at (850) 921-9469, or holli.brandt@dep.state.fl.us Location: bdpwk01 E:\various_maps\tmdl_assess_maps

Basin	Wbid
SO FK LITTLE MANATEE R	1790
dread runoff to bay	1797B
NEW RIVER	1442
HILLSBOROUGH RIVER	1443A
TROUT CREEK	1455
SOUTH BRANCH	1456
CYPRESS CREEK	1402
HILLSBOROUGH RIVER	1443B
HILLSBOROUGH RIVER	1443D
BIG DITCH	1469
BROOKER CREEK	1474
BLACKWATER CREEK	1482
CHANNELIZED STREAM	1483
TWO HOLE BRANCH	1489
ITCHEPACKASASSA CREEK	1495B
DOUBLE BRANCH	1513
BRUSHY CREEK	1498
FLINT CREEK	1522A
HILLSBOROUGH RIVER	1443E
Lake Thonotosassa	1522B
Rocky Creek	1507
COW HOUSE CREEK	1534
TAMPA BYPASS CANAL	1536C
SWEETWATER CREEK	1516
Baker Creek	1522C
Pemberton Creek	1542
Mill Creek	1542A
Old Tampa Bay	1558I
SPARKMAN BRANCH	1561
CHANNEL G	1563
Rocky Creek	1507A
Sienkle Creek	1536B
TURKEY CREEK	1578B
BELLOWS LAKE OUTLET	1579
YBOR CITY DRAIN	1584A
Palm River	1536E
UCETA YARD DRAIN	1599
DIRECT RUNOFF TO BAY	1601
Old Tampa Bay	1558H
English Creek	1592C
DELANEY CREEK	1605
DIRECT RUNOFF TO BAY	1609
McKay Bay	1584B
Old Tampa Bay	1558G
Hillsborough Bay	1558E
North Prong Alafia R.	1621E
BUCHHORN CREEK	1635
BLACK POINT CHANNEL	1637
THIRTYMILE CREEK	1639
Old Tampa Bay	1558F
Hillsborough Bay	1558D
Alafia River	1621G
SOUTH PRONG ALAFIA R	1653
BELL CREEK	1660
BULLFROG CREEK	1666A
OWENS BRANCH	1675
TAMPA BAY	1558C
LITTLE MANATEE RIVER	1742A
PAYNE CREEK	1757B
COCKROACH BAY	1778

Legend

- County Boundary
- WAFR Facilities
  - NPDES (National) Facility
  - State or Local Facility
- Major Roads
- Water Lines
- Water Bodies
- 1998 303(d) Listed Waters

N

3 0 3 6 Miles

Verified List of Impaired Waters for the Tampa Bay Group 1 Basin

OGC Case Number	WBID	Water Segment Name	Parameters Identified Using the Impaired Waters Rule	Concentrations Causing Impairment*	Priority for TMDL Development**	Projected Year For TMDL Development	COMMENTS
02-1360	1473W	Lake Juanita	Nutrients (Historic TSI)	median TN = 0.60 mg/l; median TP = 0.01 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1361	1473X	Mound Lake	Nutrients (Historic TSI)	median TN = 0.45 mg/l; median TP = 0.01 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1362	1473Y	Calm Lake	Nutrients (Historic TSI)	median TN = 0.33 mg/l; median TP = 0.01 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1363	1473Y	Calm Lake	Nutrients (TSI)	median TN = 0.33 mg/l; median TP = 0.01 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1364	1474V	Crescent	Nutrients (TSI)	median TN = 0.65 mg/l; median TP = 0.02 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1365	1474W	Dead Lady Lake	Nutrients (TSI)	median TN = 0.88 mg/l; median TP = 0.03 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1366	1478H	Lake Reinheimer - Open	Nutrients (TSI)	median TN = 1.03 mg/l; median TP = 0.02 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1367	1486	Lake Tarpon	Dissolved Oxygen	< 5.0 mg/l	Medium	2008	Linked to nutrients.
02-1368	1486	Lake Tarpon	Nutrients (TSI)	median TN = 1.13 mg/l; median TP = 0.03 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients. Nutrients being addressed by SWFWMD through PLRGs.
02-1369	1493	Buck Lake	Nutrients (TSI)	median TN = 1.18 mg/l; median TP = 0.14 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1370	1494B	Brant Lake	Nutrients (TSI)	median TN = 1.03 mg/l; median TP = 0.04 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1440	1498	Sunset Lake	Nutrients (TSI)	median TN = 0.72 mg/l; median TP = 0.02 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1371	1502A	Lake Estes	Nutrients (TSI)	median TN = 0.82 mg/l; median TP = 0.03 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1372	1502C	Chapman Lake	Nutrients (TSI)	median TN = 1.07 mg/l; median TP = 0.04 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1373	1507A	Rocky Creek	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	High	2003	Linked to nutrients and BOD. Flow disrupted by control structures. Algal blooms observed.
02-1374	1507A	Rocky Creek	Nutrients (Historic Chlorophyll)	median TN = 1.35 mg/l	Medium	2008	Nitrogen is limiting nutrient. Flow disrupted by control structures. Algal blooms observed.
02-1375	1513	Double Branch	Coliforms (Total Coliform)	> 2400 per ml	Low	2008	
02-1376	1513	Double Branch	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Low	2008	Linked to nutrients.
02-1377	1516	Sweetwater Creek - Upper	Coliforms (Total Coliform)	> 2400 per ml	Low	2008	
02-1378	1516	Sweetwater Creek - Upper	Dissolved Oxygen	< 5.0 mg/l	Low	2008	Linked to nutrients.
02-1379	1516	Sweetwater Creek - Upper	Nutrients (Historic Chlorophyll)	median TN = 0.67 mg/l	Medium	2008	Nitrogen is limiting nutrient.
02-1380	1516A	Lake Carroll	Nutrients (TSI)	median TN = 0.44 mg/l; median TP = 0.01 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1381	1516B	Lake Madelene	Nutrients (TSI)	median TN = 0.67 mg/l; median TP = 0.01 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1382	1516E	Lake Ellen - Open Water	Nutrients (TSI)	median TN = 0.72 mg/l; median TP = 0.02 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1383	1529	Cow Branch	Unionized Ammonia	> 0.02 mg/l	Medium	2008	
02-1384	1530	Moccasin Creek	Nutrients (Chlorophyll)	median TN = 0.94 mg/l	Low	2008	Nitrogen is limiting nutrient.
02-1385	1536B	Sixmile Creek	Dissolved Oxygen	< 5.0 mg/l	Low	2008	Linked to nutrients and BOD. Flow disrupted by control structures. Algal blooms observed.
02-1386	1536C	Tampa Bypass Canal	Dissolved Oxygen	< 5.0 mg/l	Low	2008	Linked to nutrients and BOD. Flow disrupted by control structures. Algal blooms observed.
02-1387	1536E	Palm River	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Low	2008	Linked to nutrients and BOD. Flow disrupted by control structures. Algal blooms observed.
02-1388	1536E	Palm River	Nutrients (Historic Chlorophyll)	median TN = 1.0 mg/l	Medium	2008	Nitrogen is limiting nutrient. Flow disrupted by control structures. Algal blooms observed.
	1558A	Tampa Bay Lower	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1389	1558A	Tampa Bay Lower	Coliforms - Shellfish	Exceeds SEAS Thresholds	Medium	2008	Listed due to downgrade in shellfish harvesting classification.
02-1390	1558B	Tampa Bay Mid	Coliforms - Shellfish	Exceeds SEAS Thresholds	Medium	2008	Listed due to downgrade in shellfish harvesting classification.
02-1473	1558B	Tampa Bay Mid	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1474	1558C	Tampa Bay Upper	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.

OGC Case Number	WBID	Water Segment Name	Parameters Identified Using the Impaired Waters Rule	Concentrations Causing Impairment*	Priority for TMDL Development**	Projected Year For TMDL Development	COMMENTS
02-1475	1558D	Hillsborough Bay Lower	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1476	1558E	Hillsborough Bay Upper	Mercury-Fish	less than current criterion (0.025 ug/l)	High	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1391	1558F	Old Tampa Bay Lower	Coliforms - Shellfish	Exceeds SEAS Thresholds	Medium	2008	Listed due to downgrade in shellfish harvesting classification.
02-1477	1558F	Old Tampa Bay Lower	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1392	1558G	Old Tampa Bay	Coliforms - Shellfish	Exceeds SEAS Thresholds	Medium	2008	Listed due to downgrade in shellfish harvesting classification.
02-1478	1558G	Old Tampa Bay	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1393	1558H	Old Tampa Bay	Coliforms - Shellfish	Exceeds SEAS Thresholds	Medium	2008	Listed due to downgrade in shellfish harvesting classification.
02-1479	1558H	Old Tampa Bay	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1394	1558I	Old Tampa Bay	Coliforms - Shellfish	Exceeds SEAS Thresholds	Medium	2008	Listed due to downgrade in shellfish harvesting classification.
02-1480	1558I	Old Tampa Bay	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1395	1563	Channel G	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Low	2008	Linked to nutrients.
02-1396	1569	Bishop Creek	Coliforms (Fecal Coliform)	> 800 per 100 ml	Low	2008	
02-1397	1569	Bishop Creek	Coliforms (Total Coliform)	> 2400 per ml	Low	2008	
02-1398	1570A	Sweetwater Creek Tidal - Lower	Coliforms (Fecal Coliform)	> 800 per 100 ml	High	2003	For the 1998 303(d) analysis the station data were incorrectly assigned to WBID 1601.
02-1399	1570A	Sweetwater Creek Tidal - Lower	Coliforms (Total Coliform)	> 2400 per ml	High	2003	For the 1998 303(d) analysis the station data were incorrectly assigned to WBID 1601.
02-11400	1570A	Sweetwater Creek Tidal - Lower	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	High	2003	For the 1998 303(d) analysis the station data were incorrectly assigned to WBID 1601. Low DO linked to nutrients.
02-1401	1570A	Sweetwater Creek Tidal - Lower	Nutrients (Chlorophyll)	median TN = 1.21 mg/l	High	2003	Nitrogen is limiting nutrient. For the 1998 303(d) analysis the station data were incorrectly assigned to WBID 1601.
02-1402	1570A	Sweetwater Creek Tidal - Lower	Nutrients (Historic Chlorophyll)	median TN = 1.21 mg/l	High	2003	Nitrogen is limiting nutrient. For the 1998 303(d) analysis the station data were incorrectly assigned to WBID 1601.
02-1403	1574A	Alligator Lake	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Low	2008	Linked to nutrients.
02-1404	1574A	Alligator Lake	Nutrients (Chlorophyll)	median TN = 0.67 mg/l; median TP = 0.14 mg/l	Low	2008	Nitrogen and phosphorus are limiting nutrients.
02-1405	1575	Mullet Creek	Coliforms (Fecal Coliform)	> 800 per 100 ml	Low	2008	
02-1406	1575	Mullet Creek	Coliforms (Total Coliform)	> 2400 per ml	Low	2008	
02-1407	1584B	Mckay Bay	Dissolved Oxygen	< 5.0 mg/l	High	2003	Linked to nutrients.
02-1481	1584B	Mckay Bay	Mercury-Fish	less than current criterion (0.025 ug/l)	High	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.

OGC Case Number	WBID	Water Segment Name	Parameters Identified Using the Impaired Waters Rule	Concentrations Causing Impairment*	Priority for TMDL Development**	Projected Year For TMDL Development	COMMENTS
02-1408	1584B	Mckay Bay	Nutrients (Chlorophyll)	median TN = 0.80 mg/l	High	2003	Nitrogen is limiting nutrient.
02-1409	1584B	Mckay Bay	Nutrients (Historic Chlorophyll)	median TN = 0.80 mg/l	High	2003	Nitrogen is limiting nutrient.
02-1410	1603C	Beckett Lake - Open Water	Nutrients (TSI)	median TN = 0.87 mg/l; median TP = 0.08 mg/l	Medium	2008	Nitrogen and phosphorus are limiting nutrients.
02-1482	1604	Allen Creek	Nutrients (Chlorophyll)	median TN = 1.05 mg/l			Nitrogen is limiting nutrient.
02-1411	1605	Delaney Creek	Coliforms (Fecal Coliform)	> 800 per 100 ml	High	2003	
02-1412	1605	Delaney Creek	Coliforms (Total Coliform)	> 2400 per ml	High	2003	
02-1413	1605	Delaney Creek	Dissolved Oxygen	< 5.0 mg/l	High	2003	Linked to nutrients.
02-1414	1605	Delaney Creek	Lead	> e(1.273[lnH]-4.705)	High	2003	
02-1415	1605D	Delaney Creek Tidal	Coliforms (Fecal Coliform)	> 800 per 100 ml	Medium	2008	
02-1416	1605D	Delaney Creek Tidal	Coliforms (Total Coliform)	> 2400 per ml	Medium	2008	
02-1417	1605D	Delaney Creek Tidal	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Medium	2008	Linked to nutrients.
	1605D	Delaney Creek Tidal	Lead	> 5.6 ug/l	Medium	2008	
02-1418	1605D	Delaney Creek Tidal	Nutrients (Chlorophyll)	median TN = 2.33 mg/l	Medium	2008	Nitrogen is limiting nutrient.
02-1419	1624	Direct Runoff To Bay	Coliforms (Fecal Coliform)	> 800 per 100 ml	High	2003	
02-1420	1624	Direct Runoff To Bay	Coliforms (Total Coliform)	> 2400 per ml	High	2003	
02-1421	1624	Direct Runoff To Bay	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	High	2003	Linked to nutrients.
02-1422	1625	Cross Canal (North)	Coliforms (Fecal Coliform)	> 800 per 100 ml	Low	2008	
02-1423	1625	Cross Canal (North)	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Low	2008	Linked to nutrients.
02-1424	1627	Long Branch	Coliforms (Fecal Coliform)	> 800 per 100 ml	High	2003	
02-1425	1627	Long Branch	Coliforms (Total Coliform)	> 2400 per ml	High	2003	
02-1426	1627	Long Branch	Dissolved Oxygen	< 5.0 mg/l	High	2003	Linked to nutrients and BOD.
02-1427	1637	Black Point Channel	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Low	2008	This segment was listed on the 1998 303(d) list; however, it was not assessed in the 1996 305(b) report. Linked to nutrients.
02-1428	1666	Bullfrog Creek	Coliforms (Fecal Coliform)	> 800 per 100 ml	Medium	2008	
02-1429	1666	Bullfrog Creek	Coliforms (Total Coliform)	> 2400 per ml	Medium	2008	
02-1430	1666A	Bullfrog Creek	Coliforms (Total Coliform)	> 2400 per ml	Low	2008	
02-1431	1666A	Bullfrog Creek	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Low	2008	Linked to nutrients.
02-1432	1683	Smacks Bayou	Coliforms (Fecal Coliform)	> 800 per 100 ml	Low	2008	
02-1433	1700	Coffeepot Bayou	Coliforms (Fecal Coliform)	> 800 per 100 ml	Low	2008	
02-1434	1709D	Little Bayou - Basin Q	Coliforms (Fecal Coliform)	> 800 per 100 ml	Medium	2008	
02-1435	1709D	Little Bayou - Basin Q	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Medium	2008	Linked to nutrients.
02-1436	1709D	Little Bayou - Basin Q	Nutrients (Chlorophyll)	median TN = 1.11 mg/l	Medium	2008	Nitrogen is limiting nutrient.
02-1483	1776	Cockroach Bay	Coliforms - Shellfish	Exceeds SEAS Thresholds			Listed due to downgrade in shellfish harvesting classification.
02-1438	1776	Cockroach Bay	Dissolved Oxygen	< 4.0 mg/l, and less than 5.0 mg/l as daily average	Low	2008	Linked to nutrients and BOD.
02-1437	1776	Cockroach Bay	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Has contaminated sediments - ongoing restoration effort. Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
	1797B	Bishops Harbor	Coliforms - Shellfish	Exceeds SEAS Thresholds			Listed due to downgrade in shellfish harvesting classification.
02-1439	1797B	Bishops Harbor	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Age of data verified to be within last 7.5 years. Numeric criterion is inadequate because mercury is accumulating in the food chain such that fish tissue mercury levels exceed recommended levels for consumption.
02-1444	8999	Florida Gulf Coast	Mercury-Fish	less than current criterion (0.025 ug/l)	Low	2011	Confirmed recent data for coastal fish advisory for mackerel. Includes nearshore areas in 8049.

* For nutrients, these are median concentrations calculated from data generated from 1995 through June, 2002. The specific concentration of nutrients causing the impairment is unknown.
** Priorities were retained from the 1998 303(d) list (i.e., High or Low), but High, Medium and Low are used for newly listed waters identified under the IWR.

Waters to be Delisted from the 1998 303(d) List for the Tampa Bay Group 1 Basin

WBID	Water Segment Name	1998 303(d) Parameters of Concern	Parameters Evaluated Using the Impaired Waters Rule (IWR)	EPA's Integrated Report Category*	COMMENTS
1474	Brooker Creek	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1474	Brooker Creek	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1474	Brooker Creek	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1507A	Rocky Creek	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1507A	Rocky Creek	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1513	Double Branch	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1516	Sweetwater Creek - Upper	Collforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1530	Moccasin Creek	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1530	Moccasin Creek	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1536B	Sixmile Creek	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1536B	Sixmile Creek	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1536B	Sixmile Creek	Turbidity	Turbidity	2	Meets Standards.
1536E	Palm River	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1536E	Palm River	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1558C	Tampa Bay Upper	Coliforms	Collforms (Fecal Coliform)	2	Meets Standards.
1558C	Tampa Bay Upper	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1558D	Hillsborough Bay Lower	Dissolved Oxygen	Dissolved Oxygen	2	Meets Standards.
1558D	Hillsborough Bay Lower	Nutrients	Nutrients (Chlorophyll)	4c	Nitrogen is limiting nutrient. Have reasonable assurance that nutrient impairment will be addressed by Tampa Bay Estuary Program.
1558E	Hillsborough Bay Upper	Dissolved Oxygen	Dissolved Oxygen	2	Meets Standards.
1558E	Hillsborough Bay Upper	Nutrients	Nutrients (Chlorophyll)	4c	Nitrogen is limiting nutrient. Have reasonable assurance that nutrient impairment will be addressed by Tampa Bay Estuary Program.
1558F	Old Tampa Bay Lower	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1558F	Old Tampa Bay Lower	Coliforms	Coliforms (Total Collform)	2	Meets Standards.
1558G	Old Tampa Bay	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1558G	Old Tampa Bay	Collforms	Coliforms (Total Collform)	2	Meets Standards.

Waters to be Delisted from the 1998 303(d) List for the Tampa Bay Group 1 Basin

WBID	Water Segment Name	1998 303(d) Parameters of Concern	Parameters Evaluated Using the Impaired Waters Rule (IWR)	EPA's Integrated Report Category*	COMMENTS
1558H	Old Tampa Bay	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1558H	Old Tampa Bay	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1558H	Old Tampa Bay	Nutrients	Nutrients (Chlorophyll)	4c	Nitrogen is limiting nutrient. Have reasonable assurance that nutrient impairment will be addressed by Tampa Bay Estuary Program.
1558I	Old Tampa Bay	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1558I	Old Tampa Bay	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1558I	Old Tampa Bay	Nutrients	Nutrients (Chlorophyll)	4c	Nitrogen is limiting nutrient. Have reasonable assurance that nutrient impairment will be addressed by Tampa Bay Estuary Program.
1559	Direct Runoff To Bay	Coliforms		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1558I.
1559	Direct Runoff To Bay	Dissolved Oxygen		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1558I.
1559	Direct Runoff To Bay	Nutrients		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1558I.
1563	Channel G	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1563	Channel G	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1569	Bishop Creek	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1574A	Alligator Lake	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1574A	Alligator Lake	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1575	Mullet Creek	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1593	Direct Runoff To Bay	Dissolved Oxygen		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1558I.
1599	Uceta Yard Drain	Nutrients		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1983. Basin located in industrial area which contains Superfund sites.
1601	Direct Runoff To Bay	Coliforms		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1570A.
1601	Direct Runoff To Bay	Dissolved Oxygen		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1570A.
1601	Direct Runoff To Bay	Nutrients		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1570A.
1603	Direct Runoff To Bay	Nutrients	Nutrients (Chlorophyll)	2	Flaw in original analysis. Existing data indicate no nutrient impairment.

Waters to be Delisted from the 1998 303(d) List for the Tampa Bay Group 1 Basin

WBID	Water Segment Name	1998 303(d) Parameters of Concern	Parameters Evaluated Using the Impaired Waters Rule (IWR)	EPA's Integrated Report Category*	COMMENTS
1603	Direct Runoff To Bay	Biochemical Oxygen Demand	Dissolved Oxygen	2	No numeric criteria, but meets standards for DO.
1603	Direct Runoff To Bay	Chemical Oxygen Demand	Dissolved Oxygen	2	No numeric criteria, but meets standards for DO.
1603	Direct Runoff To Bay	Total Suspended Solids	Turbidity	2	No numeric criteria, but meets standards for turbididty.
1604	Allen Creek	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1604	Allen Creek	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1604	Allen Creek	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1605	Delaney Creek	Turbidity	Turbidity	2	Meets Standards.
1609	Direct Runoff To Bay	Coliforms		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1443.
1609	Direct Runoff To Bay	Dissolved Oxygen		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1443.
1609	Direct Runoff To Bay	Nutrients		3a	Flaw in original analysis. Data do not represent WBID. Data are from WBID 1443.
1625	Cross Canal (North)	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1625	Cross Canal (North)	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1627	Long Branch	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1630	Direct Runoff To Bay			3a	Listing of this water segment in 1998 was based on a NPS survey. No data.
1666A	Bullfrog Creek	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1683	Smacks Bayou	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1683	Smacks Bayou	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1700	Coffeepot Bayou	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.
1700	Coffeepot Bayou	Nutrients	Nutrients (Chlorophyll)	2	Meets Standards.
1709	Big Bayou - Basin W	Coliforms	Coliforms (Fecal Coliform)	2	WBID boundaries redelineated to conform to City of St. Petersburg basin delineations. Reanalysis of data indicates the fecal coliform counts meet standards.
1709	Big Bayou - Basin W	Coliforms	Coliforms (Total Coliform)	2	WBID boundaries redelineated to conform to City of St. Petersburg basin delineations. Reanalysis of data indicates the total coliform counts meet standards.
1709	Big Bayou - Basin W	Dissolved Oxygen	Dissolved Oxygen	2	WBID boundaries redelineated to conform to City of St. Petersburg basin delineations. Reanalysis of data indicates the dissolved oxygen values meet standards.

Waters to be Delisted from the 1998 303(d) List for the Tampa Bay Group 1 Basin

WBID	Water Segment Name	1998 303(d) Parameters of Concern	Parameters Evaluated Using the Impaired Waters Rule (IWR)	EPA's Integrated Report Category*	COMMENTS
1709	Big Bayou - Basin W	Nutrients	Nutrients (Chlorophyll)	4c	WBID boundaries redelineated to conform to City of St. Petersburg basin delineations. Nutrients addressed by Tampa Bay Estuary Program.
1778	Cockroach Bay	Coliforms	Coliforms (Fecal Coliform)	2	Meets Standards.
1778	Cockroach Bay	Coliforms	Coliforms (Total Coliform)	2	Meets Standards.

Tampa Bay Basin - Group 1 Priority Watersheds

Brooker Creek

Rocky Creek

Lower Sweetwater Creek

Long Branch

McKay Bay

Delaney Creek

Direct Runoff to Bay: Pinellas County Roosevelt

Project Location

Palm Harbor

Tampa

Brandon

Pinellas Park

St. Petersburg

US 41

US 92

US 19

US 301

Alafia River

0 2 4 6 Miles

N

Map prepared June 25, 2003 by the Bureau of Watershed Management, Division of Water Resource Management. This map is a representation of ground conditions and is not intended for delineations or analysis of the features shown. For more information or copies, contact Holli Brandt at (850) 245-8539, or holli.brandt@dep.state.fl.us Location: bdpwk01 E:\atlas\group1\tampa_bay

Legend

- Cities
- Interstates
- FDOT US Routes
- Major Rivers (lines)
- Water Bodies
- Tampa Bay Basin Boundary
- Tampa WBID Boundaries

Priority Watersheds

- Rocky Creek System
- Delaney Creek Basin
- Lower Sweetwater Creek Basin
- Direct Runoff to Bay: Roosevelt Basin
- Long Branch Basin
- Mckay Bay System
- Brooker Creek Basin

Tampa Bay Basin - Group 1

McKay Bay and Delaney Creek Priority Watershed

Project Location

0 0.8 1.6 2.4 Miles

N

Map prepared June 26, 2003 by the Bureau of Watershed Management, Division of Water Resource Management. This map is a representation of ground conditions and is not intended for delineations or analysis of the features shown. For more information or copies, contact Holli Brandt at (850) 245-8539, or holli.brandt@dep.state.fl.us Location: bdpwk01 E:\atlas\group1\tampa_bay

Legend

- Cities
- Interstates
- FDOT US Routes
- Landfills
- State Funded hazardous waste sites
- Superfund hazardous waste sites
- Springs
- Wastewater Facilities
- Wastewater Facilities Greater than 0.1 MGD
- Outstanding Florida Waters
- Groundwater Contamination Areas
- Verified List of Impaired Waters
- Water Lines
- Water Bodies
- Tampa Bay Boundary
- County Boundary
- WBID boundaries
- Priority Watershed System

Land Use Level 1

- Urban and Built Up
- Agriculture
- Rangeland
- Upland Forests
- Water
- Wetlands
- Barren Land
- Trans., Commun., & Utilities
- Special Classification

Hillsborough River

US 92

US 41

I - 4

US 92

I - 75

Brandon

US 41

Project Location

HILLSBOROUGH

US 41

US 301

Alafia River

Tampa Bay Basin - Group 1

Delaney Creek Priority Watershed

0 0.6 1.2 1.8 Miles

N

Map prepared June 26, 2003 by the Bureau of Watershed Management, Division of Water Resource Management. This map is a representation of ground conditions and is not intended for delineations or analysis of the features shown. For more information or copies, contact Holli Brandt at (850) 245-8539, or holli.brandt@dep.state.fl.us Location: bdpwk01 E:\atlas\group1\tampa_bay

Legend

- Cities
- Interstates
- FDOT US Routes
- Landfills
- State Funded hazardous waste sites
- Superfund hazardous waste sites
- Springs
- Wastewater Facilities
- Wastewater Facilities Greater than 0.1 MGD
- Outstanding Florida Waters
- Groundwater Contamination Areas
- Verified List of Impaired Waters
- Water Lines
- Water Bodies
- Tampa Bay Boundary
- County Boundary
- WBID boundaries
- Priority Watershed System

Land Use Level 1

- Urban and Built Up
- Agriculture
- Rangeland
- Upland Forests
- Water
- Wetlands
- Barren Land
- Trans., Commun., & Utilities
- Special Classification

APPENDIX C

Drainage Calculations

NOTE:
This information is preliminary and subject to change until the final design is approved.

US 301 SEIR
Pre-Development Calculations
Hillsborough County, Florida

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Entire Rd	Open space; grass cover > 75%	(good)	D	6.98	80
	Paved; open ditches (w/right-of-way)		D	7.14	93
	Woods - grass combination	(good)	D	1.6	79
	Total Area / Weighted Curve Number			15.72	86

US 301 SEIR
Post-Development Calculations
Hillsborough County, Florida

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Entire Rd	Open space; grass cover > 75%	(good)	D	6.35	80
	Paved parking lots, roofs, driveways		D	.5	98
	Paved; open ditches (w/right-of-way)		D	7.77	93
	Woods - grass combination	(good)	D	1.1	79
	Total Area / Weighted Curve Number			15.72	87

Runoff Volume Calculations

(Using SCS TR-55)

Pre-Development Condition

For CN calculation, please see attached print-out from *Win TR-55* program.

25-year / 24-hour rainfall depth >>> P_{25}=8.0 inches
(Figure B-5, "25-year, 24-hour rainfall", 210-VI-TR-55, Second Edition, June 1986)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{86} - 10 = 1.63$$

$$Q = \frac{(P_{25} - 0.2S)^2}{(P_{25} + 0.8S)} = \frac{(8.0 - 0.2 * 1.63)^2}{(8.0 + 0.8 * 1.63)} = 6.33 \text{ inches}$$

$$V_r = Q * A = 6.33 \text{ inches} * \frac{1 \text{ foot}}{12 \text{ inches}} * 15.72 \text{ acres} = 8.29 \text{ ac - ft}$$

Post-Development Condition

For CN calculation, please see attached print-out from *Win TR-55* program.

25-year / 24-hour rainfall depth >>> P_{25}=8.0 inches
(Figure B-5, "25-year, 24-hour rainfall", 210-VI-TR-55, Second Edition, June 1986)

$$S = \frac{1000}{CN} - 10 = \frac{1000}{87} - 10 = 1.49$$

$$Q = \frac{(P_{25} - 0.2S)^2}{(P_{25} + 0.8S)} = \frac{(8.0 - 0.2 * 1.49)^2}{(8.0 + 0.8 * 1.49)} = 6.45 \text{ inches}$$

$$V_r = Q * A = 6.45 \text{ inches} * \frac{1 \text{ foot}}{12 \text{ inches}} * 15.72 \text{ acres} = 8.45 \text{ac - ft}$$

Total Attenuation Volume

8.45 ac-ft – 8.29 ac-ft = **0.16 ac-ft**

Appendix D
Geotechnical Report

REPORT OF
GEOTECHNICAL EXPLORATION

CONDUCTED OF

U.S. Hwy 301 – FALKENBURG TO CAUSEWAY
Hillsborough County, Florida

PREPARED FOR:

CENTEX HOMES – West Florida
3020 South Falkenburg Road
Riverview, FL 33569

FES PROJECT NO. 06-624 (Rev. 1)

MARCH, 2007

PREPARED BY:

FAULKNER
ENGINEERING SERVICES, Inc.
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FAULKNER
ENGINEERING SERVICES, Inc.

GEOTECHNICAL ENGINEERING
& CONSTRUCTION
MATERIALS TESTING

March 9, 2007

Mr. Michael Piendel
Centex Homes – West Florida
3020 South Falkenburg Road
Riverview, FL 33569

RE: Report of Geotechnical Exploration
U.S. Hwy 301 – Falkenburg to Causeway
Hillsborough County, Florida
FES Project No.: 06-624 (Rev.1)

Dear Mr. Piendel:

Faulkner Engineering Service, Inc. (FES) has completed the geotechnical exploration for the referenced project. We provided our services in general accordance with our proposal No. P06-731, dated December 7, 2006 that was authorized by Centex Homes – West Florida. The purpose of our exploration was to explore the subsurface soil and groundwater conditions along the roadway improvement (widening) to provide information for flexible pavement design and infiltration rates in the proposed swales. In addition pavement cores to evaluate the existing pavement section were performed. This report summarizes our field exploration and presents our findings, conclusions and geotechnical engineering recommendations.

PROJECT INFORMATION

Existing Site

U.S. Hwy. 301 from Falkenburg Road and Causeway Blvd. is and existing 6 lane highway located in Hillsborough County, Florida. The highway is bordered by a mixture of residential, commercial and undeveloped property.

Proposed Construction

Based on our review of a concept plan provided by Kimley-Horn and Associates, Inc., we understand that the project will consist of the improvement (widening) of approximately 4300 +/- linear feet of U.S. Hwy. 301 from Station 1052+66.00 to Station 1095+51.

Soil Survey Review

According to the "Soil Survey of Hillsborough County, Florida", as prepared by the U.S. Department of Agriculture Natural Resource Conservation Service (formerly the Soil Conservation Service) the subject property is primarily underlain by:

- *Myakka fine sand* – The NRCS defines this unit as nearly level, somewhat poorly drained and located on broad plains on the flatwoods. The NRCS indicates this soil unit typically has a surface layer of very dark gray fine sand about 5 inches thick underlain by gray fine sand to about 20 inches. Below, is black, dark reddish brown, brownish yellow, very pale brown and dark grayish brown fine sand to a depth of 6½ feet or more. The NRCS indicates the seasonal high water level is at a depth of 10 inches for 1 to 4 months and recedes to a depth of 40 inches during prolonged dry periods.
- *Pomello fine sand, 0 to5 percent slopes*– The NRCS describes this soil as nearly level to gently sloping and moderately well drained. The NRCS indicates this unit typically has a surface layer of very dark gray fine sand about 3 inches thick underlain by light gray fine sand to about 4 feet. Below is dark brown and grayish brown to a depth about 6½ feet or more. The NRCS indicates that the seasonal high water table in most years is between 24 to 40 inches of ground surface for 1to 4 months.

- *Smyrna fine sand*– The NRCS defines this unit as nearly level and poorly drained located on the broad, low lying, convex swells on the flatwoods. The NRCS indicates this soil unit typically has a surface layer of very dark gray fine sand about 4 inches thick, underlain by gray fine sand to a depth of 12 inches. Below, is dark brown, very dark grayish brown, light brownish gray and brown fine sand to a depth of about 6½ feet. The NRCS indicates the seasonal high water level range from the surface to a depth of 10 inches for more than 2 months and recedes to a depth of 10 to 40 inches for 6 months or more.

- *Ona fine sand* – The NRCS defines this unit as nearly level and somewhat poorly drained. The NRCS indicates this soil unit typically has a surface layer of very dark gray fine sand about 4 inches thick underlain by black fine sand to about 8 inches. Below is very dark brown fine sand to about 22 inches, that transition to light gray fine sand to 7½. The NRCS indicates that seasonal high water level is at a depth of 10 inches for more than 2 and recedes to a depth of 10 to 40 inches for 6 months or more.

SUBSURFACE EXPLORATION

Field Exploration

During our field exploration a total of eighty-one (81) auger borings were drilled to a depth of 5 feet below ground surface (bgs) spaced at approximately 100 foot intervals along both sides of U.S. Hwy 301. In addition, four (4) pavement cores to identify existing asphalt and base thickness were performed at approximately 1000 foot intervals, four (4) DRI's were performed in the swales on both sides of U.S. Hwy 301 and a total of six (6) limerock bearing ratio (LBR) samples were collected (3 samples per mile of improvement on both sides of U.S. Hwy 301). The procedures used by FES for field sampling and testing were in general accordance with ASTM procedures, industry standards of care and established geotechnical engineering practice.

The auger borings were advanced by mechanically rotating an approximate 4-inch diameter continuous flight auger into the subsurface soils. The cuttings brought to the surface were logged in the field and representative samples were obtained at each change in the soil stratum. The borings were performed within 20 feet of the edge of the existing pavement on both sides of the road. A few borings were drilled within the existing swale and as a result the boring elevations may vary significantly.

The samples recovered from our roadway auger borings were placed in sealed containers and transported to the FES laboratory for further evaluation. Detailed descriptions of the soils encountered during the field exploration are presented on the boring records included in Appendix A and Report of Core Borings (Plan 2).

Our staff was onsite during the fieldwork to supervise and monitor the drilling and also perform a site reconnaissance, noting pertinent site and topographic features as well as surface indicators of soil conditions. FES located the borings based on a concept plan provided by Kimley-Horn. Because of the methods used, the boring locations shown on the attached Boring Location Plan (Plan 1) should be considered approximate.

Soil Sample Handling and Classification

The soil samples obtained during our drilling operations were placed in sealed containers to retain moisture and returned to our laboratory. The samples were visually classified by a staff geotechnical engineer according to the "Unified Soil Classification System" (ASTM D2487) and reviewed by a Professional Engineer. Two (2) limerock bearing ratio (LBR) samples were tested in accordance with FDOT Method FM5-515 (LBR Test).

Double Ring Infiltration Test (DRI)

Four (4) double ring infiltration tests (DRI) were performed within the swales. The approximate locations are shown on the attached Boring Location Plan (Plan 1) and Report of Core Borings (Plan 2).

The infiltration testing was performed in accordance with procedures outlined in ASTM Test Method D-3385. This test method generally consists of driving two concentric rings, 12 and 24 inches in diameter, into the ground. The smaller ring is placed within the larger and both partially filled with water. The water is maintained at a constant level during the test and the volume of water infiltrated during timed intervals is converted to an incremental infiltration velocity. The result of our DRI testing is as follows:

TEST No	Depth of Test Below Ground Surface (Feet)	Stabilized Infiltration Rate (In/hr.)
DRI-1	2	3
DRI-2	2	0.5
DRI-3	2	4
DRI-4	2	0.5

FINDINGS

Subsurface Conditions

General Soil Profile

The conditions presented below highlight the major subsurface stratifications encountered during our field exploration of the site. More detailed descriptions of the materials encountered are provided on the attached soil profile. It should be understood that subsurface conditions will vary across this site and between boring locations. Changes in subsurface strata may be more gradual than indicated.

Our roadway auger borings generally encountered varying colored fine sand (SP) and fine sands with trace of silt and clay fines (SP-SM/SP-SC) from the ground surface to the termination of the borings at 5 feet (bgs).

Groundwater

Groundwater was encountered in our auger borings at depths ranging from 3.3 feet to not encountered with the depths explored at the time of drilling. Groundwater levels will fluctuate with time due to seasonal rainfall and locally heavy precipitation events; therefore, future groundwater levels may be encountered at depths different from those indicated by our borings. Please refer to the attached Table 1 for groundwater data at the time of drilling and estimated seasonal high groundwater level.

The seasonal high water table is typically encountered during late summer following the rainy season. Several factors can affect the seasonal high groundwater level such as drainage characteristics of the soils; land surface elevation; and relief points such as lakes, rivers and swamps. A majority of the borings did not expose soil indicators which aid in determining the seasonal high groundwater. In addition the areas explored have been reworked and swales added. Without the aid of soils indicators and existing ground elevations we were not able to in a majority of the borings estimate the seasonal high groundwater. In the borings that soil indicators were present the seasonal high groundwater is estimated at depths ranging from 0.5 feet to 4.5 feet below current ground surface at the areas explored. It is our opinion that US Hwy. 301 was constructed to an elevation based on seasonal high indicators at the time and that the groundwater table should not have an adverse effect on the improvements (widening) constructed to match the existing highway.

Limerock Bearing Ratio (LBR) Test

The results of the LBR testing are presented in the following table. A more detailed description of the LBR results is presented in the attached Moisture-Density Relationship & Limerock Bearing Ratio reports.

STATION/LBR Sample	LBR Value (%)
STA-1	20
STA-2	20
STA-3	30
STA-4	28
STA-5	30
STA-6	20

Pavement Cores

Four (4) pavement cores were performed along existing U.S. Hwy 301 at approximately 1000 foot intervals to identity pavement section composition and thickness. The pavement section appeared in good condition. The pavement core results are presented in the attached Report of Thickness Checks. The approximate locations of the cores are shown on the attached Boring Location Plan (Plan 1) and Report of Core Borings (Plan 2).

CONCLUSIONS

Our geotechnical engineering evaluation of this site with respect to the proposed construction and our recommendations are based entirely on our site observations and the field exploratory data obtained from our borings.

The roadway auger borings generally encountered fine sands (SP) and fine sand with silt and clay fines (SP-SM/SP-SC) from the ground surface to the termination of the borings at 5 feet (bgs). It appears that the shallow subsurface soil will provide a suitable subgrade for roadway construction after proper site preparation and in-place densification.

It should be noted that subsurface conditions can vary across this site and between boring locations. Conditions can also vary in areas not explored by our borings. Contractors bidding earthwork requirements are urged to conduct their own borings, test pits or other investigations to determine those conditions that may affect their specific work requirements. Faulkner Engineering Services, Inc. can not be responsible for interpretations made by others based on the information contained in this report and the attachments.

RECOMMENDATIONS

Site Preparation

Site Stripping

Before earthwork and construction activities begin all existing topsoil, muck, debris, vegetation, and large roots down to finger-size should be removed within the construction limits. Site stripping should extend at least ten feet beyond the construction area. All pockets of organics, organic laden soils and/or deleterious material should be undercut to competent soil. The resulting excavations should be backfilled with structural fill placed in maximum one-foot thick lifts. Backfill soils should be of the same composition and be compacted to the same criteria as structural fill soils. This process should be observed by a representative of FES to ensure that all organics, organic laden soils and/or deleterious material has been removed.

Proof-Rolling / In-Place Densification

Following site stripping and prior to any fill placement or beginning construction, proof-rolling / in-place densification of the ground surface with a heavy vibratory roller should be performed within the construction area. A vibratory roller having a rated centrifugal force of at least 50,000 pounds is recommended. Compaction within the construction area should continue until the soils appear relatively firm and unyielding and the soils have achieved a relative compaction of at least 98 percent of modified proctor maximum dry density (ASTM D-1557) to a depth of at least 1-foot below new pavement.

Proof-rolling and densification efforts should be closely monitored by a FES engineering technician to observe any unusual or excessive deflection of the soils beneath the compacting equipment used. If unusual or excessive deflection is observed, then the areas should be undercut to firm soil and backfilled with compacted structural fill placed in maximum one-foot thick lifts.

Flexible Pavement Considerations

Roadway traffic distribution or frequency for the planned roadway widening has not been provided at this time. The LBR test results and existing pavement sections revealed in the cores should be utilized for designing the pavement section. Based on the LBR test results a Resilient Modulus estimated at 7500 psi should be used in the design.

The pavement section should be designed in accordance with the latest edition of the FDOT Flexible Pavement Design Manual. Methods and materials used for pavement construction should also conform to applicable sections of the most recent edition of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

TESTING AND MONITORING

Construction testing and monitoring are essential to proper site construction and performance. Observation and testing of site preparation and earthwork activities is an integral part of the engineering recommendations contained in this report. Having FES provide the construction materials testing and inspection services provides continuity and increases the potential that our recommendations will be properly implemented.

LIMITATIONS

This report has been prepared for the exclusive use of **Centex Homes – West Florida** and their designers for the specific application to the project previously discussed. Our conclusions and recommendations have been rendered using generally accepted standards of geotechnical engineering geology practice in the state of Florida. No other warranty is expressed or implied.

Our conclusions and recommendations are based on the design information furnished to us, the data obtained from the previously described subsurface exploration, and our experience. They do not reflect variations in the subsurface conditions that are likely to exist in the region of our borings and in unexplored areas of the site. These variations are due to the inherent variability of the subsurface conditions in this geologic region. Should variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon our on-site observations of the conditions.

This area of Florida is underlain by limestone bedrock that is susceptible to dissolution and the subsequent development of karst features such as voids and sinkholes in the natural soil overburden. Construction in a sinkhole prone area is therefore accompanied by some risk that internal soil erosion and ground subsidence could affect new structures in the future. It is not possible to investigate or design to completely eliminate the possibility of future sinkhole related problems. In any event, the Owner must understand and accept this risk.

The scope of our services does not include any environmental assessments or investigations for the possible presence of hazardous or toxic materials in the soil, groundwater or surface water within or in the general vicinity of the site studied.

If changes are made in the overall design or the location of the proposed roadway, the recommendations presented in this report must not be considered valid unless the changes are reviewed by our firm and recommendations modified or verified in writing. We should be given the opportunity to review the grading plan and the applicable portions of the project specifications when the design is finalized. This review will allow us to check whether these documents are consistent with the intent of our recommendations.

CLOSING

Faulkner Engineering Services Inc. appreciates the opportunity to be of service to **Centex Homes – West Florida** by providing these geotechnical consulting services and we look forward to assisting you through project completion. If you have any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Faulkner Engineering Services, Inc.

Joser E. Barcelo R.
Staff Geotechnical Engineer

3/12/07

David W. Faulkner, P.E.
President
Fla. Registration No. 50740

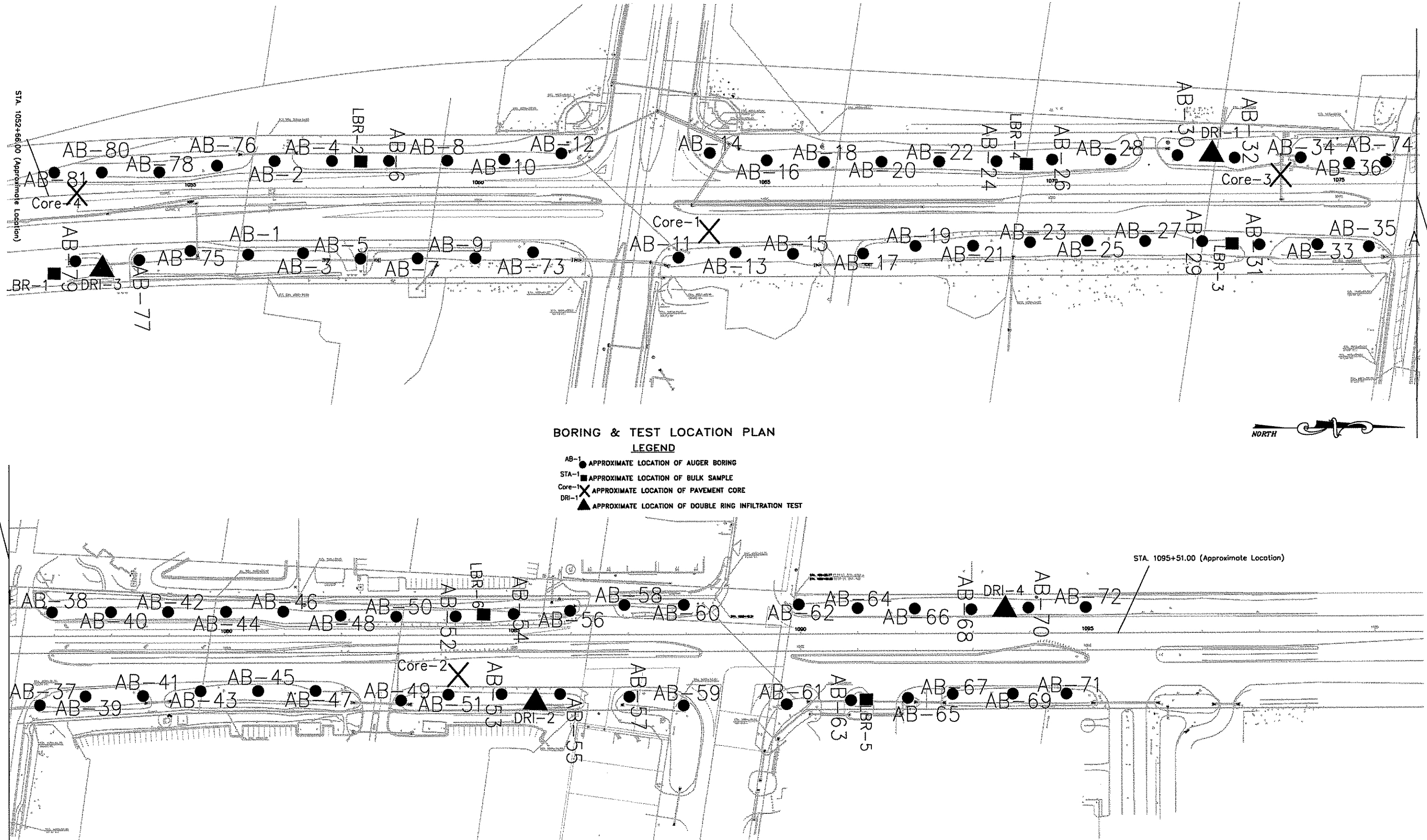
cc: Richard Claybrooke (Kimley-Horn Tampa)

Attachments:
- Boring & Test Location Plan (Plan 1)
- Report of Core Borings (Plan 2)
- Groundwater Data (Table 1)
- Report of Thickness Checks
- Moisture-Density Relationship & Limerock Bearing Ratio Test Results
- ASFE Information

Appendix A: Logs of Soil Borings

Appendix B: Key to Soil Classification

BORING & TEST LOCATION PLAN



LEGEND

- AB-1 ● APPROXIMATE LOCATION OF AUGER BORING
- STA-1 ■ APPROXIMATE LOCATION OF BULK SAMPLE
- Core-1 X APPROXIMATE LOCATION OF PAVEMENT CORE
- DRI-1 ▲ APPROXIMATE LOCATION OF DOUBLE RING INFILTRATION TEST

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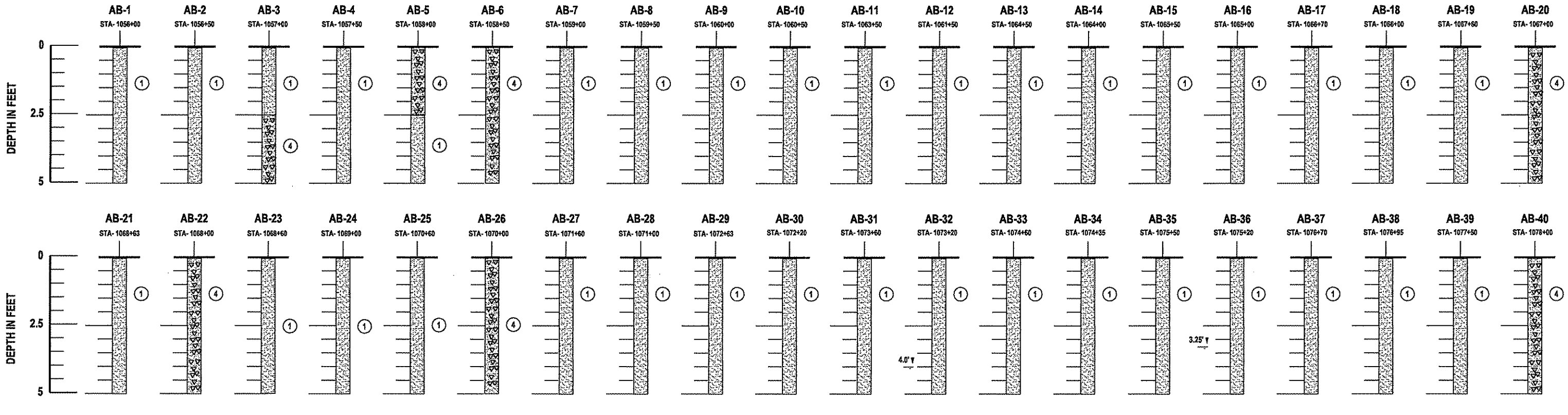
U.S. Hwy 301
(Falkenburg/Causeway Blvd)

SCALE	DATE	JOB NO.
1"= 160'	03.06.07	06-624
DRAWN: JBR	PLAN 1	
CHKD: DF		

U.S. HWY 301 (FALKENBURG/CAUSEWAY) REPORT OF CORE BORINGS



LEGEND

STRATUM		AASHTO GROUP
1	Dark brown to light Brown, Light gray, Orangish brown, Fine Sand	A-3
2	Light brown to brown, Gray fine Sand with trace clay	A-3
3	Brown or Grayish Brown Clayey Sand	A-2-6
4	Dark Brown, Light Brown to Brown Fine Sand with rock fragments	A-3

STRATUM	DESCRIPTION	AASHTO GROUP
5	Dark Brown, Brown Fine Sand with trace silt	A-3

1.0' Approximate Groundwater Level at time of drilling

Date of Borings: 12.20.06 – 12.22.06

Drilling Made by: U.S. Precision Drilling, inc.

Borings begin STA: 1052 + 66.00 Borings End STA: 1095 + 51.00

County: Hillsborough County, Florida

GENERAL NOTES

- All Depths given in Distance below existing ground at boring locations.
- Borings were done per A.S.T.M. test procedures.
- The soil stratification is representative of the conditions at the location where the boring was made but conditions may vary at adjacent locations.
- Borings terminated at 5 feet below existing ground surface.
- Borings were not survey and locations are approximate.

Borings on North Bound Line: AB–1, AB–3, AB–5, AB–7, AB–9, AB–11, AB–13, AB–15, AB–17, AB–19, AB–21, AB–23, AB–25, AB–27, AB–29, AB–31, AB–33, AB, 35, AB–37, AB–39, AB–41, AB–43, AB–45, AB–47, AB–49

Borings on South Bound Line: AB–2, AB–4, AB–6, AB–8, AB–10, AB–12, AB–14, AB–16, AB–18, AB–20, AB–22, AB–24, AB–26, AB–28, AB–30, AB–32, AB–34, AB–36, AB, 38, AB–40, AB–42, AB–44, AB–46, AB–48, AB–50

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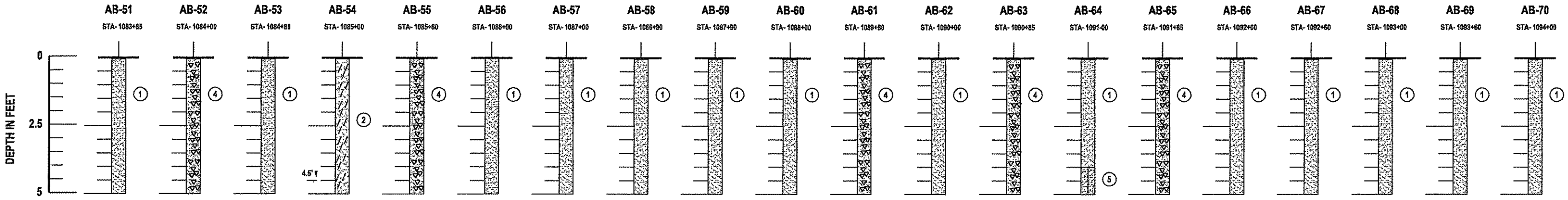
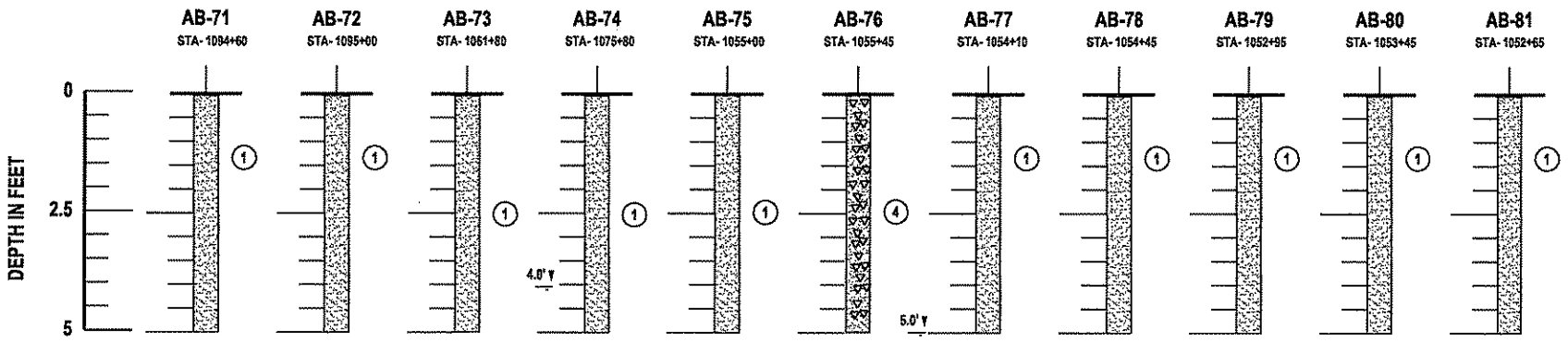
U.S. Hwy 301
Falkenburg/Causeway
REPORT OF CORE BORINGS

SCALE	DATE	JOB NO.
N.T.S.	02.22.07	06-624
DRAWN: JBR	PLAN 2	
CHKD: DF		

U.S. HWY 301 (FALKENBURG/CAUSEWAY) REPORT OF CORE BORINGS





LEGEND

STRATUM	DESCRIPTION	AASHTO GROUP
1	Dark brown to light Brown, Light gray/brown, Orangish brown, Fine Sand	A-3
2	Light brown to brown, Gray fine Sand with trace clay	A-3
3	Brown or Grayish Brown Clayey Sand	A-2-6
4	Light Brown to Brown Fine Sand with rock fragments	A-3
5	Dark Brown, Brown Fine Sand with trace silt	A-3

1.0' ▼ Approximate Groundwater Level at time of drilling

DRI/LBR/Core Locations

	STA	Offset
DRI-1	1072+80	--
DRI-2	1085+40	--
DRI-3	1053+45	--
DRI-4	1093+50	--
LBR-1	1052+60	--
LBR-2	1057+90	--
LBR-3	1073+15	--
LBR-4	1069+55	--
LBR-5	1091+10	--
LBR-6	1084+50	--
Core-1	1064+00	24" from edge of roadway
Core-2	1084+00	24" from edge of roadway
Core-3	1074+00	90" from edge of roadway
Core-4	1053+00	60" from edge of roadway

Date of Borings: 12.20.06 – 12.22.06

Drilling Mode by: U.S. Precision Drilling, inc.

Borings begin STA: 1052 + 66.00 Borings End STA: 1095 + 51.00

County: Hillsborough County, Florida

GENERAL NOTES

- All Depths given in Distance below existing ground at boring locations.
- Borings were done per A.S.T.M. test procedures.
- The soil stratification is representative of the conditions at the location where the boring was made but conditions may vary at adjacent locations.
- Borings terminated at 5 feet below existing ground surface.
- Borings were not survey and locations are approximate.

Borings on North Bound Line: AB-79, AB-77, AB-75, AB-73, AB-56, AB-58, AB-60, AB-62, AB-64, AB-66, AB-68, AB-70, AB-72, AB-51, AB-53, AB-55
Borings on South Bound Line: AB-81, AB-80, AB-78, AB-76, AB-50, AB-52, AB-54, AB-57, AB-59, AB-61, AB-63, AB-65, AB-67, AB-69, AB-71, AB-74

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U.S. HWY 301
Falkenburg/Causeway
REPORT OF CORE BORINGS

SCALE	DATE	JOB NO.
N.T.S.	02.22.07	06-624
DRAWN: JBR	PLAN 2	
CHKD: DF		

Table 1 Groundwater Data

Project Name: U.S. Hwy 301 (Falkenburg to Causeway) **FES Project No.: 06-624**

Boring No.	Ground Elevation[1] (ft)	Groundwater Data at Time of Drilling		Estimated Seasonal High Watertable	
		Elevation (ft)	Depth (ft)	Elevation (ft)	Depth (ft)
Auger Borings					
AB-1	Unknown	Unknown	N.E.	Unknown	3.5
AB-2	Unknown	Unknown	N.E.	Unknown	3.5
AB-3	Unknown	Unknown	N.E.	Unknown	N.D.
AB-4	Unknown	Unknown	N.E.	Unknown	4.0
AB-5	Unknown	Unknown	N.E.	Unknown	N.D.
AB-6	Unknown	Unknown	N.E.	Unknown	N.D.
AB-7	Unknown	Unknown	N.E.	Unknown	N.D.
AB-8	Unknown	Unknown	N.E.	Unknown	3.0
AB-9	Unknown	Unknown	N.E.	Unknown	N.D.
AB-10	Unknown	Unknown	N.E.	Unknown	N.D.
AB-11	Unknown	Unknown	N.E.	Unknown	N.D.
AB-12	Unknown	Unknown	N.E.	Unknown	3.0
AB-13	Unknown	Unknown	N.E.	Unknown	4.5
AB-14	Unknown	Unknown	N.E.	Unknown	4.0
AB-15	Unknown	Unknown	N.E.	Unknown	N.D.
AB-16	Unknown	Unknown	N.E.	Unknown	N.D.
AB-17	Unknown	Unknown	N.E.	Unknown	N.D.
AB-18	Unknown	Unknown	N.E.	Unknown	N.D.
AB-19	Unknown	Unknown	N.E.	Unknown	N.D.
AB-20	Unknown	Unknown	N.E.	Unknown	N.D.
AB-21	Unknown	Unknown	N.E.	Unknown	N.D.
AB-22	Unknown	Unknown	N.E.	Unknown	N.D.
AB-23	Unknown	Unknown	N.E.	Unknown	N.D.
AB-24	Unknown	Unknown	N.E.	Unknown	N.D.
AB-25	Unknown	Unknown	N.E.	Unknown	N.D.
AB-26	Unknown	Unknown	N.E.	Unknown	N.D.

Note: 1. Boring Elevations were not provided at the time of drilling.
N.D. = Not Determined

Table 1 Groundwater Data

Project Name: U.S. Hwy 301 (Falkenburg to Causeway) **FES Project No.: 06-624**

Boring No.	Ground Elevation[1] (ft)	Groundwater Data at Time of Drilling		Estimated Seasonal High Watertable	
		Elevation (ft)	Depth (ft)	Elevation (ft)	Depth (ft)
Auger Borings					
AB-27	Unknown	Unknown	N.E.	Unknown	N.D.
AB-28	Unknown	Unknown	N.E.	Unknown	N.D.
AB-29	Unknown	Unknown	N.E.	Unknown	N.D.
AB-30	Unknown	Unknown	N.E.	Unknown	4.5
AB-31	Unknown	Unknown	N.E.	Unknown	N.D.
AB-32	Unknown	Unknown	4.0	Unknown	1.5
AB-33	Unknown	Unknown	N.E.	Unknown	N.D.
AB-34	Unknown	Unknown	4.0	Unknown	1.5
AB-35	Unknown	Unknown	N.E.	Unknown	4.0
AB-36	Unknown	Unknown	3.3	Unknown	0.5
AB-37	Unknown	Unknown	N.E.	Unknown	4.0
AB-38	Unknown	Unknown	N.E.	Unknown	N.D.
AB-39	Unknown	Unknown	N.E.	Unknown	N.D.
AB-40	Unknown	Unknown	N.E.	Unknown	N.D.
AB-41	Unknown	Unknown	N.E.	Unknown	N.D.
AB-42	Unknown	Unknown	4.0	Unknown	1.5
AB-43	Unknown	Unknown	N.E.	Unknown	N.D.
AB-44	Unknown	Unknown	N.E.	Unknown	N.D.
AB-45	Unknown	Unknown	N.E.	Unknown	N.D.
AB-46	Unknown	Unknown	N.E.	Unknown	N.D.
AB-47	Unknown	Unknown	N.E.	Unknown	4.0
AB-48	Unknown	Unknown	N.E.	Unknown	N.D.
AB-49	Unknown	Unknown	N.E.	Unknown	N.D.
AB-50	Unknown	Unknown	N.E.	Unknown	N.D.
AB-51	Unknown	Unknown	N.E.	Unknown	N.D.
AB-52	Unknown	Unknown	N.E.	Unknown	N.D.
AB-53	Unknown	Unknown	N.E.	Unknown	N.D.
AB-54	Unknown	Unknown	4.5	Unknown	1.5
AB-55	Unknown	Unknown	N.E.	Unknown	N.D.
AB-56	Unknown	Unknown	N.E.	Unknown	N.D.

Note: 1. Boring Elevations were not provided at the time of drilling.
N.D. = Not Determined

Table 1 Groundwater Data

Project Name: U.S. Hwy 301 (Falkenburg to Causeway) **FES Project No.: 06-624**

Boring No.	Ground Elevation[1] (ft)	Groundwater Data at Time of Drilling		Estimated Seasonal High Watertable	
		Elevation (ft)	Depth (ft)	Elevation (ft)	Depth (ft)
Auger Borings					
AB-57	Unknown	Unknown	N.E.	Unknown	N.D.
AB-58	Unknown	Unknown	N.E.	Unknown	N.D.
AB-59	Unknown	Unknown	N.E.	Unknown	4.5
AB-60	Unknown	Unknown	N.E.	Unknown	N.D.
AB-61	Unknown	Unknown	N.E.	Unknown	N.D.
AB-62	Unknown	Unknown	N.E.	Unknown	N.D.
AB-63	Unknown	Unknown	N.E.	Unknown	N.D.
AB-64	Unknown	Unknown	N.E.	Unknown	4.5
AB-65	Unknown	Unknown	N.E.	Unknown	N.D.
AB-66	Unknown	Unknown	N.E.	Unknown	N.D.
AB-67	Unknown	Unknown	N.E.	Unknown	N.D.
AB-68	Unknown	Unknown	N.E.	Unknown	N.D.
AB-69	Unknown	Unknown	N.E.	Unknown	4.5
AB-70	Unknown	Unknown	N.E.	Unknown	N.D.
AB-71	Unknown	Unknown	N.E.	Unknown	4.0
AB-72	Unknown	Unknown	N.E.	Unknown	N.D.
AB-73	Unknown	Unknown	N.E.	Unknown	N.D.
AB-74	Unknown	Unknown	4.0	Unknown	2.0
AB-75	Unknown	Unknown	N.E.	Unknown	3.0
AB-76	Unknown	Unknown	N.E.	Unknown	N.D.
AB-77	Unknown	Unknown	5.0	Unknown	3.0
AB-78	Unknown	Unknown	N.E.	Unknown	N.D.
AB-79	Unknown	Unknown	N.E.	Unknown	N.D.
AB-80	Unknown	Unknown	N.E.	Unknown	N.D.
AB-81	Unknown	Unknown	N.E.	Unknown	3.0

Note: 1. Boring Elevations were not provided at the time of drilling.
N.D. = Not Determined

Faulkner Engineering Services, Inc.

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U.S. Hwy 301 - Falkenburg to Causeway

Hillsborough County, Florida

Client: Mr. Michael Piendel
Centex Homes - West Florida Division
3020 S. Falkenburg Road
Riverview, Florida 33569

Report Date: Decmeber 29, 2006

Project Number: 06-624

REPORT OF THICKNESS CHECKS - U.S. Hwy 301 - Falkenburg to Causeway

Thickness Check Number	Thickness Check Location	Existing Asphalt		Existing Base	
		Composition	Measured Average Thickness (in)	Composition	Measured Average Thickness (in)
1	**North Bound East Lane / U.S. Hwy 301** Approx. Cor-1 (Sta 1064+00) (24" from Edge of Roadway)	Total Aspahlt	3 3/4	Limerock	13 1/4
2	**North Bound East Lane / U.S. Hwy 301** Approx. Cor-2 (Sta 1084+00) (24" from Edge of Roadway)	Total Aspahlt	3 3/4	Shell intermixed with light brown, fine SAND (SP)	14 1/2
3	**South Bound West Lane / U.S. Hwy 301** Approx. Cor-3 (Sta 1074) (90" from Edge of Roadway)	Total Aspahlt	5 3/4	Shell intermixed with light brown, fine SAND (SP)	16 1/4
4	**South Bound West Lane / U.S. Hwy 301** Approx. Cor-4 (Sta 1053) (60" from Edge of Roadway)	Total Aspahlt	4 1/4	Shell intermixed with light brown, fine SAND (SP)	13 1/4

Respectfully Submitted,
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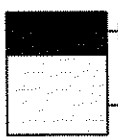

Asphalt Layer

Base Layer (Limerock and/or Shell intermixed with (SP)

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US Highway 301 (Falkenburg to Causeway)

Hillsborough County, Florida

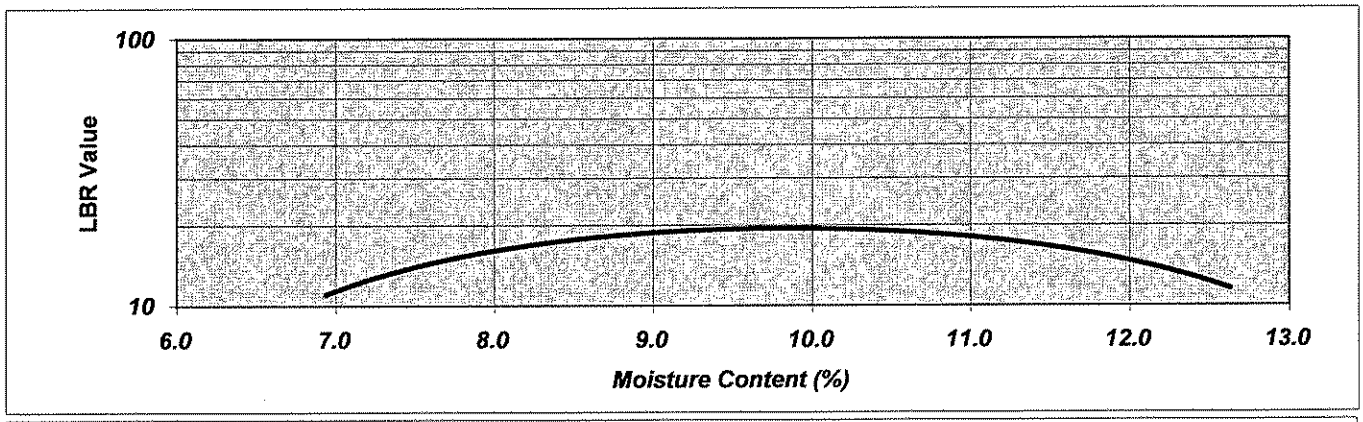
Client: Mr. Michael Piendel
Centex Homes - West Florida
3020 South Falkenburg Road
Riverview, FL 33569

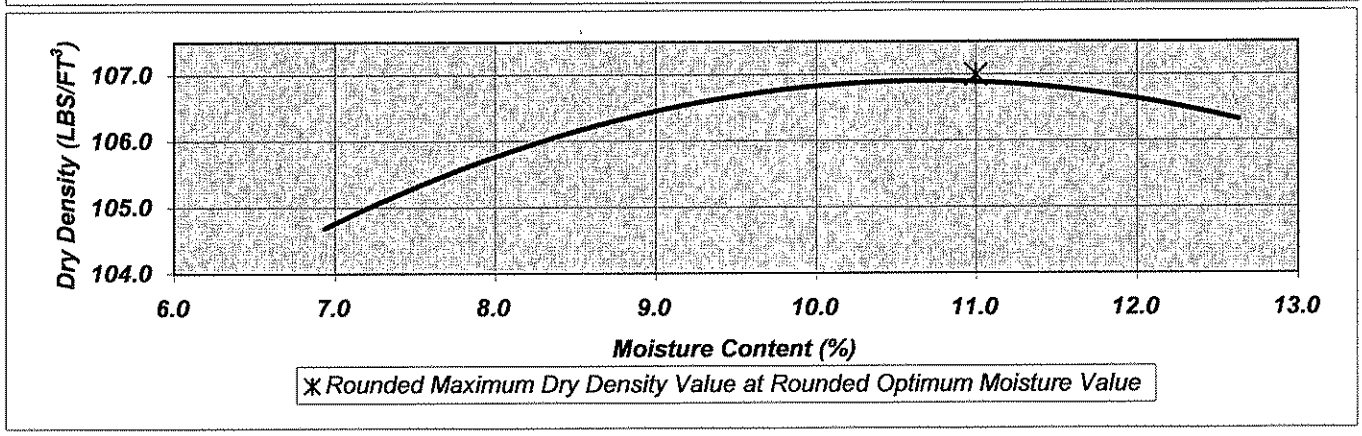
Report Date: January 2, 2007

Project Number: 06-624

MOISTURE-DENSITY RELATIONSHIP & LIMEROCK BEARING RATIO

Report Number: LBR1 (Preliminary)





Maximum Dry Density:	**107.0**	LBS/FT^3	per Method:	FSTM 5-515
Optimum Moisture Content:	**11.0**	%		[LBR - Soaked 48 +/- 4 Hours]
LBR Value:	**20**	%		Surcharge Weight: 15 lbs

Sample Description: Brown Fine Sand

Sample Location: LBR 1

Sampled By: Miguel Marceles

Sample Date: December 23, 2006

Respectfully Submitted,
Faulkner Engineering Services

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US Highway 301 (Falkenburg to Causeway)

Hillsborough County, Florida

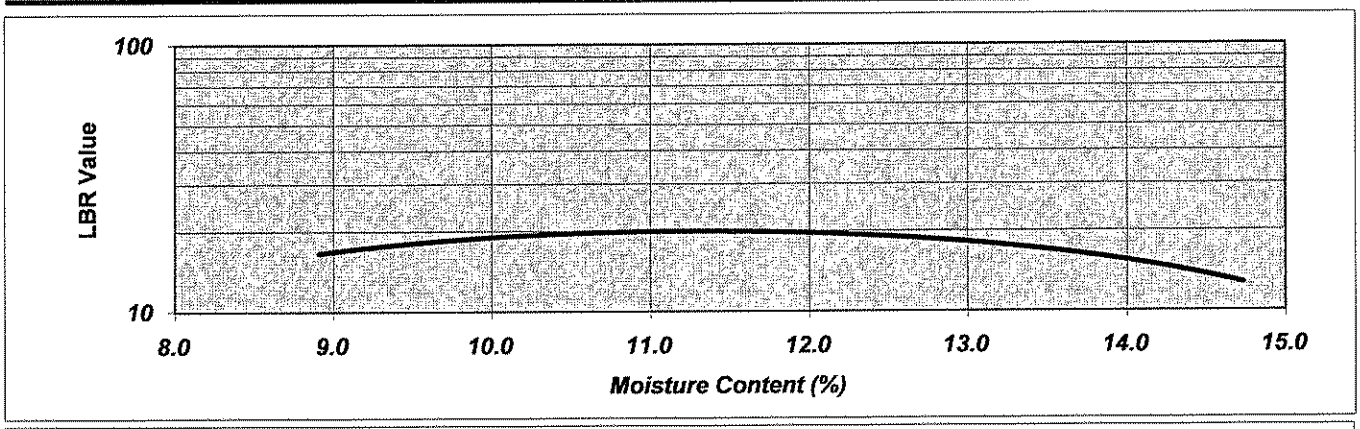
Client: Mr. Michael Piendel
Centex Homes - West Florida
3020 South Falkenburg Road
Riverview, FL 33569

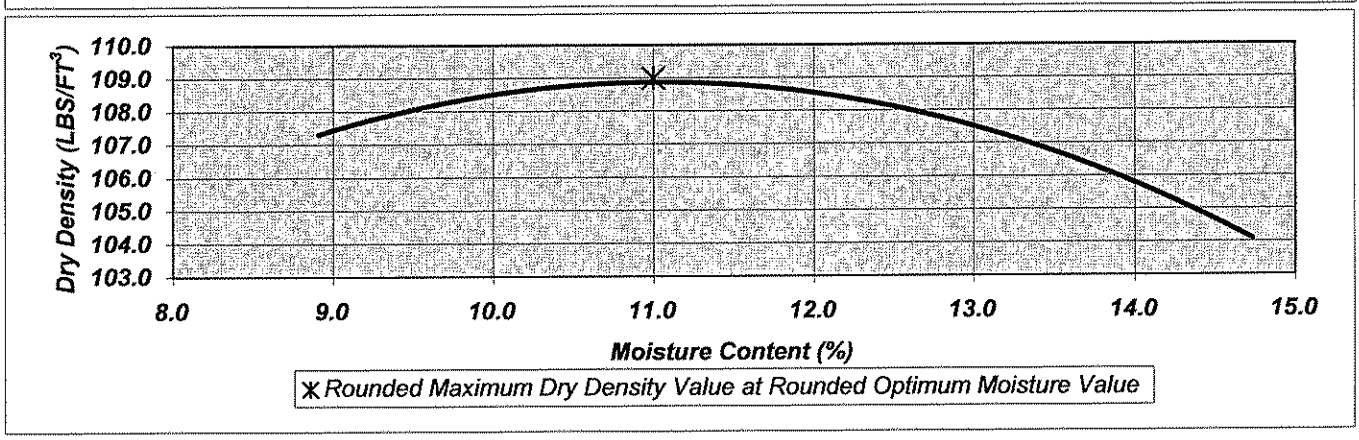
Report Date: January 3, 2007

Project Number: 06-624

MOISTURE-DENSITY RELATIONSHIP & LIMEROCK BEARING RATIO

Report Number: LBR2 (Preliminary)





Maximum Dry Density:	**109.0**	LBS/FT^3	per Method:	FSTM 5-515
Optimum Moisture Content:	**11.0**	%		[LBR - Soaked 48 +/- 4 Hours]
LBR Value:	**20**	%		Surcharge Weight: 15 lbs

Sample Description: Brown Silty Sand

Sample Location: LBR 2

Sampled By: Miguel Marceles

Sample Date: December 23, 2006

Respectfully Submitted,
Faulkner Engineering Services

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US Highway 301 (Falkenburg to Causeway)

Hillsborough County, Florida

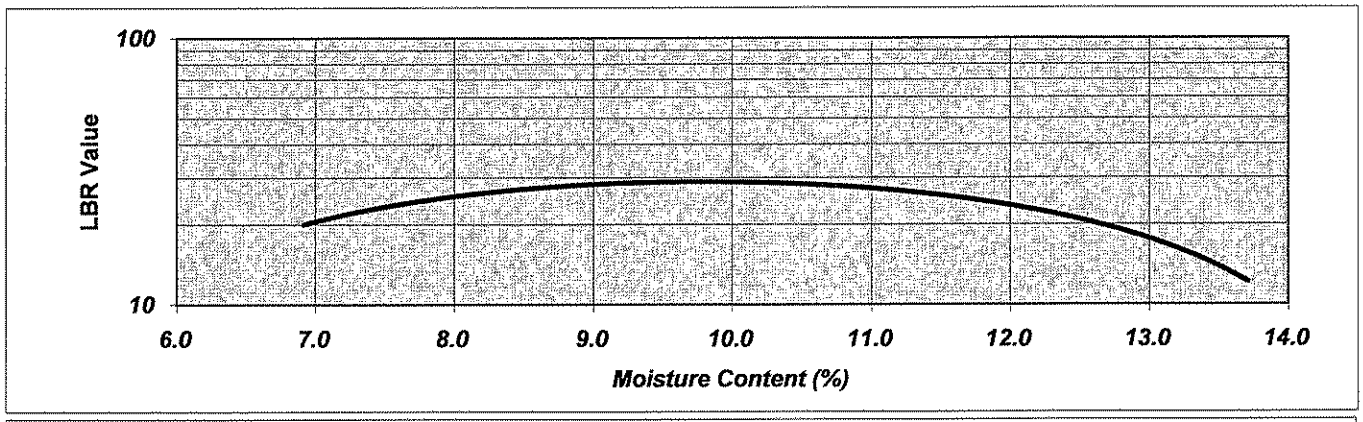
Client: Mr. Michael Piendel
Centex Homes - West Florida
3020 South Falkenburg Road
Riverview, FL 33569

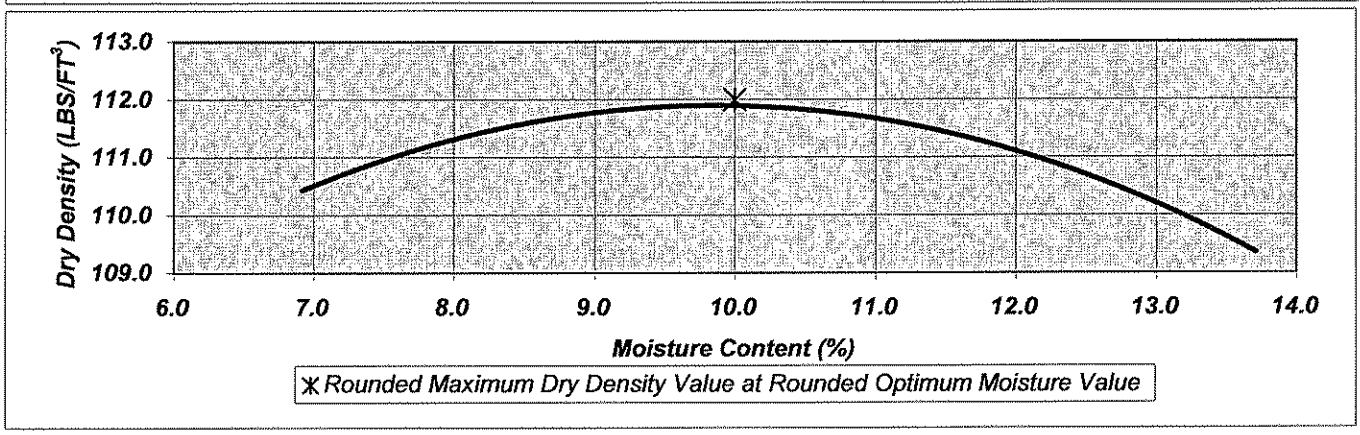
Report Date: December 28, 2006

Project Number: 06-624

MOISTURE-DENSITY RELATIONSHIP & LIMEROCK BEARING RATIO

Report Number: LBR3 (Preliminary)





Maximum Dry Density:	**112.0**	LBS/FT^3	per Method:	FSTM 5-515
Optimum Moisture Content:	**10.0**	%		[LBR - Soaked 48 +/- 4 Hours]
LBR Value:	**30**	%		Surcharge Weight: 15 lbs

Sample Description: Brown Silty Sand

Sample Location: LBR 3

Sampled By: Miguel Marceles

Sample Date: December 23, 2006

Respectfully Submitted,
Faulkner Engineering Services

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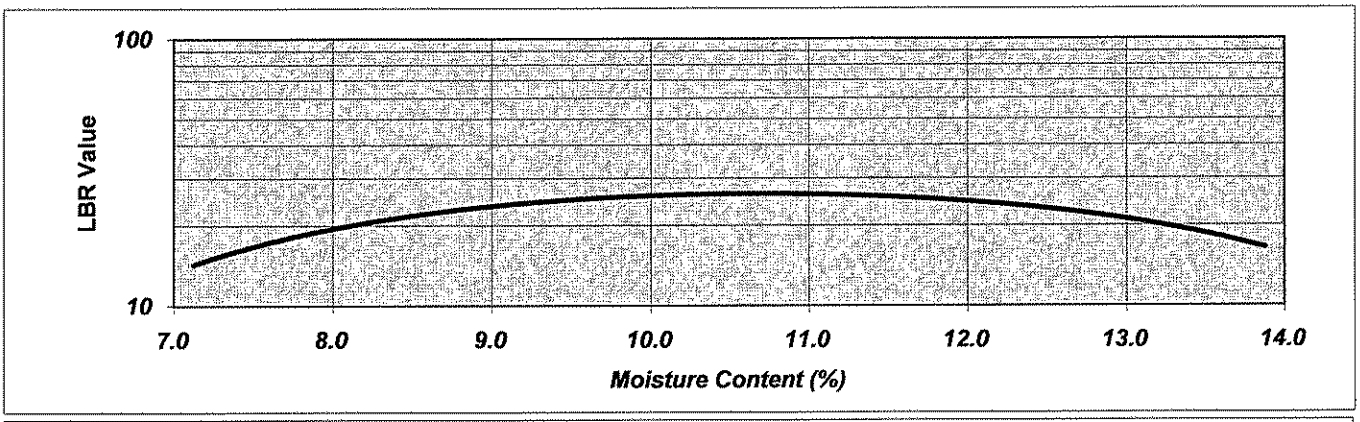
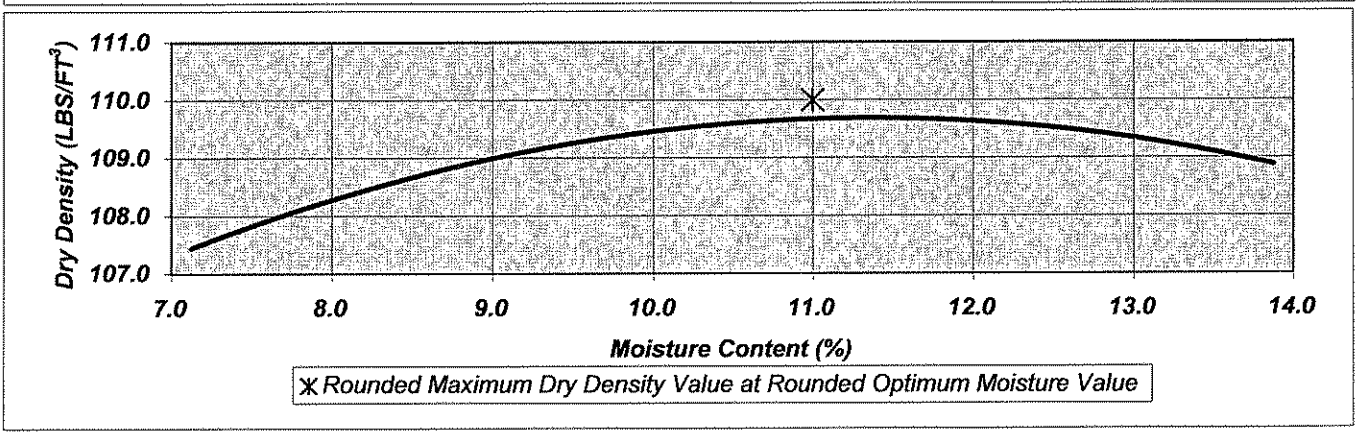
Report Date: January 2, 2007

Project Number: 06-624

MOISTURE-DENSITY RELATIONSHIP & LIMEROCK BEARING RATIO

Report Number: LBR4 (Preliminary)





Maximum Dry Density:	**110.0**	LBS/FT^3	per Method:	FSTM 5-515
Optimum Moisture Content:	**11.0**	%		[LBR - Soaked 48 +/- 4 Hours]
LBR Value:	**28**	%		Surcharge Weight: 15 lbs

Sample Description: Brown Silty Sand

Sample Location: LBR 4

Sampled By: Miguel Marceles

Sample Date: December 23, 2006

Respectfully Submitted,
Faulkner Engineering Services

1/19/07

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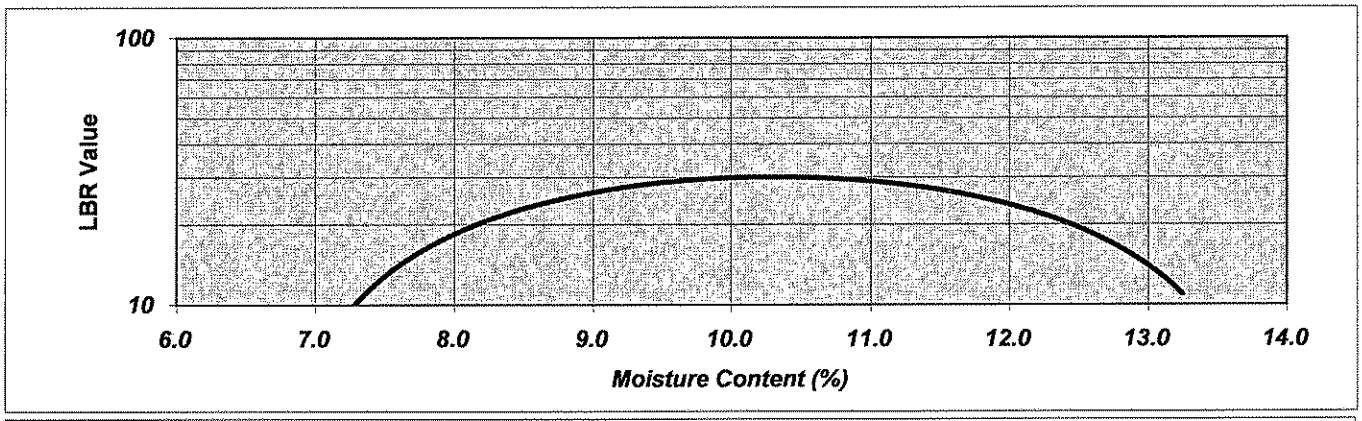
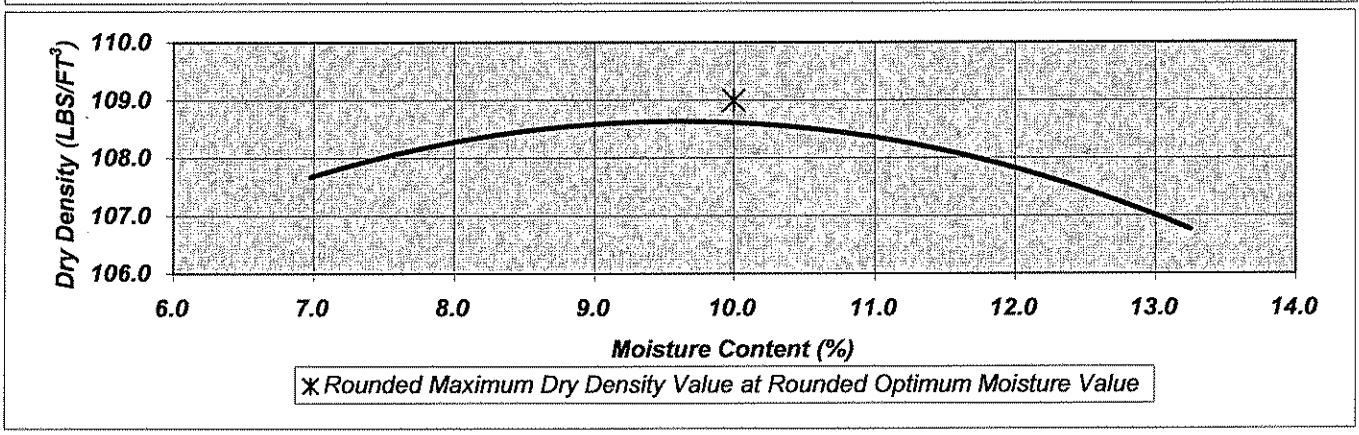
Report Date: January 2, 2007

Project Number: 06-624

MOISTURE-DENSITY RELATIONSHIP & LIMEROCK BEARING RATIO

Report Number: LBR5 (Preliminary)





Maximum Dry Density:	**109.0**	LBS/FT^3	per Method:	FSTM 5-515
Optimum Moisture Content:	**10.0**	%		[LBR - Soaked 48 +/- 4 Hours]
LBR Value:	**30**	%		Surcharge Weight: 15 lbs

Sample Description: Brown Silty Sand

Sample Location: LBR 5

Sampled By: Miguel Marceles

Sample Date: December 23, 2006

Respectfully Submitted,
Faulkner Engineering Services

1/19/07

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US Highway 301 (Falkenburg to Causeway)

Hillsborough County, Florida

Client: Mr. Michael Piendel
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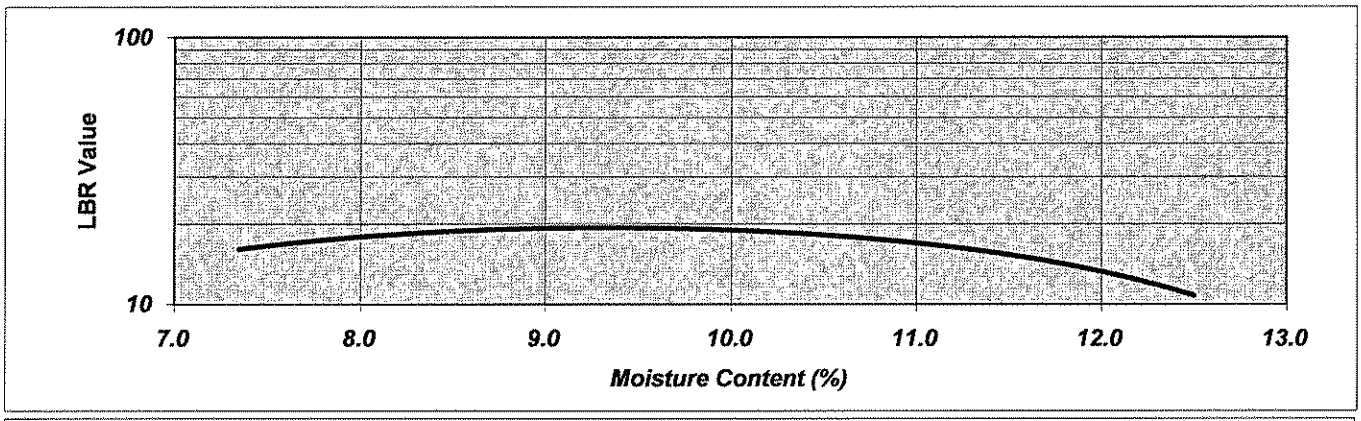
Riverview, FL 33569

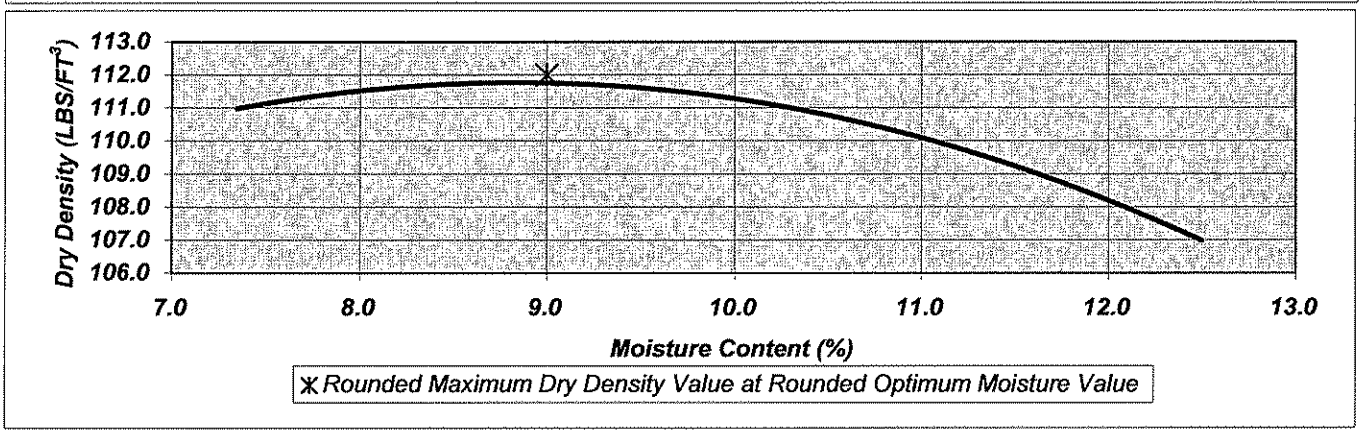
Report Date: January 3, 2007

Project Number: 06-624

MOISTURE-DENSITY RELATIONSHIP & LIMEROCK BEARING RATIO

Report Number: LBR6 (Preliminary)





Maximum Dry Density:	**112.0**	LBS/FT^3	per Method:	FSTM 5-515
Optimum Moisture Content:	**9.0**	%		[LBR - Soaked 48 +/- 4 Hours]
LBR Value:	**20**	%		Surcharge Weight: 15 lbs

Sample Description: Brown Silty Sand

Sample Location: LBR 6

Sampled By: Miguel Marceles

Sample Date: December 23, 2006

Respectfully Submitted,
Faulkner Engineering Services

John R. Gregos, Jr., P.E.
Florida Registration No. 58628

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one—not even you*—should apply the report for any purpose or project except the one originally contemplated.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject To Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE PROFESSIONAL FIRMS PRACTICING IN THE GEOSCIENCES

8811 Colesville Road Suite G106 Silver Spring, MD 20910
Telephone: 301-565-2733 Facsimile: 301-589-2017
email: info@asfe.org www.asfe.org

IIGER06983.5M

APPENDIX A

Logs of Soil Borings

AB-1

Depth (feet BGS)	Soil Description
0 - 2.5	Brown, fine SAND (SP)
2.5 - 5	Light gray, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-2

Depth (feet BGS)	Soil Description
0 - 2.5	Dark brown, fine SAND (SP)
2.5 - 5	Light gray, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-3

Depth (feet BGS)	Soil Description
0 - 2.5	Brown, fine SAND (SP)
2.5 - 5	Light brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-4

Depth (feet BGS)	Soil Description
0 - 3	Brown, fine SAND (SP)
3 - 5	Light gray, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-5

Depth (feet BGS)	Soil Description
0 - 2.5	Brown, fine SAND (SP) with trace rock fragments
2.5 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-6

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-7

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-8

Depth (feet BGS)	Soil Description
0 - 2	Dark brown, fine SAND (SP)
2 - 5	Light gray, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-9

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-10

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-11

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-12

Depth (feet BGS)	Soil Description
0 - 2	Dark brown, fine SAND (SP)
2 - 5	Light gray, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-13

Depth (feet BGS)	Soil Description
0 - 3.5	Dark brown, fine SAND (SP)
3.5 - 5	Light brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-14

Depth (feet BGS)	Soil Description
0 - 3	Dark brown, fine SAND (SP)
3 - 5	Light gray, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-15

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-16

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-17

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-18

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-19

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-20

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-21

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-22

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-23

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-24

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-25

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-26

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-27

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-28

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-29

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-30

Depth (feet BGS)	Soil Description
0 - 4	Dark brown, fine SAND (SP)
4 - 5	Light brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-31

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-32

Depth (feet BGS)	Soil Description
0 - 2	Dark brown, fine SAND (SP)
2 - 4	Orangish brown, fine SAND (SP)
4 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was encountered at 4 feet at completion of boring.

AB-33

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-34

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-35

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP); @ approx. 4 feet minor orange staining
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-36

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was encountered at 3.25 feet at completion of boring.

AB-37

Depth (feet BGS)	Soil Description
0 - 3	Dark brown, fine SAND (SP)
3 - 5	Light brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-38

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-39

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-40

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-41

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-42

Depth (feet BGS)	Soil Description
0 - 2	Light brown, fine SAND (SP)
2 - 4	Light gray/brown, fine SAND (SP)
4 - 5	Dark brown, fine SAND (SP-SM) with trace silt
5	Boring terminated

Groundwater was encountered at 4 feet at completion of boring.

AB-43

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-44

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-45

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-46

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-47

Depth (feet BGS)	Soil Description
0 - 3	Dark brown, fine SAND (SP)
3 - 5	Light brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-48

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-49

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-50

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-51

Depth (feet BGS)	Soil Description
0 - 5	Gray/brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-52

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-53

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-54

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP-SC) with trace clay to clayey fine SAND (SC)
5	Boring terminated

Groundwater was encountered at 4.5 feet at completion of boring.

AB-55

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-56

Depth (feet BGS)	Soil Description
0 - 5	Gray/brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-57

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-58

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-59

Depth (feet BGS)	Soil Description
0 - 4	Dark brown, fine SAND (SP)
4 - 5	Light brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-60

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-61

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-62

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-63

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-64

Depth (feet BGS)	Soil Description
0 - 4	Brown, fine SAND (SP)
4 - 5	Dark brown, fine SAND (SP-SM) with trace silt
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-65

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-66

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-67

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-68

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-69

Depth (feet BGS)	Soil Description
0 - 4	Dark brown, fine SAND (SP)
4 - 5	Light brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-70

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-71

Depth (feet BGS)	Soil Description
0 - 3	Dark brown, fine SAND (SP)
3 - 5	Light brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-72

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-73

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-74

Depth (feet BGS)	Soil Description
0 - 2	Brown, fine SAND (SP)
2 - 5	Orange/brown, fine SAND (SP) with minor orange staining
5	Boring terminated

Groundwater was encountered at 4 feet at completion of boring.

AB-75

Depth (feet BGS)	Soil Description
0 - 2	Dark brown, fine SAND (SP)
2 - 5	Light brown/gray, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-76

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP) with trace rock fragments
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-77

Depth (feet BGS)	Soil Description
0 - 2	Very dark brown, fine SAND (SP)
2 - 5	Light brown/gray, fine SAND (SP)
5	Boring terminated

Groundwater was encountered at 5 feet at completion of boring.

AB-78

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-79

Depth (feet BGS)	Soil Description
0 - 5	Dark brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-80

Depth (feet BGS)	Soil Description
0 - 5	Brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

AB-81

Depth (feet BGS)	Soil Description
0 - 2	Dark brown, fine SAND (SP)
2 - 5	Light brown, fine SAND (SP)
5	Boring terminated

Groundwater was not encountered at completion of boring.

APPENDIX B

Key to Soil Classification

UNIFIED SOIL CLASSIFICATION

(After U.S. Waterways Experiment Station and ASTM D 2487-66T)

Major Division		Group Symbol	Laboratory Classification Criteria		Soil Description
			Finer than 200 Sieve %	Supplementary Requirements	
Coarse-grained (over 50% by weight coarser than No. 200 sieve)	Gravelly soils (over half of coarse fraction larger than No. 4)	GW	0-5*	D_{60}/D_{10} greater than 4, $D_{30}^2/D_{60} \times D_{10}$ between 1 & 3	Well-graded gravels, sandy gravels
		GP	0-5*	Not meeting above gradation for GW	Gap-graded or uniform gravels, sandy gravels
		GM	12 or more *	PL less than 4 or below A-line	Silty gravels, silty sandy-gravels,
		GC	12 or more *	PL over 7 and above A-line	Clayey gravels, clayey sandy gravels
	Sandy soils (over half of coarse fraction finer than No. 4)	SW	0-5*	D_{60}/D_{10} greater than 4, $D_{30}^2/D_{60} \times D_{10}$ between 1 & 3	Well-graded sands, gravelly sands
		SP	0-5*	Not meeting above gradation for requirements	Gap-graded or uniform sands, gravelly sands
		SM	12 or more *	PL less than 4 or below A-line	Silty sands, silty gravelly sands,
		SC	12 or more *	PL over 7 and above A-line	Clayey sands, clayey gravelly sands
Fine-grained (over 50% by weight finer than No. 200 sieve)	Low-com pressibility (liquid limit less than 50)	ML	Plasticity chart		Silts, very fine sands, silty or clayey fine sands, micaceous silts
		CL	Plasticity chart		Low plasticity clays, sandy or silty clays
		OL	Plasticity chart, organic odor or color		Organic silts and clays of low plasticity
	High com-pressibility (liquid limit greater than 50)	MH	Plasticity chart		Micaceous silts, diatomaceous silts, volcanic ash
		CH	Plasticity chart		Highly plastic clays and sandy clays
		OH	Plasticity chart, organic odor or color		Organic silts and clays of high plasticity
Soils with fibrous organic matter		PT	Fibrous organic matter, will char, burn, or glow		Peat, sandy peats, and clayey peat

*For soils having 5 to 12 percent passing the No. 200 sieve, use a dual symbol such as GW-GC.