



February 10, 2000

HDR Engineering, Inc.  
2202 North Westshore Boulevard  
Suite 250  
Tampa, Florida 33607-5711

Attention: Mr. Bruce Hasbrouck, VP  
Senior Environmental Scientist

Subject: Report of Geotechnical Services  
Sarasota Bay Ecosystem Restoration  
Sarasota County, Florida  
Williams Project No. C399322

Dear Mr. Hasbrouck:

As authorized, Williams Earth Sciences, Inc. (Williams), has conducted a geotechnical exploration of five dredge spoil areas in Sarasota Bay. The purpose of this work was to determine the nature of the materials present in the dredge spoil areas and the potential use of the materials for the ecosystem restoration of Sarasota Bay.

The five dredge spoil areas explored included: Snake Island in the mouth of the Venice Inlet; Palmer Point and Jim Neville Preserve located in the vicinity of Midnight Pass; and Skier's Island and Big Edwards Island located in Robert's Bay off of Siesta Key. The scope of work included conducting hand auger borings to determine the nature of materials present at each location; conducting laboratory testing on selected samples to better define the characteristics of the materials; and an evaluation of the materials found to determine their potential for use in beach restoration, erosion protection and sea grass bed restoration.

On September 3, 1999, Williams representative, Stephen C. Knauss, P.E. visited all of the spoil areas accompanied by HDR representatives. Utilizing the observations made at that time and preliminary sketches of the areas prepared by King Engineering, boring locations were decided and those locations were sent to King Engineering. The borings were then located in the field by King Engineering as they surveyed the areas. There was a time gap between the boring layout and the execution of the field work. In some cases, the stakes had been removed before we conducted our borings. We then relocated the borings, measuring from existing stakes and topographic features. Therefore, some of the boring locations may be approximate. The boring elevations as noted on the boring logs were determined by King Engineering or from the topographic plans they supplied.

In addition, grab samples were obtained of the initial 6 inches of soil in two sea grass areas. One sample was obtained off of Palmer Point and the other was obtained off Jim Neville Preserve. These samples were obtained for laboratory testing and identification. The results of laboratory testing of samples from the spoil areas were compared with the sea grass samples to see if they were similar in nature.

CORPORATE OFFICE:  
10600 Endeavour Way  
Largo, FL 33777  
(727) 541-3444 FAX (727) 541-1510  
WESLargo@aol.com



All of the areas were reached by boat. Public launch ramps were utilized to place our boat(s) into the water.

The borings were conducted by utilizing either a bucket type hand auger or a post-hole digger. In addition, where a significant amount of rock or shell was found, it was necessary to use a pry bar to loosen or break the material so that the hole could be advanced. The holes were advanced to the water table or practical refusal utilizing the manually operated equipment. It is our understanding that the water level represented the original grade before the dredged materials were deposited.

For ease in identifying which spoil area the borings represented, the borings from Snake Island were identified as SN-; from Palmer Point Park PP-; from Jim Neville Preserve JN-; from Skier's Island SK-; and from Big Edwards Island BE-. In addition, the samples from sea grass areas were identified as SG-. Boring Location Plans for each of the studied areas are attached.

Upon completion of the field work, the samples were returned to the laboratory where the field identifications were confirmed by a Professional Geologist. Samples were selected for laboratory testing. The samples selected were felt to be representative of the soils encountered. However, due to the difficulty in obtaining representative samples of the larger sized materials, laboratory testing was limited to the sands and fine-grained soils. The laboratory tests included gradation tests, -200 wash gradations, organic content tests and Atterberg Limits tests. These were conducted in accordance with appropriate ASTM test procedures. Attached to this report are the boring logs, a summary of the laboratory tests as well as gradation curves for each of the soils tested.

This report is organized so that the subsurface conditions and uses of material from each spoil area will be discussed in their entirety with a summary at the end of the report. The field and laboratory data have also been organized by study area.

### SEA GRASS SAMPLES

Two samples from sea grass areas were obtained. SG-1 was taken from off Palmer Point while SG-2 was taken off Jim Neville Preserve. In both cases, the samples were obtained in shallow water. The samples were taken utilizing a hand auger and digging about 6 inches into the bottom.

The soils obtained included a shelly fine sand and a slightly silty slightly shelly fine sand. These soils were classified as SP and SP-SM respectively. Laboratory tests indicated that as much as 15 percent was larger than a No. 4 sieve. The amount of material passing the No. 200 sieve ranged from 2 to 9 percent.

### SNAKE ISLAND

Snake Island is a dredge spoil island located in the Venice Pass in south Sarasota County. It is approximately 2 acres in size. Topographically, it is characterized by about 2 foot high banks close to the waters edge. The elevation of the interior generally ranges from about 2 feet MSL to a high of about 7 feet MSL. The high point is located in the northwestern quadrant of the island. Vegetation included mangroves, dense shrub trees as well as some grass areas and large pine trees. There was evidence that people picnic on the island. A significant amount of shoreline erosion was observed on the west side of the island. It was noted during our drilling operations that the wake from virtually every boat entering Venice Pass washed the west side of the island. This appeared to be true even if the boats slowed when they were supposed to do so.

The field work on Snake Island was conducted on December 10, 1999. Eleven borings were conducted at the locations staked by King, or relocated, if necessary. According to the topographic survey of this island, the highest point on the island is about +7 feet (MSL) and as a result, the borings were as deep as 8 feet. The borings encountered soils classified as fine sands from the ground surface to their termination. Some shell and shell fragments, as well as small pieces of phosphate, were found within the sand. In observing the banks of the island, it appeared that the shell may be present in relatively thin layers. However, when sampled with a hand auger, these layers were not apparent. Boring SN-4 encountered soils consisting predominately of small shell fragments from 2 feet to the termination of the boring at 3.5 feet. This type of material has been described as a shell hash. At the termination of the borings conducted in the middle of the island and the northwest quadrant, an organic silt was encountered.

According to the 1987 Soil Conservation Service (SCS) soil survey, the soils on this site are identified as Canaveral fine sands, a natural formation. This soil type is described as fine sand with shell fragments. The 1959 soil survey shows Snake Island to be part of the island which presently exists to its northwest with the island described as a coastal beach ridge with some areas of tidal swamp. In comparing these descriptions with the results of our borings, it appears that it is possible that most of Snake Island may represent a natural deposit, not dredged material.

The results of the laboratory tests indicate that the soils can generally be identified as poorly graded fine sand (SP). Due to the shell fragments, there was some material that did not pass a No. 4 sieve. This ranged from 1 percent to as great as 41 percent in the case of the shell hash. All of the sand samples tested had less than 6 percent passing a No. 200 sieve. All material in the shell hash passed a 1-1/2 inch sieve with 7 percent retained on the No. 200 sieve. Two of the organic containing soils were tested for moisture content and organic content. The natural moisture content was on the order of 50% and the organic content ranged from 3.8 to 7 percent.

It appears that the soils found on the island may be utilized for beach restoration or sea grass restoration. The amount of shell present may preclude its use as a final layer on a beach where the area will be frequented by the public unless the material is screened to remove the larger material. In our preliminary report, we indicated that it may take processing the soil to remove the shell if it is to be used for sea grass restoration. However, based upon the tests of soil from sea grass areas, it now appears that such processing will not be necessary, as it appears that a significant amount of shell may be present in sea grass areas. As a result, it appears that all of the material from this island can be used for sea grass restoration areas. Large sized material was not found and as a result, the soils from this island will not be suitable for use as erosion protection material.

### **PALMER POINT PARK**

Palmer Point Park is located at the north end of Casey Key, just south of the former location of Midnight Pass. The dredge spoil area is about 5 acres. A mud flat is located to the south and Midnight Pass is located to the north. A tidal flat is located to the east. Residential property is located to the west and a tennis court adjoins the park on that side. Palmer Point has very little topography with the highest point at about elevation 4 feet MSL. However, there is an embankment adjacent to the tennis court with its top at about elevation 5 feet MSL. Vegetation ranges from underbrush to large trees. Mangroves are located on all sides of the park.

The field work was conducted on December 28, 1999. Eighteen borings were conducted at the locations staked by King Engineering. The borings encountered fine sands with varying amounts of shell fragments. A boring conducted in a mud flat on the east end of the Palmer Point, PP-29, encountered a silty peat from the ground surface to the termination of the boring at 6 inches. This may represent a former sea grass or mangrove area.

According to the 1987 SCS soil survey, the soils in the Palmer Point area are identified as Kesson and Wulfert mucks. These soil types are typically found in tidal marshes and swamps. Based upon our field work, it appears that these soils were present before the dredged material was deposited. The 1959 soil survey indicates that this area was generally below the water level and not given a soil description.

The results of the laboratory tests on the soils recovered indicated that the material was a fine sand with a relatively small amount of fines. Almost all of the shell fragments passed the No. 200 sieve. Most of the samples had less than 5 percent passing a No. 200 sieve and those identified as being silty had 6 to 12 percent passing a No. 200 sieve. An organic content test conducted on a sample from boring PP-29 revealed a natural moisture content of 147 percent and an organic content of 24 percent.

It appears that the materials found on Palmer Point may be used for beach restoration. In our preliminary report we indicated that it did not appear that the material could be used for sea grass restoration. However, a review of the laboratory data indicates that the gradation of these soils is not significantly different from the soils from the sea grass restoration areas. Therefore it appears that all of the material encountered may be utilized for either of the two uses. The materials encountered by our exploration are not suitable for erosion protection because the particle size of the materials was too fine.

### JIM NEVILLE PRESERVE

Jim Neville Preserve is the largest spoil area studied in this project. This spoil area is located to the east of the south end of Siesta Key, just to the north of what once was Midnight Pass. The area explored consisted of two areas separated by a mud flat. The total area is about 35 acres. The southern area has a gentle topography with a slight ridge running in northwest to southeast direction. The highest point of this area is at about elevation 7 feet MSL. The northern area is somewhat larger. It too has a gentle topography with a high point of about elevation 10.5 feet MSL located near its north end. The outer edges of the areas were vegetated with mangroves. On the interior, vegetation consisted of pine trees and pepper plants. In some cases, the peppers were very dense and impenetrable without cutting.

The bulk of the borings were drilled on December 28, 1999. However, due to difficult drilling conditions, it was necessary to return to this spoil area on January 4, 2000 to complete four of the borings. Twenty-four borings were drilled in the Jim Neville Preserve area.

Nine borings were drilled on the southern area. While most of the borings were drilled on the perimeter, three borings were drilled in the interior at an elevation of +2 feet MSL or higher. Those borings drilled on the perimeter encountered fine sands to their termination 1 to 2 feet below the ground surface. Some shell fragments, phosphate and silt were present in the samples. The three borings in the interior encountered fine sand with a significant amount of large, intact shell, shell fragments and limestone fragments to a depth of 5 to 7 feet below the ground surface. This material appears to represent dredged fill. It was difficult to advance these holes manually due to the size and amount of shell and rock pieces encountered. It was necessary to utilize a rod to break or loosen the material before it could be removed from the hole using either a hand auger or a posthole digger. Due to the large size of the material, it was not possible to recover a representative sample for laboratory testing. Below the dredged material, fine sands were encountered to the termination of the borings. Boring JN-38, drilled at the northwest end of this area, encountered peat below one foot. This probably represents mangrove areas covered by dredged materials.

In the northern area, 15 borings were drilled. Four of the borings were drilled at higher interior locations while the rest were drilled around the perimeter of the area. These borings encountered similar materials to the southern area. The perimeter borings encountered fine sand with some shell fragments, phosphate and silt. These borings were terminated within 2 feet of the ground surface. The interior borings encountered dredged material consisting of large, intact shell, shell fragments and limestone fragments

from the ground surface to a depth of 3 to 6 feet below the ground surface. One boring, JN-48 could not be advanced beyond 6 feet due to the large rock and therefore, it did not reach its anticipated termination depth at about 7 to 8 feet below the ground surface. The digging was difficult and representative samples could not be obtained for laboratory testing. Three borings, JN-39, JN-40 and JN-45, encountered peat from one to two feet below the ground surface and were terminated in this material.

The peat was encountered in those borings drilled at the interface of the two areas. This would appear to represent an area where pre-existing vegetation was buried during the dredging operations.

According to the 1987 SCS soil survey, the soils in the Jim Neville Preserve area are Kesson and Wulfert mucks. These soil types are typically found in tidal marsh areas and tidal swamps. Our field work indicates that this type was present before the dredge material was placed. The 1959 soil survey shows a somewhat different configuration for this area and identifies the soils as tidal swamp area.

Laboratory testing was limited to those samples representative of the soils present in the field. As a result, those soils containing significant amounts of shell or limestone fragments were not tested. Therefore, the laboratory tests were primarily conducted on samples taken from borings on the exterior of the area. The results of the laboratory tests indicated that the perimeter soils are poorly graded fine sands. Most of the samples tested had 95 percent or more passing the No. 4 sieve with less than 10 percent passing the No. 200 sieve. A near surface sample from JN-37 had 79 percent passing the No. 4 sieve. One sample of the soil identified as peat was tested for moisture content and organic content. The results of the test indicated a moisture content of 167 percent and an organic content of 23 percent by weight.

With the exception of the soils found at the perimeter of the Jim Neville Preserve, the dredged material encountered does not appear to be suitable for beach restoration due to the significant amount of large material such as whole shells as well as limestone pieces. For the same reason, it does not appear that the material from the interior will be suitable for use in sea grass restoration areas. The manual sampling techniques did not provide for recovery of material large enough to be considered for erosion protection. However, no large limestone pieces (6"+) were observed and as a result, we do not believe that there is a significant amount of dredged material from this area that will be suitable for erosion protection. As a result, without processing, it does not appear that material from this area can be used for restoration projects and its use appears to be limited to general fill.

### **SKIER'S ISLAND**

Skier's Island is a dredge spoil island located in the south half of Robert's Bay. It is to the west of the Gulf Intracoastal Waterway. It is a relatively long, slender island approximately 1250 feet long by an average of 275 feet wide and encompassing approximately 8 acres. The site has a ridge running along its spine ranging in elevation from about 6 feet MSL near the south end to about 7 feet MSL near its north end. In addition, there was a break in the ridge at about the middle of the island where the ridge dips to an elevation of about 1 foot MSL. Vegetation included mature pines as well as mangroves along the edge of the island. Rocks, on the order of 6 inches +/-, were observed on the ground surface. At the time of our field work, a camp ground occupied by at least one person was observed at the north end of the island.

The field work was conducted on Skier's Island from January 5<sup>th</sup> to January 8<sup>th</sup>, 2000. Twenty-nine borings were drilled on Skier's Island, most at locations as staked by King Engineering. Some stakes had been removed and they were relocated by Williams' personnel utilizing a tape and turning approximate angles from existing landmarks. In general, the borings drilled at elevation +2 feet (MSL) or less, encountered fine sands with some shell or limestone pieces and are considered to be sands. The borings drilled where the elevation was +2 feet MSL or higher encountered dredged fill material consisting of sand with large shell and pieces of limestone. In some borings, the samples consisted almost entirely of

shell and were identified as shell hash, while in other areas the samples primarily consisted of limestone pieces. These soils were sometimes classified as gravels even though there technically may be very little "gravel" present. Some of the surficial limestone pieces were as large as 12 inches in one dimension. It was very difficult to advance the holes due the size of material encountered as well as its interlocked nature. It was necessary to utilize a rod to loosen the formation before it could be removed utilizing the hand auger or posthole digger. It was not possible to advance all of the borings to their programmed depth due to size of material encountered. Due to the manual excavation techniques utilized, it was also not possible to determine how large the larger pieces of limestone were.

According to the 1987 SCS soil survey, the soils on Skier's Island are identified as Kesson and Wulfert mucks. With the exception of one boring where a significant amount of roots were found, this material was not apparent. A review of the 1959 soil survey does not show any evidence of Skier's Island. Therefore, we do not believe that this island is underlain by organic material.

Laboratory testing was generally conducted on selected samples from the borings made at elevation +2 feet MSL or less. The test results indicated that soils identified as very shelly or shell hash had 23 to 29 percent retained on the No. 4 sieve, the dividing sieve between gravel and sand. Most of them also had less than 5 percent passing the No. 200 sieve. However, a sample taken from SK-62 from 0 to 1.5 feet MSL and identified as an SM, contained 22 percent material finer than the No. 200 sieve. A gradation test conducted on the initial 2 feet of material from boring SK-80 at elevation 5.3 feet MSL and identified as an SM, indicated that 30 percent of the sample was retained on the No. 4 sieve and 24 percent of the sample passed a No. 200 sieve. Laboratory tests were not conducted on those samples identified as gravels and poorly graded sands because we could not obtain a large enough sample to consider it representative of the materials present.

With the exception of the soils found at the perimeter of the island it appears that the material present can't be used for beach or sea grass restoration areas due to the size of material encountered. It also appears that without processing, the material sampled and/or observed in the interior areas of the island is not of sufficient size to allow it to be used for erosion protection. It is likely that some of the material could be used for erosion protection, but it does not appear that there is a sufficient quantity that it would be cost effective to process the material. Excavation utilizing machinery would be necessary to confirm this opinion.

## **BIG EDWARDS ISLAND**

Big Edwards Island is located in the northern area of Robert's Bay, just south of the Siesta Key Bridge. The island is relatively square in shape with dimensions of 550 feet north-to-south and 400 feet east-to-west. The island is approximately 6 acres in area. It is our understanding that this area had been a mangrove island which had been used as a spoils area for the dredging of the Inland Waterway which is located on the east side of the island. The topography of this island was unlike the other 4 areas studied under this contract. There was a relatively narrow perimeter berm enclosing an area where dredged material was placed. The elevation outside the perimeter of the berm ranged from 0 MSL to about 5 feet MSL. According to the survey, the elevation of the top of the berm generally varied from about 12 to 13 feet MSL. However, the berm was as high as about 14 feet MSL in the northwest corner of the island. Inside of the berm, the elevation varied from a low of about 5 feet MSL at the south end of the island to a high of about 17 feet MSL near the north end of the island. Vegetation ranged from mature pine trees to areas of mangroves. The island was generally accessible without cutting vegetation. There was some evidence that people visited the island on a regular basis.

Field work on Big Edward's Island was conducted between January 7 and 13, 2000. Forty-two borings were drilled on Big Edward's Island. Most of the borings were drilled at stakes placed by King Engineering. However, some stakes had been removed and those drilling locations were determined by the Williams drill crew by measuring from the remaining stakes and the topographic features. Prior to drilling it was suspected that the material in the berm would be different from the material inside of the bermed area. However, the borings drilled in the berm and inside of the berm encountered similar dredged fill consisting of fine sand with varying amounts of shell and limestone rock pieces. The rock included pieces as large as 8 to 10 inches in dimension. In some cases, the soils encountered were classified as gravel. It was very difficult to advance the borings and in two cases the auger heads broke off in the holes and were lost. At several locations, the holes were abandoned before their scheduled termination depth due to large rocks being encountered. This was in spite of the fact that posthole diggers and a rod with a point were used to assist in the advancement of the boring. It appeared that more shell was found at the south end of the island with more rock found in the samples from the northern end of the island. As with the Skier's Island which had significant rock or shell, the borings conducted at the lower elevations of the perimeter of the island encountered fine sands with some shell fragments. In addition, some silty sands and sandy silts were encountered, primarily at the south end of the island and at about 0 MSL.

According to the 1987 SCS soil survey, the soils on Big Edwards Island are identified as Kesson and Wulfert mucks. Two borings encountered organic soils at their termination depths and several other borings encountered silts which may represent the top of this soil type. The 1959 soil survey shows an island with a slightly different configuration and identifies the soils as representative of tidal swamps. It is possible that the organic deposits are more extensive, but have settled under the load of the dredged material and were below the depth of our exploration.

Laboratory tests were conducted on selected samples. It was not possible to conduct tests on much of the dredged material because the sampling technique did not allow us to obtain representative samples of the large shell or rock. The laboratory grain size tests indicated that the soils from the lower elevations on this island contained much more silt than the other dredge spoil areas studied under this contract. Samples with 71 to 91 percent passing a No. 4 sieve had 22 to 32 percent passing a No. 200 sieve. Laboratory grain size tests were also conducted on three samples identified as silts. The fines content ranged from 56 to 96 percent. An Atterberg Limits test was conducted on a sample from BE-88 at 3 to 4 feet below the ground surface with 82 percent passing the No. 200 sieve. The results indicated a liquid limit of 41 and a plasticity index of 16. This means that this soil is at the borderline of being a low plasticity silt (ML) and a low plasticity clay (CL). The natural moisture content of this soil was 50 percent.

Based upon the samples recovered, it does not appear that the dredged material from this island can be used for beach restoration or sea grass restoration due to the relatively large size of material encountered. It also did not appear that a sufficient amount of material was large enough to allow it to be used for erosion protection. The samples recovered and the material observed suggest that there would be a relatively small amount of material suitable for erosion protection after processing has been conducted.

## GENERAL COMMENTS

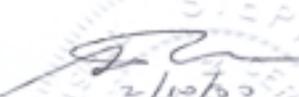
The nature of dredging operations is such that the soils found in spoils areas will vary significantly within a relatively short distance. We have described the soils encountered in this study in general terms, however, the soils did vary from boring to boring as can be expected for dredged fill. It should be noted that the manual exploration techniques utilized did not allow us to obtain representative samples of the larger material on Jim Neville Preserve, Skier's Island and Big Edwards Island. As a result, we could not conduct gradation tests on the recovered samples. It would be necessary to excavate test pits, probably

utilizing a backhoe, to allow us to obtain a representative sample, particularly at depth. That was beyond the scope of our exploration. In addition, the nature of dredged material is such that it is possible that pockets and layers of material not encountered by our exploration will be encountered during construction operations.

Williams has appreciated this opportunity to be of service to you on this project. Should you have any questions, please contact us at your convenience.

Sincerely,

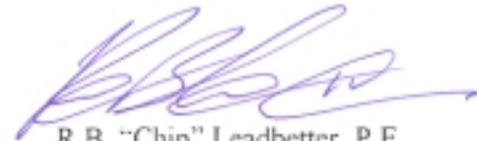
**WILLIAMS EARTH SCIENCES, INC.**



2/10/00  
Stephen C. Krauss, P.E.  
Senior Geotechnical/Materials Engineer  
Florida Registration No. 28202

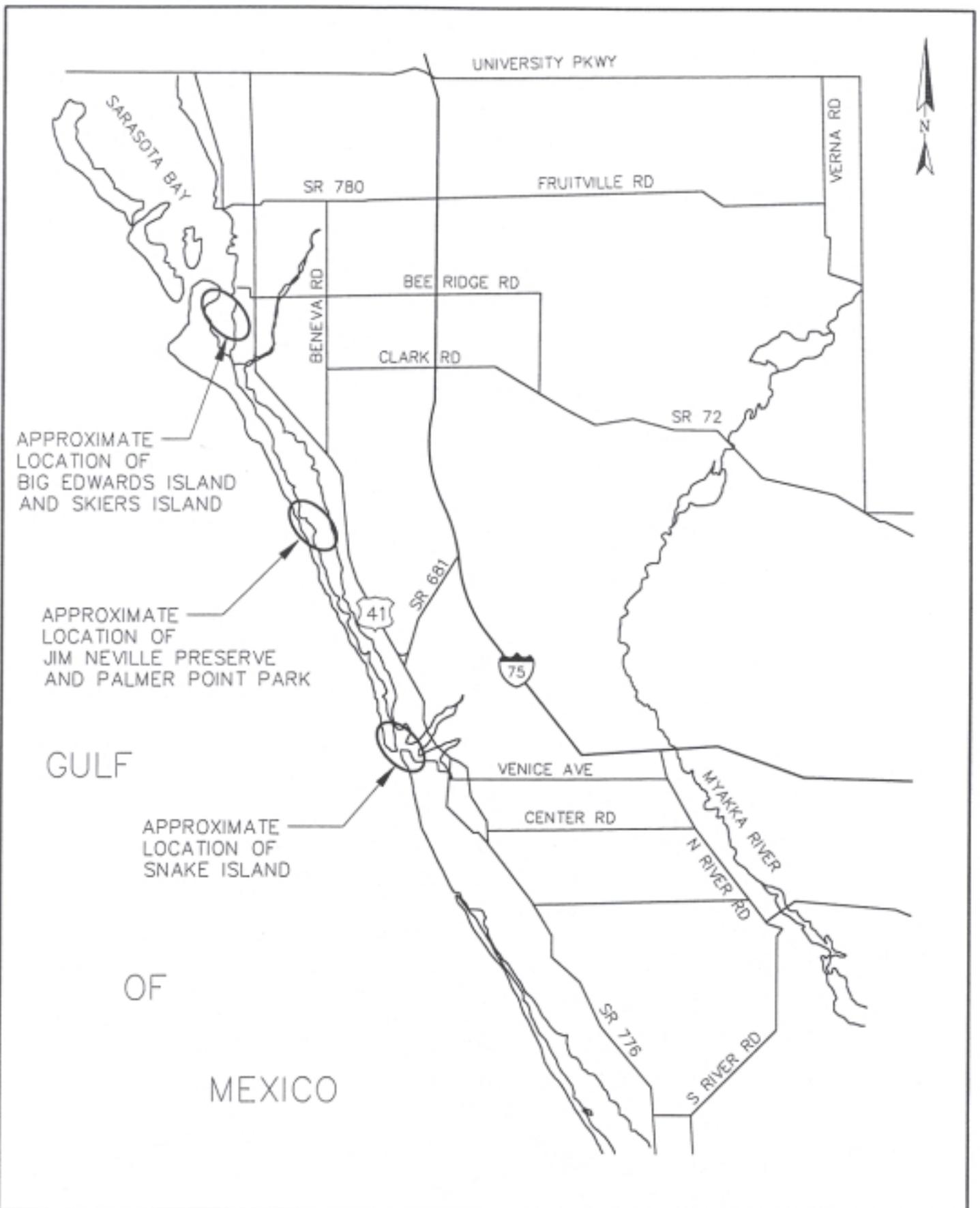
Distribution: (2) Addressee  
(1) File

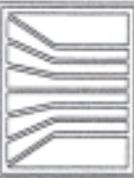
Attachments: Site Location Maps  
Report of Auger Borings  
Summary of Laboratory Tests  
Laboratory Test Results



R.B. "Chip" Leadbetter, P.E.  
Senior Geotechnical Engineer  
Florida Registration No. 53182

F:\PROJECTS\C399\XNC399322\Report.doc



	<b>WILLIAMS EARTH SCIENCES, INC.</b>	
	CORPORATE OFFICE: 10600 Endeavour Way, Largo, FL 33777	
	Largo: (727) 541-3444	FAX: (727) 541-1510
	Jacksonville: (904) 262-8852	FAX: (904) 262-8864
Panama City: (850) 747-9419	FAX: (850) 763-2454	

SARASOTA BAY ECOSYSTEM RESTORATION SARASOTA COUNTY, FLORIDA		
SITE LOCATION MAP		
Drawn By: TEJ	Date: 1-12-00	Scale: N.T.S.
Checked By: SK	Report No. C399322	Figure No. 1

SEA GRASS AREAS

PALMER POINT  
&  
JIM NEVILLE PRESERVE

**WILLIAMS**  
EARTH SCIENCES, INC.

**SUMMARY OF LABORATORY TEST RESULTS**

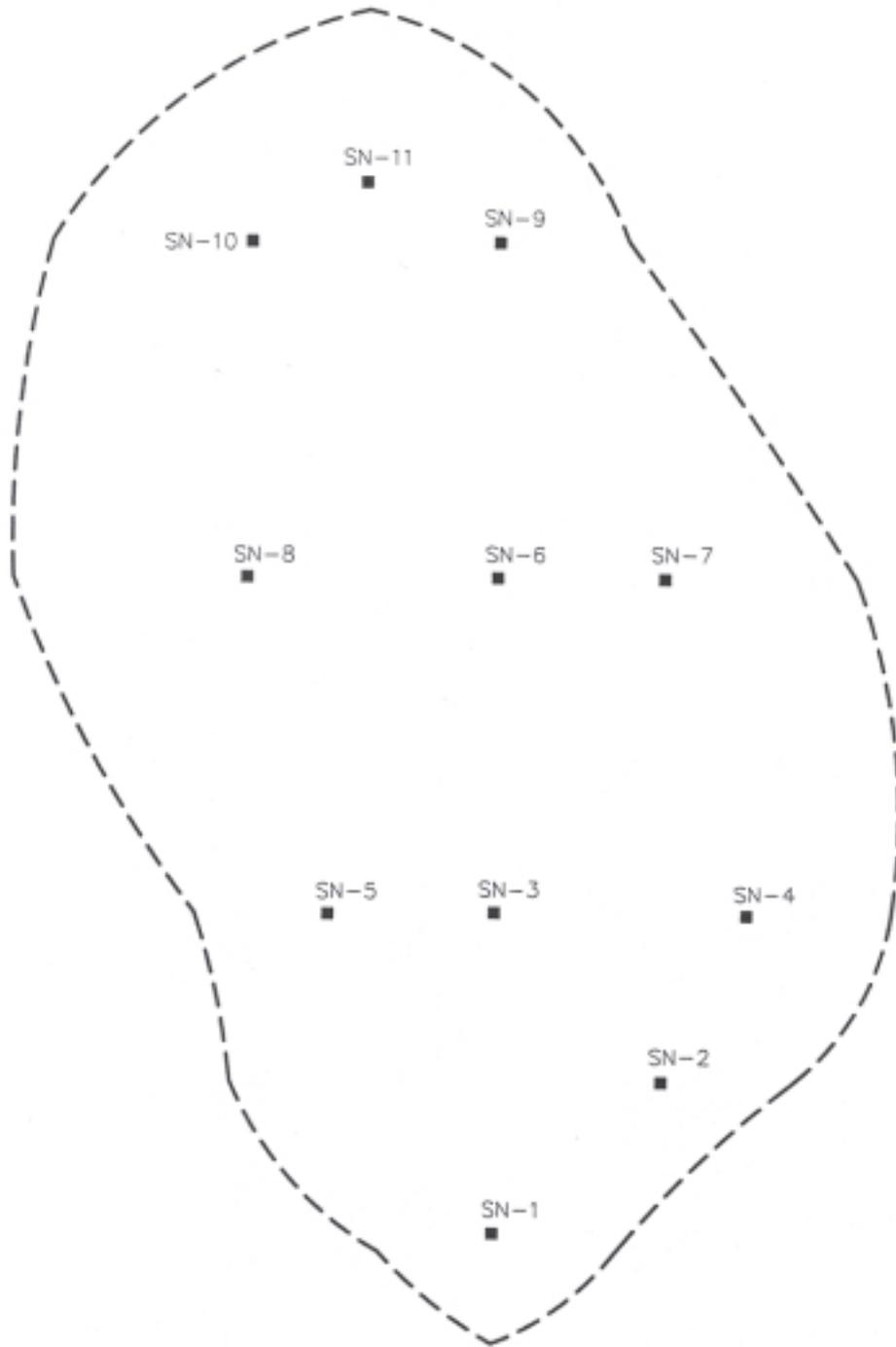
CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Sea Grass Areas (Palmer Point and Jim Neville Preserve)

WILLIAMS PROJECT NO.: C398322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits		
																LL	PI	
SG-1 12/99	---	Grey shelly fine sand with grasses (SP) (Sampled off of Palmer Point)		100	96	96	90	90	85	82	74	64	35	2				
SG-2 12/99	---	Dark gray slightly silty slightly shelly fine sand with grasses (SP-SM) (Sampled off of Jim Neville Preserve)				100	99	99	97	93	89	85	59	9				

\*NOTE: Borings SG-1 and SG-2 were completed in sea grass areas.

# SNAKE ISLAND



**WILLIAMS EARTH SCIENCES, INC.**

CORPORATE OFFICE:  
10600 Endeavour Way, Largo, FL 33777

Largo: (727) 541-3444 FAX: (727) 541-1510  
 Jacksonville: (904) 262-8852 FAX: (904) 262-8864  
 Panama City: (850) 747-9419 FAX: (850) 763-2454

**SNAKE ISLAND  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA**

**BORING LOCATION PLAN**

Drawn By: TEJ	Date: 1-12-00	Scale: AS SHOWN
Checked By: SK	Report No. C399322	Figure No. 2

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo, (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 262-8832 Fax: (904) 262-8864  
 Dunedin, (850) 342-9418 Fax: (850) 353-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Snake Island

WILLIAMS PROJECT N°: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SN-1	12/10/99	0.0-1.5	Light grayish brown phosphatic fine sand	SP	1.1	1.8
		1.5-2.5	Light gray phosphatic slightly shelly fine sand	SP		
SN-2	12/10/99	0.0-1.0	Light gray fine sand	SP	1.9	2.8
		1.0-2.5	Light grayish brown phosphatic fine sand	SP		
		2.5-3.5	Light grayish brown shelly phosphatic fine sand	SP		
SN-3	12/10/99	0.0-1.8	Light grayish brown slightly shelly fine sand	SP	3.9	4.0
		1.8-3.0	Light brown shelly fine sand	SP		
		3.0-3.5	Light brown slightly shelly fine sand	SP		
		3.5-4.5	Grayish brown slightly shelly fine sand	SP		
SN-4	12/10/99	0.0-1.0	Light brown fine sand	SP	2.2	3.7
		1.0-2.0	Dark grayish brown shelly slightly silty fine sand	SP-SM		
		2.0-3.5	Slightly silty shell hash	SP		
SN-5	12/10/99	0.0-2.5	Light grayish brown shelly fine sand	SP	4.1	4.0
		2.5-3.0	Light brown shelly fine sand with decaying roots	SP		
		3.0-4.5	Grayish brown fine sand	SP		

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE:  
 10600 Endeavour Way, Largo, FL 33777  
 Largo: (727) 561-2444 Fax: (727) 561-1510  
 Jacksonville: (904) 262-8652 Fax: (904) 262-8666  
 Panama City: (904) 872-8433 Fax: (904) 872-2454

## REPORT OF AUGER BORINGS

**CLIENT: HDR Engineering, Inc.**  
**PROJECT: Sarasota Bay Ecosystem - Snake Island**

**WILLIAMS PROJECT Nº: C399322**

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SN-6	12/10/99	0.0-1.0	Light brown slightly shelly fine sand	SP	5.6	6.0
		1.0-2.8	Light brown shelly fine sand	SP		
		2.8-5.0	Light brown fine sand	SP		
		5.0-6.0	Interlayered light brown fine sand and dark grayish brown organic silt	PT		
SN-7	12/10/99	0.0-2.5	Grayish brown shelly fine sand	SP	5.0	5.0
		2.5-4.0	Light brown shelly fine sand	SP		
		4.0-5.0	Light brown shelly fine sand with large oyster shells	SP		
		5.0-6.0	Interlayered light gray fine sand and dark brown organic silt	PT		
SN-8	12/10/99	0.0-1.5	Light grayish brown fine sand	SP	6.9	7.0
		1.5-6.0	Light brown shelly fine sand	SP		
		6.0-7.0	Brown slightly shelly fine sand	SP		
		7.0-8.0	Interlayered grayish brown fine sand and dark grayish brown organic silt	PT		
SN-9	12/10/99	0.0-1.8	Light brown fine sand with minor roots	SP	3.0	3.6
		1.8-4.0	Brown fine sand	SP		
		4.0-6.0	Dark brown fine sand	SP		


**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo: (727) 541-3444 Fax: (727) 541-1518  
 Jacksonville: (904) 262-8852 Fax: (904) 262-8844  
 Panama City: (904) 874-3113 Fax: (904) 874-3111

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Snake Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SN-10	12/10/99	0.0-2.5	Light brown fine sand	SP	4.8	5.1
		2.5-4.5	Light brown medium to fine sand	SP		
		4.5-5.5	Light grayish brown shelly fine sand	SP		
		5.5-6.0	Dark brown very silty fine sand with finely divided organic matter	PT		
SN-11	12/10/99	0.0-1.0	Light brown fine sand with minor roots	SP	2.1	2.7
		1.0-2.8	Light brown fine sand	SP		
		2.8-5.5	Dark brown fine sand with minor finely divided organic matter	SP		
		5.5-6.0	Gray silty fine sand with minor finely divided organic matter and shell fragments	SM		

\*Approximate surface elevation noted from topographic maps.

F:\PROJECTS\C399322\HANDAUG.DOC

**WILLIAMS**  
EARTH SCIENCES, INC.

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Snake Island

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1 1/2"	1"	% <sup>w</sup>	% <sup>w</sup>	1/2"	% <sup>w</sup>	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
																	LL	PI
SN-2 12/99	1.0-2.5	Light grayish brown phosphatic fine sand (SP)				100			100	99	98	96	77	13	0			
SN-3 12/99	0.0-1.8	Light grayish brown slightly shelly fine sand (SP)				100			97	95	93	84	73	37	1			
SN-4 12/99	2.0-3.5	Slightly silty shelly hash (SP)		100	95	84			73	59	51	40	37	24	7			
SN-5 12/99	0.0-2.5	Light grayish brown shelly fine sand with decaying roots (SP)				100			99	92	82	63	50	19	1			
SN-6 12/99	5.0-6.0	Interlayered light brown fine sand and dark grayish brown organic silt (PT)	50												13	7		
SN-7 12/99	0.0-2.5	Grayish brown shelly fine sand (SP)				100			88	74	63	46	34	11	1			

**WILLIAMS**  
EARTH SCIENCES, INC.

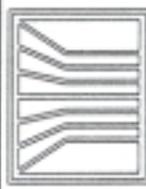
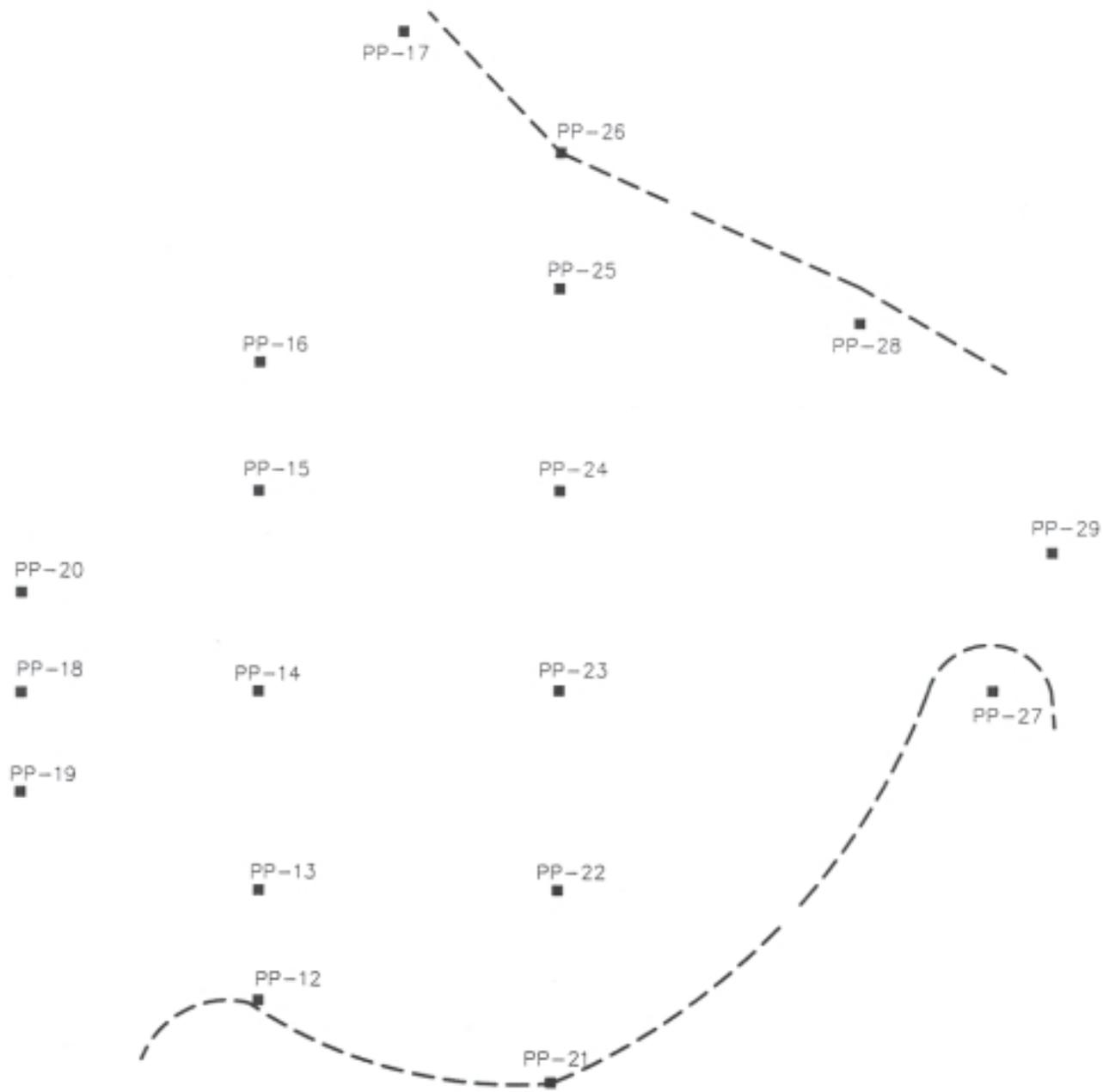
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Snake Island

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
																LL	PI
SN-9 12/99	0.0-1.8	Light brown fine sand with minor roots (SP)								100	99	96	41	1			
SN-9 12/99	4.0-6.0	Dark brown fine sand (SP)						100	99	99	97	90	47	3			
SN-10 12/99	2.5-4.5	Light brown medium to fine sand (SP)					100	99	96	91	53	37	14	1			
SN-11 12/99	2.8-5.5	Dark brown fine sand with minor finely divided organic matter (SP)	46											4	3.8		

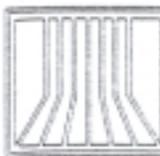
# PALMER POINT PARK



**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE:  
 10800 Endeavour Way, Largo, FL 33777  
 Largo: (727) 541-3444 FAX: (727) 541-1510  
 Jacksonville: (904) 282-8852 FAX: (904) 282-8854  
 Panama City: (850) 747-9419 FAX: (850) 763-2454

<b>PALMER POINT PARK          SARASOTA BAY ECOSYSTEM RESTORATION          SARASOTA COUNTY, FLORIDA</b>		
<b>BORING LOCATION PLAN</b>		
Drawn By: TEJ	Date: 1-12-00	Scale: AS SHOWN
Checked By: SK	Report No. C399322	Figure No. 3

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo: (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville: (904) 262-6637 Fax: (904) 262-8864  
 Phoenix, AZ: (602) 242-5818 Fax: (602) 263-2454



## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Palmer Point

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
PP-12	12/28/99	0.0-0.5	Grayish brown slightly shelly fine sand with minor cementations	SP	0.9	0.5
PP-13	12/28/99	0.0-1.0	Grayish brown slightly shelly slightly silty fine sand with minor roots	SP-SM	1.3	1.0
PP-14	12/28/99	0.0-1.5 1.5-2.0	Light brown fine sand Light grayish brown silty fine sand	SP SM	2.3	2.0
PP-15	12/28/99	0.0-1.5 1.5-2.0	Light brown slightly shelly fine sand Mottled light gray and reddish brown slightly shelly slightly silty fine sand	SP SP-SM	2.0	2.0
PP-16	12/28/99	0.0-0.5	Grayish brown silty fine sand	SM	0.6	0.5
PP-17	12/28/99	0.0-1.0	Light brown slightly shelly medium to fine sand	SP	1.3	1.0
PP-18	12/28/99	0.0-1.0	Light grayish brown slightly silty fine sand with minor roots	SP-SM	2.7	1.0

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1516  
 Jacksonville (904) 263-8652 Fax: (904) 263-8884  
 Panama City (904) 263-3433 Fax: (904) 263-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Palmer Point

WILLIAMS PROJECT N<sup>o</sup>: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
PP-19	12/28/99	0.0-1.0	Brown silty fine sand with minor limnerock fragments	SM	2.7	1.0
PP-20	12/28/99	0.0-1.0	Gray shelly fine sand	SP	2.8	1.0
PP-21	12/28/99	0.0-1.0	Light gray fine sand	SP	0.8	1.0
PP-22	12/28/99	0.0-1.5	Light gray fine sand	SP	2.0	1.5
PP-23	12/28/99	0.0-1.5	Light gray fine sand	SP	3.5	3.5
		1.5-3.0	Light gray shelly fine sand with minor roots	SP		
		3.0-3.5	Light gray slightly shelly fine sand	SP		
PP-24	12/28/99	0.0-2.5	Light brown shelly fine sand	SP	3.9	4.0
		2.5-4.0	Light brown slightly shelly fine sand with minor roots	SP		
PP-25	12/28/99	0.0-1.0	Light grayish brown slightly shelly fine sand	SP	1.2	1.0

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-0510  
 Jacksonville (904) 262-8832 Fax (904) 262-8864  
 Dunwoody, GA (404) 252-3333 Fax (404) 252-3254

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Palmer Point

WILLIAMS PROJECT №: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
PP-26	12/28/99	0.0-0.5	Gray shelly fine sand	SP	0.7	0.5
PP-27	12/28/99	0.0-0.5	Light grayish brown fine sand	SP	0.5	0.5
PP-28	12/28/99	0.0-0.5	Brown slightly shelly fine sand with minor roots	SP	0.9	0.5
PP-29	12/28/99	0.0-0.5	Dark brown silty peat	PT	0.2	0.5

\* Approximate surface elevation noted from topographic maps.

F:\PROJECTS\C399XX\C399322-Hand-Aug\Palmer Point.DOC

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Palmer Point

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1"	¼"	½"	¾"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
															LL	PI
PP-13 12/99	0.0-1.0	Grayish brown slightly shelly slightly silty fine sand with minor roots (SP-SM)							100	97	93	63	10			
PP-14 12/99	1.5-2.0	Light grayish brown silty fine sand (SM)							100	99	96	75	12			
PP-15 12/99	1.5-2.0	Mottled light gray and reddish brown slightly shelly slightly silty fine sand (SP-SM)		100	99	99	99	99	99	94	86	49	6			
PP-17 12/99	0.0-1.0	Light brown slightly shelly medium to fine sand (SP)			100			96	97	84	51	6	1			
PP-20 12/99	0.0-1.0	Gray shelly fine sand (SP)			100			99	97	87	79	53	4			
PP-22 12/99	0.0-1.5	Light gray fine sand (SP)							100	99	94	38	1			

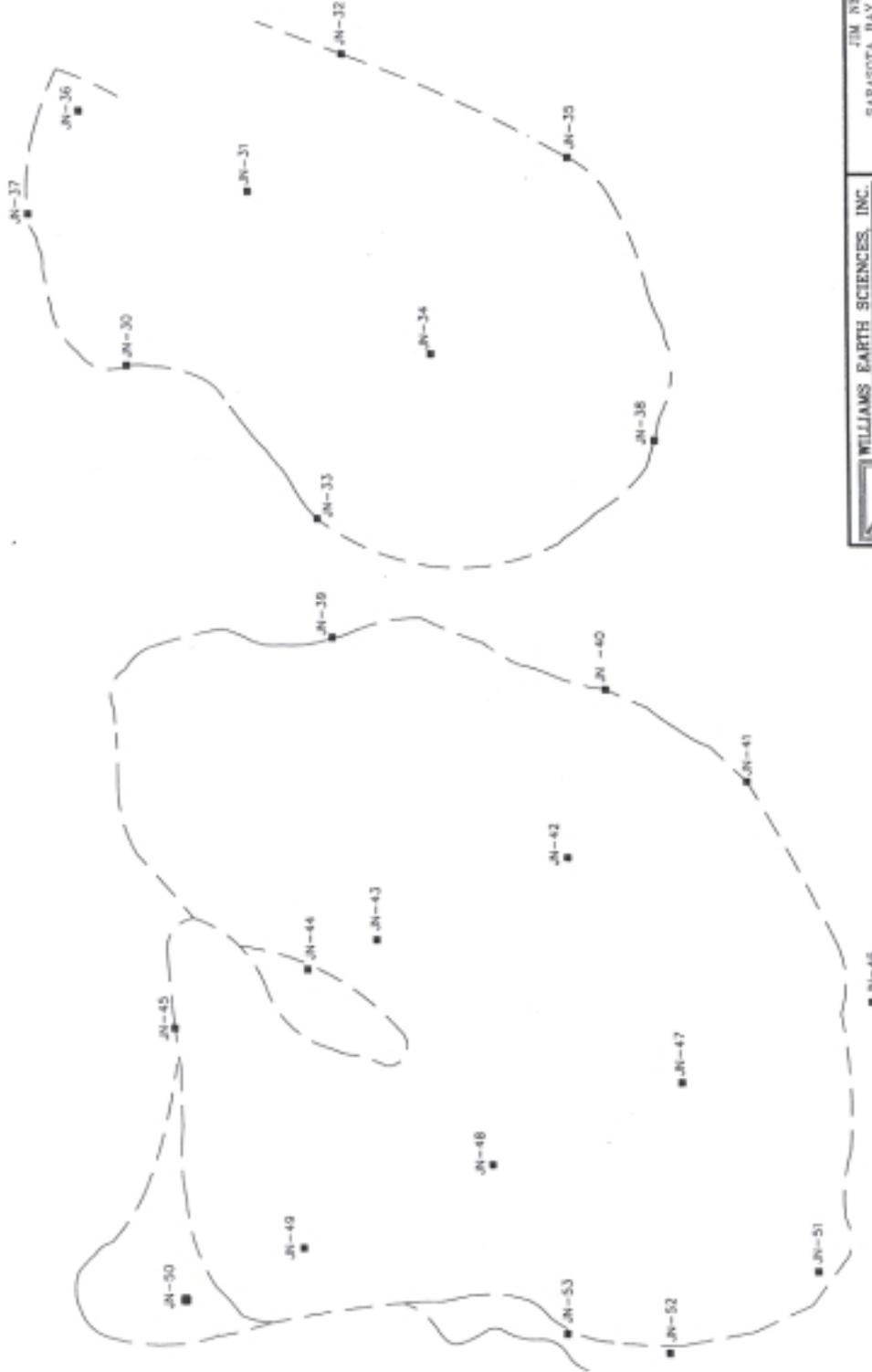
**WILLIAMS**  
EARTH SCIENCES, INC.

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Palmer Point

WILLIAMS PROJECT NO.: C398322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	Moisture						Organic Content (%)	Atterberg Limits				
				1"	3/8"	1/2"	3/4"	#4	#10		#40	#60	#100	#200	LL
PP-24 12/99	0.0-2.5	Light brown shelly fine sand (SP)					100	98	95	75	62	16	0		
PP-25 12/99	0.0-1.0	Light grayish brown slightly shelly fine sand (SP)							100	96	92	51	1		
PP-29 12/99	0.0-0.5	Dark brown silty peat (PT)	147												24



**WILLIAMS EARTH SCIENCES, INC.**

12000 E. 97th Ave.  
Mesa, Colorado 80403, U.S.A.

Large: (303) 341-1444  
Medium: (303) 341-1445  
Small: (303) 341-1446

Corporate: (303) 341-1447  
Fax: (303) 341-1448  
Telex: (303) 341-1449

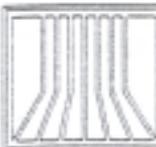


**JIM NEVILLE PRESERVE  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA**

**BORING LOCATION PLAN**

Drawn By: T.E.J.  
Checked By: SK  
Date: 1-12-00  
Resort No. C-399322  
Scale: AS SHOWN  
Figure No. 4

Jim

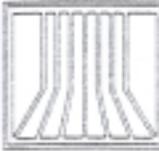

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 262-8852 Fax: (904) 262-8864  
 Panama City (904) 241-3415 Fax: (904) 241-3454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve

WILLIAMS PROJECT No: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-30	12/28/99	0.0-0.7	Light grayish brown slightly silty fine sand with minor roots	SP-SM	0.6	1.0
		0.7-1.0	Gray slightly silty fine sand	SP-SM		
JN-31	12/28/99	0.0-0.1	Root material	PT	5.6	6.0
		0.1-0.8	Light grayish brown phosphatic shelly fine sand	SP		
		0.8-2.0	Light grayish brown phosphatic shelly silty fine sand	SM		
		2.0-6.0	Light gray phosphatic shelly fine sand	SP		
		6.0-6.4	Gray slightly shelly fine sand with minor roots	SP		
		6.4-6.5	Gray silty fine sand	SM		
		6.5-7.0	Reddish brown peat	PT		
JN-32	12/28/99	0.0-0.7	Light grayish brown slightly shelly fine sand	SP	0.5	1.0
		0.7-1.3	Light gray slightly shelly slightly silty fine sand	SP-SM		
JN-33	12/28/99	0.0-1.0	Gray slightly shelly fine sand	SP	0.5	0.3
JN-34	1/4/00	0.0-2.0	Gray shelly fine sand with limestone gravel	SP-GP	7.5	7.5
		2.0-7.5	Light brown shelly fine sand with limestone fragments	SP-GP		
		7.5-8.0	Light gray fine sand	SP		



WILLIAMS EARTH SCIENCES, INC.  
CORPORATE OFFICE  
10600 Endeavour Way, Largo, FL 33777  
Largo (727) 541-3444 Fax (727) 541-1518  
Jacksonville (904) 262-8852 Fax (904) 262-8884  
Dunedin, FL (850) 242-8418 Fax (850) 243-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)	
JN-35	12/28/99	0.0-0.8	Light brown fine sand	SP	0.8	1.0	
		0.8-2.0	Gray slightly phosphatic slightly silty fine sand	SP-SM			
JN-36	1/4/00	0.0-3.5	Light brown shelly fine sand with limestone fragments	SP	3.7	4.3	
		3.5-4.3	Tan shelly slightly silty fine sand with limestone gravel	SP-GP			
		4.3-5.0	Gray very shelly fine sand with limestone gravel	SP-GP			
JN-37	12/29/99	0.0-0.3	Grayish brown shelly fine sand with roots	SP	2.5	1.5	
		0.3-1.0	Grayish brown shelly slightly silty fine sand with gravel	SP-SM			
		1.0-1.5	Gray slightly phosphatic fine sand	SP			
JN-38	12/28/99	0.0-0.7	Light brown fine sand	SP	0.7	1.0	
		0.7-0.8	Gray sandy clayey silt	MH			
		0.8-2.0	Dark brown peat	PT			
JN-39	12/28/99	0.0-0.8	Grayish brown slightly silty fine sand with minor roots	SP-SM	0.5	1.0	
		0.8-1.5	Reddish brown sandy peat	PT			

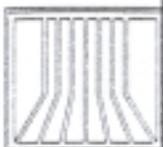
**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1516  
 Jacksonville (904) 262-8652 Fax: (904) 262-8664  
 Panama City (850) 142-3433 Fax: (850) 142-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve

WILLIAMS PROJECT Nº: C399322

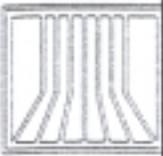
LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-40	12/28/99	0.0-0.7	Light tan fine sand	SP	1.0	1.0
		0.7-1.3	Light gray slightly silty fine sand	SP-SM		
		1.3-2.0	Reddish brown silty peat	PT		
JN-41	12/28/99	0.0-0.5	Light brown silty fine sand	SM	0.6	0.5
JN-42	1/4/00	0.0-4.0	Light brown shelly fine sand with limestone gravel	SP-GP	5.6	5.4
		4.0-6.0	Light brown slightly shelly slightly silty fine sand	SP-SM		
JN-43	12/28/99	0.0-1.0	Light gray shelly fine sand	SP	2.0	2.0
		1.0-2.0	Gray slightly shelly fine sand	SP		
JN-44	12/28/99	0.0-0.5	Light grayish brown slightly shelly slightly silty fine sand with minor roots	SP-SM	0.4	0.5
JN-45	12/28/99	0.0-0.5	Gray sandy silt with roots	PT	0.5	0.5
JN-46	12/28/99	0.0-0.5	Light brown silty fine sand with minor roots	SM	0.5	0.5


**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-3510  
 Jacksonville (904) 262-8852 Fax (904) 262-8866  
 Dunwoody, GA (770) 433-3410 Fax (770) 433-3454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve  
 WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-47	12/28/99	0.0-3.5 3.5-5.0	Light brown shelly fine sand with limestone gravel Light brown slightly shelly fine sand	SP-GP SP	5.2	5.0
JN-48	1/4/00	0.0-6.0	Tan shelly fine sand with limestone gravel Unable to penetrate further due to large rocks	SP-GP	10.6	Not Encountered
JN-49	12/28/99	0.0-3.5 3.5-4.0	Tan shelly slightly silty fine sand with limestone gravel Gray slightly shelly fine sand	SP-GP SP	3.2	3.5
JN-50	12/28/99	0.0-0.5	Light grayish brown slightly silty fine sand with minor roots	SP-SM	0.5	0.5
JN-51	12/28/99	0.0-0.5	Brown silty fine sand with minor roots	SM	0.7	0.5


**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10800 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-5444 Fax (727) 541-1510  
 Jacksonville (904) 262-8852 Fax (904) 262-8864  
 Dallas, TX (950) 241-5415 Fax (950) 241-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	* APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-52	12/28/99	0.0-0.5	Grayish brown silty fine sand with minor roots	SM	0.5	0.5
JN-53	12/28/99	0.0-0.5	Grayish brown silty fine sand	SM	0.5	0.5

\* Approximate surface elevation noted from topographic maps.

F:\PROJECTS\C399322\Hand Aug\Jim Neville Preserve.DOC

**WILLIAMS**  
EARTH SCIENCES, INC.

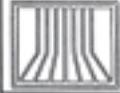
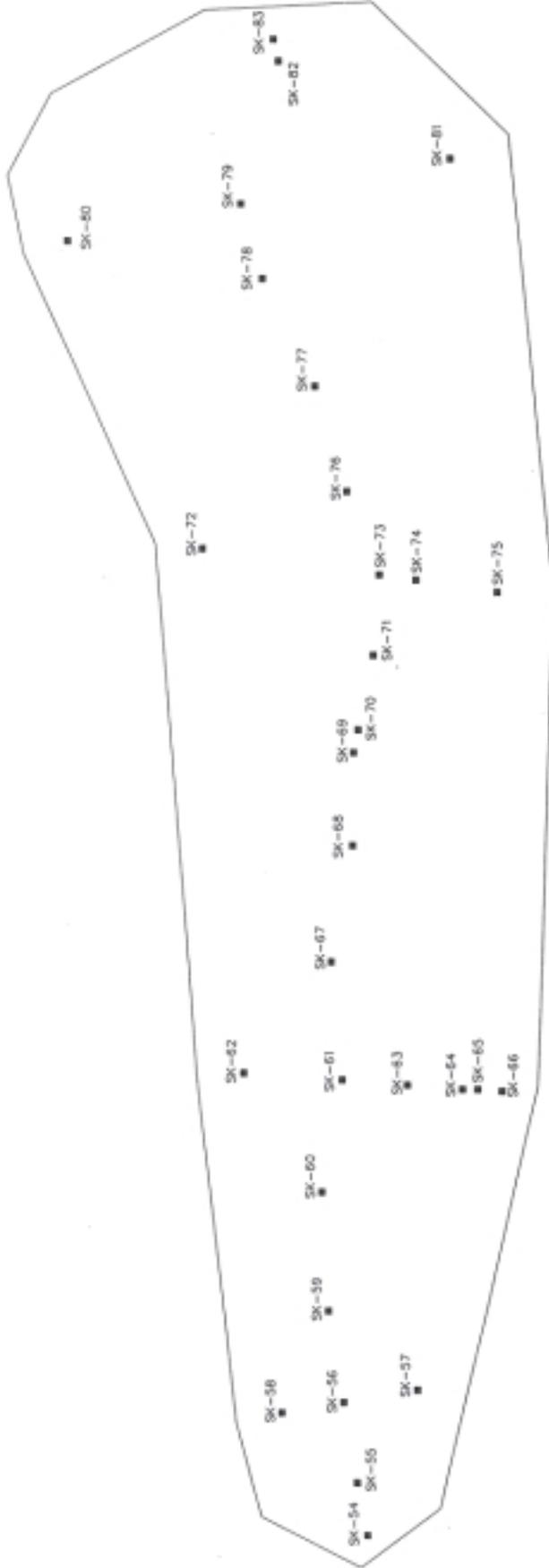
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Jim Neville Preserve

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1"	¾"	½"	%"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
															LL	PI
JN-30 1/00	0.7-1.0	Gray slightly silty fine sand (SP-SM)					100	95	94	93	91	70	9			
JN-31 1/00	2.0-6.0	Light gray phosphatic shelly fine sand (SP)			100		96	94	88	73	64	40	2			
JN-32 1/00	0.7-1.3	Light gray slightly shelly slightly silty fine sand (SP-SM)						100	99	98	96	82	7			
JN-33 1/00	0.0-1.0	Gray slightly shelly fine sand (SP)					100	99	99	96	90	62	5			
JN-35 1/00	0.8-2.0	Gray slightly phosphatic slightly silty fine sand (SP-SM)							100	99	99	80	8			
JN-37 1/00	0.3-1.0	Grayish brown shelly slightly silty fine sand with gravel (SP-SM)		100	88		88	79	69	55	49	33	6			
JN-39 1/00	0.0-0.8	Grayish brown slightly silty fine sand with minor roots (SP-SM)					100	99	99	95	89	60	7			
JN-40 1/00	1.3-2.0	Reddish brown silty peat (PT)	167										22	23		





**WILLIAMS EARTH SCIENCES, INC.**

LABORATORY OFFICE  
12800 Collier Blvd., Suite 11, 33977  
Largo, FL 34707 SK-1563  
Largo, FL 34707 SK-2044 FAX (727) 341-1563  
Tampa, FL 33604 SK-2044 FAX (813) 282-8884  
Pensacola, FL 32504 SK-2044 FAX (904) 282-8884  
Pensacola, FL 32504 SK-2044 FAX (904) 282-8884  
Pensacola, FL 32504 SK-2044 FAX (904) 282-8884

**SKIERS ISLAND  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA**

**BORING LOCATION PLAN**

Drawn By: TEJ Date: 1-12-00 Scale: AS SHOWN  
Checked By: SK Report No. C399.322 Figure No. 5

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 262-8852 Fax: (904) 262-8864  
 Panama City (904) 242-0419 Fax: (904) 242-2454

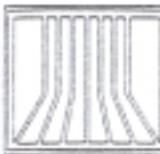
## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-54	1/5/00	0.0-1.0	Dark gray shelly fine sand	SP	0.0	0.0
SK-55	1/6/00	0.0-4.5	Light brown shelly fine sand with abundant limestone gravel and boulders	GP	3.3	4.2
SK-56	1/6/00	0.0-3.3	Brown shelly fine sand with limestone gravel	SP-GP	2.5	2.9
SK-57	1/6/00	0.0-3.5	Sandy shell hash with limestone boulders and gravel	GP	2.0	3.0
SK-58	1/6/00	0.0-1.0 1.0-1.8 1.8-2.5	Light brown shelly fine sand Light grayish brown shelly fine sand Gray shelly fine sand	SP SP SP	1.6	2.2
SK-59	1/6/00	0.0-6.0	Light brown shelly fine sand with limestone gravel	GP	5.8	5.8
SK-60	1/6/00	0.0-4.0 4.0-5.5 5.5-6.3	Sandy shell hash with limestone boulders and gravel Sandy shell hash with limestone gravel Light brown calcareous very sandy silt with limestone gravel	GP GP ML	5.6	5.8

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10000 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-5444 Fax: (727) 541-1510  
 Jacksonville (904) 262-8852 Fax: (904) 262-8884  
 Panama City (850) 241-3418 Fax: (850) 243-2454

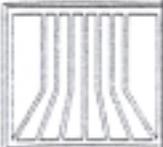


## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-61	1/6/00	0.0-4.8	Light brown calcareous very silty fine sand with limestone gravel	SM	4.8	5.7
		4.8-6.0	Light brown calcareous sandy silt with limestone gravel	ML		
SK-62	1/5/00	0.0-1.5	Light brown very shelly silty fine sand	SM	0.4	0.3
SK-63	1/5/00	0.0-2.5	Brown shelly fine sand with large shell fragments and gravel	GP	2.2	3.0
		2.5-3.5	Light brown shelly silty fine sand with limestone fragments	SM		
SK-64	1/5/00	0.0-1.5	Grayish brown shelly fine sand with roots	SP	0.1	0.3
SK-65	1/5/00	0.0-1.5	Shell hash	SP	1.8	2.3
		1.5-2.0	Gray shelly silty fine sand with abundant roots	PT		
		2.0-3.0	Grayish brown slightly shelly fine sand with minor roots	SP		

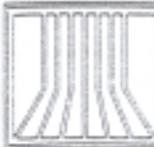

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 551-2444 Fax (727) 551-1510  
 Jacksonville (904) 252-6532 Fax (904) 252-6564  
 Panama City (904) 242-5415 Fax (904) 242-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-66	1/5/00	0.0-0.5 0.5-1.0	Light gray shelly fine sand with minor roots Gray shelly fine sand	SP SP	-0.2	0.3
SK-67	1/5/00	0.0-4.0	Light brown fine sand with limestone gravel and large shell fragments	GP	3.4	3.8
SK-68	1/5/00	0.0-2.5	Shell hash with limestone gravel and light brown fine sand	GP	1.7	2.2
SK-69	1/5/00	0.0-2.0 2.0-2.5	Shell hash with brown shelly fine sand Shell hash	GP GP	1.7	2.2
SK-70	1/5/00	0.0-1.8 1.8-2.5	Shell hash with light brown shelly fine sand Gray shelly fine sand	GP SP	0.9	1.6
SK-71	1/5/00	0.0-3.5	Light brown shelly slightly silty fine sand with large shell fragments and limestone gravel	SP-GP	3.5	3.2

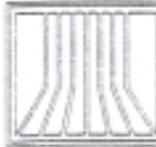

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-0510  
 Jacksonville (904) 262-8832 Fax (904) 262-8864  
 Panama City (850) 341-3415 Fax (850) 363-3454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-72	1/5/00	0.0-0.5	Grayish brown slightly silty fine sand with roots	SP-SM	0.3	0.5
		0.5-1.3	Gray slightly shelly slightly silty fine sand	SP-SM		
SK-73	1/5/00	0.0-4.8	Light brown shelly fine sand	SP	4.6	4.3
SK-74	1/5/00	0.0-2.5	Light brown shelly fine sand with large shell fragments and limestone gravel	SP-GP	1.2	2.2
SK-75	1/7/00	0.0-3.0	Light brown shelly fine sand with limestone gravel	SP	5.2	6.0
		3.0-5.0	Tan shelly silty fine sand with limestone gravel	SM		
		5.0-6.3	Shell hash with limestone gravel and sand	GP		
SK-76	1/7/00	0.0-3.0	Light brown very shelly fine sand	SP	3.4	4.7
		3.0-4.0	Light gray shelly fine sand	SP		
		4.0-4.5	Light brown shelly fine sand	SP		
		4.5-5.8	Gray shelly fine sand	SP		
SK-77	1/7/00	0.0-5.0	Light brown very shelly fine sand	SP	5.7	6.7
		5.0-6.5	Light brown shelly fine sand with limestone gravel	SP		
		6.5-7.5	Light brown shelly silty fine sand	SM		



WILLIAMS EARTH SCIENCES, INC.  
CORPORATE OFFICE  
10000 Endeavour Way, Largo, FL 33777  
Largo (727) 541-3444 Fax (727) 541-1516  
Jacksonville (904) 262-6653 Fax (904) 262-8864  
P.O. Box 241111 Jacksonville, FL 32224-1111

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-78	1/7/00	0.0-5.0 5.0-8.0	Light brown fine sand with large shell fragments and limestone gravel Light brown shelly silty fine sand with minor limestone gravel	GP SM	7.2	7.7
SK-79	1/7/00	0.0-7.0 7.0-8.0	Light brown shelly fine sand with limestone gravel Shell hash	SP GP	7.0	7.0
SK-80	1/7/00	0.0-2.0	Light brown shelly silty fine sand with limestone gravel Unable to penetrate further	SM	5.3	Not Encountered
SK-81	1/7/00	0.0-6.3	Light brown silty fine sand with limestone gravel	SM-GP	4.7	5.8
SK-82	1/7/00	0.0-3.0 3.0-5.5 5.5-6.0	Shell hash with light gray fine sand Light brown shelly fine sand with limestone gravel Tan silty fine sand with limestone gravel	GP SP-GP SP-GP	4.8	5.5

\*Approximate surface elevation noted from topographic maps.

F:\PROJECTS\C399XXX\C399322\HandAug\Skiers Island.DOC

**WILLIAMS**  
EARTH SCIENCES, INC.

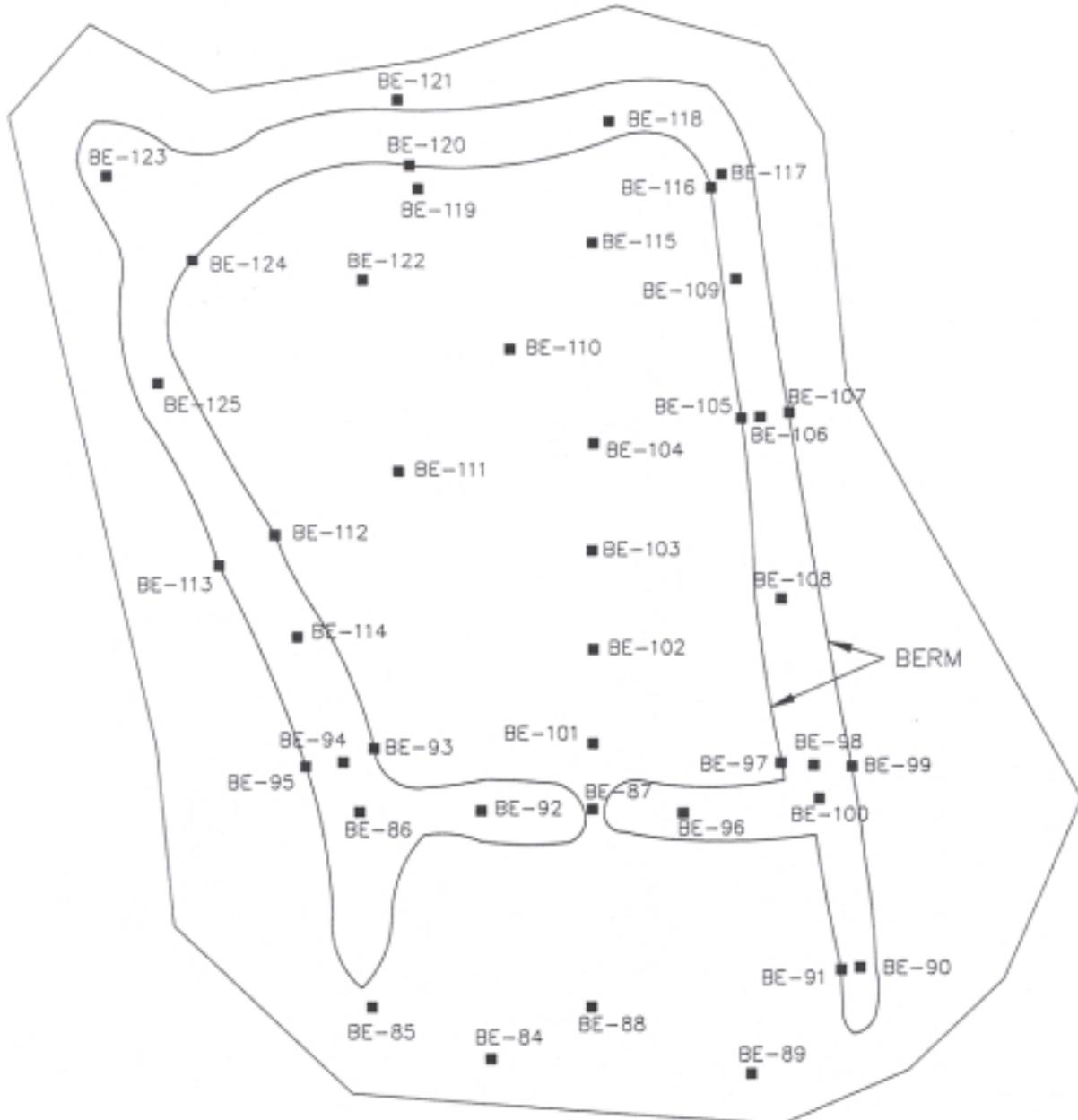
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Skier's Island

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1"	¾"	½"	¾"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
															LL	PI
SK-54 1/00	0.0-1.0	Dark gray shelly fine sand (SP)			100	95	92	87	79	58	42	23	4			
SK-62 1/00	0.0-1.5	Light brown very shelly silty fine sand (SM)		100	97	88	83	71	61	49	44	34	22			
SK-65 1/00	0.0-1.5	Shell hash (SP)			100	99	90	77	55	14	4	2	1			
SK-66 1/00	0.5-1.0	Gray shelly fine sand (SP)					100	97	93	83	75	43	4			
SK-72 1/00	0.5-1.3	Gray slightly shelly fine sand (SP)					100	99	96	90	86	64	4			
SK-80 1/00	0.0-2.0	Light brown shelly silty fine sand with gravel (SM)		100	89	84	70	56	40	36	32	24				

# BIG EDWARDS ISLAND



**WILLIAMS EARTH SCIENCES, INC.**

CORPORATE OFFICE:  
10800 Endeavour Way, Largo, FL 33777

Largo: (727) 541-3444 FAX: (727) 541-1510  
Jacksonville: (904) 262-8852 FAX: (904) 262-8864  
Panama City: (850) 747-9419 FAX: (850) 763-2454

**BIG EDWARDS ISLAND  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA**

**BORING LOCATION PLAN**

Drawn By: TEJ	Date: 1-12-00	Scale: AS SHOWN
Checked By: SK	Report No. C399322	Figure No. 6



February 10, 2000

HDR Engineering, Inc.  
2202 North Westshore Boulevard  
Suite 250  
Tampa, Florida 33607-5711

Attention: Mr. Bruce Hasbrouck, VP  
Senior Environmental Scientist

Subject: Report of Geotechnical Services  
Sarasota Bay Ecosystem Restoration  
Sarasota County, Florida  
Williams Project No. C399322

Dear Mr. Hasbrouck:

As authorized, Williams Earth Sciences, Inc. (Williams), has conducted a geotechnical exploration of five dredge spoil areas in Sarasota Bay. The purpose of this work was to determine the nature of the materials present in the dredge spoil areas and the potential use of the materials for the ecosystem restoration of Sarasota Bay.

The five dredge spoil areas explored included: Snake Island in the mouth of the Venice Inlet; Palmer Point and Jim Neville Preserve located in the vicinity of Midnight Pass; and Skier's Island and Big Edwards Island located in Robert's Bay off of Siesta Key. The scope of work included conducting hand auger borings to determine the nature of materials present at each location; conducting laboratory testing on selected samples to better define the characteristics of the materials; and an evaluation of the materials found to determine their potential for use in beach restoration, erosion protection and sea grass bed restoration.

On September 3, 1999, Williams representative, Stephen C. Knauss, P.E. visited all of the spoil areas accompanied by HDR representatives. Utilizing the observations made at that time and preliminary sketches of the areas prepared by King Engineering, boring locations were decided and those locations were sent to King Engineering. The borings were then located in the field by King Engineering as they surveyed the areas. There was a time gap between the boring layout and the execution of the field work. In some cases, the stakes had been removed before we conducted our borings. We then relocated the borings, measuring from existing stakes and topographic features. Therefore, some of the boring locations may be approximate. The boring elevations as noted on the boring logs were determined by King Engineering or from the topographic plans they supplied.

In addition, grab samples were obtained of the initial 6 inches of soil in two sea grass areas. One sample was obtained off of Palmer Point and the other was obtained off Jim Neville Preserve. These samples were obtained for laboratory testing and identification. The results of laboratory testing of samples from the spoil areas were compared with the sea grass samples to see if they were similar in nature.

CORPORATE OFFICE:  
10600 Endeavour Way  
Largo, FL 33777  
(727) 541-3444 FAX (727) 541-1510  
WESLargo@aol.com



All of the areas were reached by boat. Public launch ramps were utilized to place our boat(s) into the water.

The borings were conducted by utilizing either a bucket type hand auger or a post-hole digger. In addition, where a significant amount of rock or shell was found, it was necessary to use a pry bar to loosen or break the material so that the hole could be advanced. The holes were advanced to the water table or practical refusal utilizing the manually operated equipment. It is our understanding that the water level represented the original grade before the dredged materials were deposited.

For ease in identifying which spoil area the borings represented, the borings from Snake Island were identified as SN-; from Palmer Point Park PP-; from Jim Neville Preserve JN-; from Skier's Island SK-; and from Big Edwards Island BE-. In addition, the samples from sea grass areas were identified as SG-. Boring Location Plans for each of the studied areas are attached.

Upon completion of the field work, the samples were returned to the laboratory where the field identifications were confirmed by a Professional Geologist. Samples were selected for laboratory testing. The samples selected were felt to be representative of the soils encountered. However, due to the difficulty in obtaining representative samples of the larger sized materials, laboratory testing was limited to the sands and fine-grained soils. The laboratory tests included gradation tests, -200 wash gradations, organic content tests and Atterberg Limits tests. These were conducted in accordance with appropriate ASTM test procedures. Attached to this report are the boring logs, a summary of the laboratory tests as well as gradation curves for each of the soils tested.

This report is organized so that the subsurface conditions and uses of material from each spoil area will be discussed in their entirety with a summary at the end of the report. The field and laboratory data have also been organized by study area.

### SEA GRASS SAMPLES

Two samples from sea grass areas were obtained. SG-1 was taken from off Palmer Point while SG-2 was taken off Jim Neville Preserve. In both cases, the samples were obtained in shallow water. The samples were taken utilizing a hand auger and digging about 6 inches into the bottom.

The soils obtained included a shelly fine sand and a slightly silty slightly shelly fine sand. These soils were classified as SP and SP-SM respectively. Laboratory tests indicated that as much as 15 percent was larger than a No. 4 sieve. The amount of material passing the No. 200 sieve ranged from 2 to 9 percent.

### SNAKE ISLAND

Snake Island is a dredge spoil island located in the Venice Pass in south Sarasota County. It is approximately 2 acres in size. Topographically, it is characterized by about 2 foot high banks close to the waters edge. The elevation of the interior generally ranges from about 2 feet MSL to a high of about 7 feet MSL. The high point is located in the northwestern quadrant of the island. Vegetation included mangroves, dense shrub trees as well as some grass areas and large pine trees. There was evidence that people picnic on the island. A significant amount of shoreline erosion was observed on the west side of the island. It was noted during our drilling operations that the wake from virtually every boat entering Venice Pass washed the west side of the island. This appeared to be true even if the boats slowed when they were supposed to do so.

The field work on Snake Island was conducted on December 10, 1999. Eleven borings were conducted at the locations staked by King, or relocated, if necessary. According to the topographic survey of this island, the highest point on the island is about +7 feet (MSL) and as a result, the borings were as deep as 8 feet. The borings encountered soils classified as fine sands from the ground surface to their termination. Some shell and shell fragments, as well as small pieces of phosphate, were found within the sand. In observing the banks of the island, it appeared that the shell may be present in relatively thin layers. However, when sampled with a hand auger, these layers were not apparent. Boring SN-4 encountered soils consisting predominately of small shell fragments from 2 feet to the termination of the boring at 3.5 feet. This type of material has been described as a shell hash. At the termination of the borings conducted in the middle of the island and the northwest quadrant, an organic silt was encountered.

According to the 1987 Soil Conservation Service (SCS) soil survey, the soils on this site are identified as Canaveral fine sands, a natural formation. This soil type is described as fine sand with shell fragments. The 1959 soil survey shows Snake Island to be part of the island which presently exists to its northwest with the island described as a coastal beach ridge with some areas of tidal swamp. In comparing these descriptions with the results of our borings, it appears that it is possible that most of Snake Island may represent a natural deposit, not dredged material.

The results of the laboratory tests indicate that the soils can generally be identified as poorly graded fine sand (SP). Due to the shell fragments, there was some material that did not pass a No. 4 sieve. This ranged from 1 percent to as great as 41 percent in the case of the shell hash. All of the sand samples tested had less than 6 percent passing a No. 200 sieve. All material in the shell hash passed a 1-1/2 inch sieve with 7 percent retained on the No. 200 sieve. Two of the organic containing soils were tested for moisture content and organic content. The natural moisture content was on the order of 50% and the organic content ranged from 3.8 to 7 percent.

It appears that the soils found on the island may be utilized for beach restoration or sea grass restoration. The amount of shell present may preclude its use as a final layer on a beach where the area will be frequented by the public unless the material is screened to remove the larger material. In our preliminary report, we indicated that it may take processing the soil to remove the shell if it is to be used for sea grass restoration. However, based upon the tests of soil from sea grass areas, it now appears that such processing will not be necessary, as it appears that a significant amount of shell may be present in sea grass areas. As a result, it appears that all of the material from this island can be used for sea grass restoration areas. Large sized material was not found and as a result, the soils from this island will not be suitable for use as erosion protection material.

### **PALMER POINT PARK**

Palmer Point Park is located at the north end of Casey Key, just south of the former location of Midnight Pass. The dredge spoil area is about 5 acres. A mud flat is located to the south and Midnight Pass is located to the north. A tidal flat is located to the east. Residential property is located to the west and a tennis court adjoins the park on that side. Palmer Point has very little topography with the highest point at about elevation 4 feet MSL. However, there is an embankment adjacent to the tennis court with its top at about elevation 5 feet MSL. Vegetation ranges from underbrush to large trees. Mangroves are located on all sides of the park.

The field work was conducted on December 28, 1999. Eighteen borings were conducted at the locations staked by King Engineering. The borings encountered fine sands with varying amounts of shell fragments. A boring conducted in a mud flat on the east end of the Palmer Point, PP-29, encountered a silty peat from the ground surface to the termination of the boring at 6 inches. This may represent a former sea grass or mangrove area.

According to the 1987 SCS soil survey, the soils in the Palmer Point area are identified as Kesson and Wulfert mucks. These soil types are typically found in tidal marshes and swamps. Based upon our field work, it appears that these soils were present before the dredged material was deposited. The 1959 soil survey indicates that this area was generally below the water level and not given a soil description.

The results of the laboratory tests on the soils recovered indicated that the material was a fine sand with a relatively small amount of fines. Almost all of the shell fragments passed the No. 200 sieve. Most of the samples had less than 5 percent passing a No. 200 sieve and those identified as being silty had 6 to 12 percent passing a No. 200 sieve. An organic content test conducted on a sample from boring PP-29 revealed a natural moisture content of 147 percent and an organic content of 24 percent.

It appears that the materials found on Palmer Point may be used for beach restoration. In our preliminary report we indicated that it did not appear that the material could be used for sea grass restoration. However, a review of the laboratory data indicates that the gradation of these soils is not significantly different from the soils from the sea grass restoration areas. Therefore it appears that all of the material encountered may be utilized for either of the two uses. The materials encountered by our exploration are not suitable for erosion protection because the particle size of the materials was too fine.

### JIM NEVILLE PRESERVE

Jim Neville Preserve is the largest spoil area studied in this project. This spoil area is located to the east of the south end of Siesta Key, just to the north of what once was Midnight Pass. The area explored consisted of two areas separated by a mud flat. The total area is about 35 acres. The southern area has a gentle topography with a slight ridge running in northwest to southeast direction. The highest point of this area is at about elevation 7 feet MSL. The northern area is somewhat larger. It too has a gentle topography with a high point of about elevation 10.5 feet MSL located near its north end. The outer edges of the areas were vegetated with mangroves. On the interior, vegetation consisted of pine trees and pepper plants. In some cases, the peppers were very dense and impenetrable without cutting.

The bulk of the borings were drilled on December 28, 1999. However, due to difficult drilling conditions, it was necessary to return to this spoil area on January 4, 2000 to complete four of the borings. Twenty-four borings were drilled in the Jim Neville Preserve area.

Nine borings were drilled on the southern area. While most of the borings were drilled on the perimeter, three borings were drilled in the interior at an elevation of +2 feet MSL or higher. Those borings drilled on the perimeter encountered fine sands to their termination 1 to 2 feet below the ground surface. Some shell fragments, phosphate and silt were present in the samples. The three borings in the interior encountered fine sand with a significant amount of large, intact shell, shell fragments and limestone fragments to a depth of 5 to 7 feet below the ground surface. This material appears to represent dredged fill. It was difficult to advance these holes manually due to the size and amount of shell and rock pieces encountered. It was necessary to utilize a rod to break or loosen the material before it could be removed from the hole using either a hand auger or a posthole digger. Due to the large size of the material, it was not possible to recover a representative sample for laboratory testing. Below the dredged material, fine sands were encountered to the termination of the borings. Boring JN-38, drilled at the northwest end of this area, encountered peat below one foot. This probably represents mangrove areas covered by dredged materials.

In the northern area, 15 borings were drilled. Four of the borings were drilled at higher interior locations while the rest were drilled around the perimeter of the area. These borings encountered similar materials to the southern area. The perimeter borings encountered fine sand with some shell fragments, phosphate and silt. These borings were terminated within 2 feet of the ground surface. The interior borings encountered dredged material consisting of large, intact shell, shell fragments and limestone fragments

from the ground surface to a depth of 3 to 6 feet below the ground surface. One boring, JN-48 could not be advanced beyond 6 feet due to the large rock and therefore, it did not reach its anticipated termination depth at about 7 to 8 feet below the ground surface. The digging was difficult and representative samples could not be obtained for laboratory testing. Three borings, JN-39, JN-40 and JN-45, encountered peat from one to two feet below the ground surface and were terminated in this material.

The peat was encountered in those borings drilled at the interface of the two areas. This would appear to represent an area where pre-existing vegetation was buried during the dredging operations.

According to the 1987 SCS soil survey, the soils in the Jim Neville Preserve area are Kesson and Wulfert mucks. These soil types are typically found in tidal marsh areas and tidal swamps. Our field work indicates that this type was present before the dredge material was placed. The 1959 soil survey shows a somewhat different configuration for this area and identifies the soils as tidal swamp area.

Laboratory testing was limited to those samples representative of the soils present in the field. As a result, those soils containing significant amounts of shell or limestone fragments were not tested. Therefore, the laboratory tests were primarily conducted on samples taken from borings on the exterior of the area. The results of the laboratory tests indicated that the perimeter soils are poorly graded fine sands. Most of the samples tested had 95 percent or more passing the No. 4 sieve with less than 10 percent passing the No. 200 sieve. A near surface sample from JN-37 had 79 percent passing the No. 4 sieve. One sample of the soil identified as peat was tested for moisture content and organic content. The results of the test indicated a moisture content of 167 percent and an organic content of 23 percent by weight.

With the exception of the soils found at the perimeter of the Jim Neville Preserve, the dredged material encountered does not appear to be suitable for beach restoration due to the significant amount of large material such as whole shells as well as limestone pieces. For the same reason, it does not appear that the material from the interior will be suitable for use in sea grass restoration areas. The manual sampling techniques did not provide for recovery of material large enough to be considered for erosion protection. However, no large limestone pieces (6"+) were observed and as a result, we do not believe that there is a significant amount of dredged material from this area that will be suitable for erosion protection. As a result, without processing, it does not appear that material from this area can be used for restoration projects and its use appears to be limited to general fill.

### **SKIER'S ISLAND**

Skier's Island is a dredge spoil island located in the south half of Robert's Bay. It is to the west of the Gulf Intracoastal Waterway. It is a relatively long, slender island approximately 1250 feet long by an average of 275 feet wide and encompassing approximately 8 acres. The site has a ridge running along its spine ranging in elevation from about 6 feet MSL near the south end to about 7 feet MSL near its north end. In addition, there was a break in the ridge at about the middle of the island where the ridge dips to an elevation of about 1 foot MSL. Vegetation included mature pines as well as mangroves along the edge of the island. Rocks, on the order of 6 inches +/-, were observed on the ground surface. At the time of our field work, a camp ground occupied by at least one person was observed at the north end of the island.

The field work was conducted on Skier's Island from January 5<sup>th</sup> to January 8<sup>th</sup>, 2000. Twenty-nine borings were drilled on Skier's Island, most at locations as staked by King Engineering. Some stakes had been removed and they were relocated by Williams' personnel utilizing a tape and turning approximate angles from existing landmarks. In general, the borings drilled at elevation +2 feet (MSL) or less, encountered fine sands with some shell or limestone pieces and are considered to be sands. The borings drilled where the elevation was +2 feet MSL or higher encountered dredged fill material consisting of sand with large shell and pieces of limestone. In some borings, the samples consisted almost entirely of

shell and were identified as shell hash, while in other areas the samples primarily consisted of limestone pieces. These soils were sometimes classified as gravels even though there technically may be very little "gravel" present. Some of the surficial limestone pieces were as large as 12 inches in one dimension. It was very difficult to advance the holes due the size of material encountered as well as its interlocked nature. It was necessary to utilize a rod to loosen the formation before it could be removed utilizing the hand auger or posthole digger. It was not possible to advance all of the borings to their programmed depth due to size of material encountered. Due to the manual excavation techniques utilized, it was also not possible to determine how large the larger pieces of limestone were.

According to the 1987 SCS soil survey, the soils on Skier's Island are identified as Kesson and Wulfert mucks. With the exception of one boring where a significant amount of roots were found, this material was not apparent. A review of the 1959 soil survey does not show any evidence of Skier's Island. Therefore, we do not believe that this island is underlain by organic material.

Laboratory testing was generally conducted on selected samples from the borings made at elevation +2 feet MSL or less. The test results indicated that soils identified as very shelly or shell hash had 23 to 29 percent retained on the No. 4 sieve, the dividing sieve between gravel and sand. Most of them also had less than 5 percent passing the No. 200 sieve. However, a sample taken from SK-62 from 0 to 1.5 feet MSL and identified as an SM, contained 22 percent material finer than the No. 200 sieve. A gradation test conducted on the initial 2 feet of material from boring SK-80 at elevation 5.3 feet MSL and identified as an SM, indicated that 30 percent of the sample was retained on the No. 4 sieve and 24 percent of the sample passed a No. 200 sieve. Laboratory tests were not conducted on those samples identified as gravels and poorly graded sands because we could not obtain a large enough sample to consider it representative of the materials present.

With the exception of the soils found at the perimeter of the island it appears that the material present can't be used for beach or sea grass restoration areas due to the size of material encountered. It also appears that without processing, the material sampled and/or observed in the interior areas of the island is not of sufficient size to allow it to be used for erosion protection. It is likely that some of the material could be used for erosion protection, but it does not appear that there is a sufficient quantity that it would be cost effective to process the material. Excavation utilizing machinery would be necessary to confirm this opinion.

## **BIG EDWARDS ISLAND**

Big Edwards Island is located in the northern area of Robert's Bay, just south of the Siesta Key Bridge. The island is relatively square in shape with dimensions of 550 feet north-to-south and 400 feet east-to-west. The island is approximately 6 acres in area. It is our understanding that this area had been a mangrove island which had been used as a spoils area for the dredging of the Inland Waterway which is located on the east side of the island. The topography of this island was unlike the other 4 areas studied under this contract. There was a relatively narrow perimeter berm enclosing an area where dredged material was placed. The elevation outside the perimeter of the berm ranged from 0 MSL to about 5 feet MSL. According to the survey, the elevation of the top of the berm generally varied from about 12 to 13 feet MSL. However, the berm was as high as about 14 feet MSL in the northwest corner of the island. Inside of the berm, the elevation varied from a low of about 5 feet MSL at the south end of the island to a high of about 17 feet MSL near the north end of the island. Vegetation ranged from mature pine trees to areas of mangroves. The island was generally accessible without cutting vegetation. There was some evidence that people visited the island on a regular basis.

Field work on Big Edward's Island was conducted between January 7 and 13, 2000. Forty-two borings were drilled on Big Edward's Island. Most of the borings were drilled at stakes placed by King Engineering. However, some stakes had been removed and those drilling locations were determined by the Williams drill crew by measuring from the remaining stakes and the topographic features. Prior to drilling it was suspected that the material in the berm would be different from the material inside of the bermed area. However, the borings drilled in the berm and inside of the berm encountered similar dredged fill consisting of fine sand with varying amounts of shell and limestone rock pieces. The rock included pieces as large as 8 to 10 inches in dimension. In some cases, the soils encountered were classified as gravel. It was very difficult to advance the borings and in two cases the auger heads broke off in the holes and were lost. At several locations, the holes were abandoned before their scheduled termination depth due to large rocks being encountered. This was in spite of the fact that posthole diggers and a rod with a point were used to assist in the advancement of the boring. It appeared that more shell was found at the south end of the island with more rock found in the samples from the northern end of the island. As with the Skier's Island which had significant rock or shell, the borings conducted at the lower elevations of the perimeter of the island encountered fine sands with some shell fragments. In addition, some silty sands and sandy silts were encountered, primarily at the south end of the island and at about 0 MSL.

According to the 1987 SCS soil survey, the soils on Big Edwards Island are identified as Kesson and Wulfert mucks. Two borings encountered organic soils at their termination depths and several other borings encountered silts which may represent the top of this soil type. The 1959 soil survey shows an island with a slightly different configuration and identifies the soils as representative of tidal swamps. It is possible that the organic deposits are more extensive, but have settled under the load of the dredged material and were below the depth of our exploration.

Laboratory tests were conducted on selected samples. It was not possible to conduct tests on much of the dredged material because the sampling technique did not allow us to obtain representative samples of the large shell or rock. The laboratory grain size tests indicated that the soils from the lower elevations on this island contained much more silt than the other dredge spoil areas studied under this contract. Samples with 71 to 91 percent passing a No. 4 sieve had 22 to 32 percent passing a No. 200 sieve. Laboratory grain size tests were also conducted on three samples identified as silts. The fines content ranged from 56 to 96 percent. An Atterberg Limits test was conducted on a sample from BE-88 at 3 to 4 feet below the ground surface with 82 percent passing the No. 200 sieve. The results indicated a liquid limit of 41 and a plasticity index of 16. This means that this soil is at the borderline of being a low plasticity silt (ML) and a low plasticity clay (CL). The natural moisture content of this soil was 50 percent.

Based upon the samples recovered, it does not appear that the dredged material from this island can be used for beach restoration or sea grass restoration due to the relatively large size of material encountered. It also did not appear that a sufficient amount of material was large enough to allow it to be used for erosion protection. The samples recovered and the material observed suggest that there would be a relatively small amount of material suitable for erosion protection after processing has been conducted.

## GENERAL COMMENTS

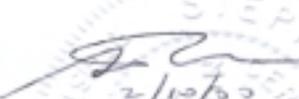
The nature of dredging operations is such that the soils found in spoils areas will vary significantly within a relatively short distance. We have described the soils encountered in this study in general terms, however, the soils did vary from boring to boring as can be expected for dredged fill. It should be noted that the manual exploration techniques utilized did not allow us to obtain representative samples of the larger material on Jim Neville Preserve, Skier's Island and Big Edwards Island. As a result, we could not conduct gradation tests on the recovered samples. It would be necessary to excavate test pits, probably

utilizing a backhoe, to allow us to obtain a representative sample, particularly at depth. That was beyond the scope of our exploration. In addition, the nature of dredged material is such that it is possible that pockets and layers of material not encountered by our exploration will be encountered during construction operations.

Williams has appreciated this opportunity to be of service to you on this project. Should you have any questions, please contact us at your convenience.

Sincerely,

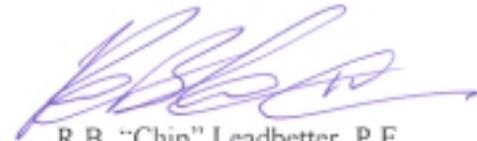
**WILLIAMS EARTH SCIENCES, INC.**



2/10/00  
Stephen C. Krauss, P.E.  
Senior Geotechnical/Materials Engineer  
Florida Registration No. 28202

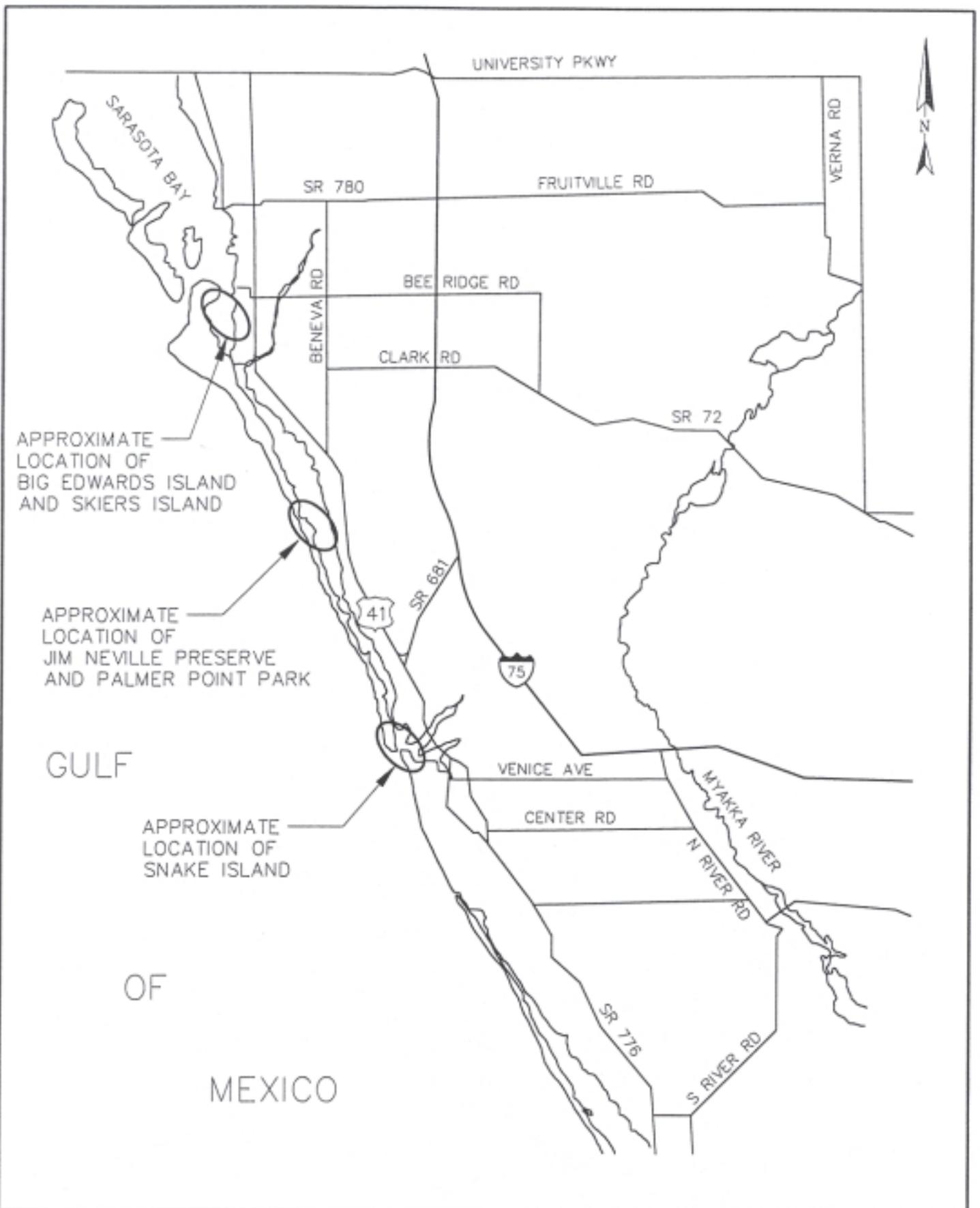
Distribution: (2) Addressee  
(1) File

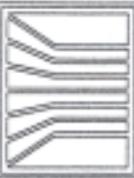
Attachments: Site Location Maps  
Report of Auger Borings  
Summary of Laboratory Tests  
Laboratory Test Results



R.B. "Chip" Leadbetter, P.E.  
Senior Geotechnical Engineer  
Florida Registration No. 53182

F:\PROJECTS\C399\XNC399322\Report.doc



	<b>WILLIAMS EARTH SCIENCES, INC.</b>	
	CORPORATE OFFICE: 10600 Endeavour Way, Largo, FL 33777	
	Largo: (727) 541-3444	FAX: (727) 541-1510
	Jacksonville: (904) 262-8852	FAX: (904) 262-8864
Panama City: (850) 747-9419	FAX: (850) 763-2454	

SARASOTA BAY ECOSYSTEM RESTORATION SARASOTA COUNTY, FLORIDA		
SITE LOCATION MAP		
Drawn By: TEJ	Date: 1-12-00	Scale: N.T.S.
Checked By: SK	Report No. C399322	Figure No. 1

SEA GRASS AREAS

PALMER POINT  
&  
JIM NEVILLE PRESERVE

**WILLIAMS**  
EARTH SCIENCES, INC.

**SUMMARY OF LABORATORY TEST RESULTS**

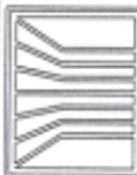
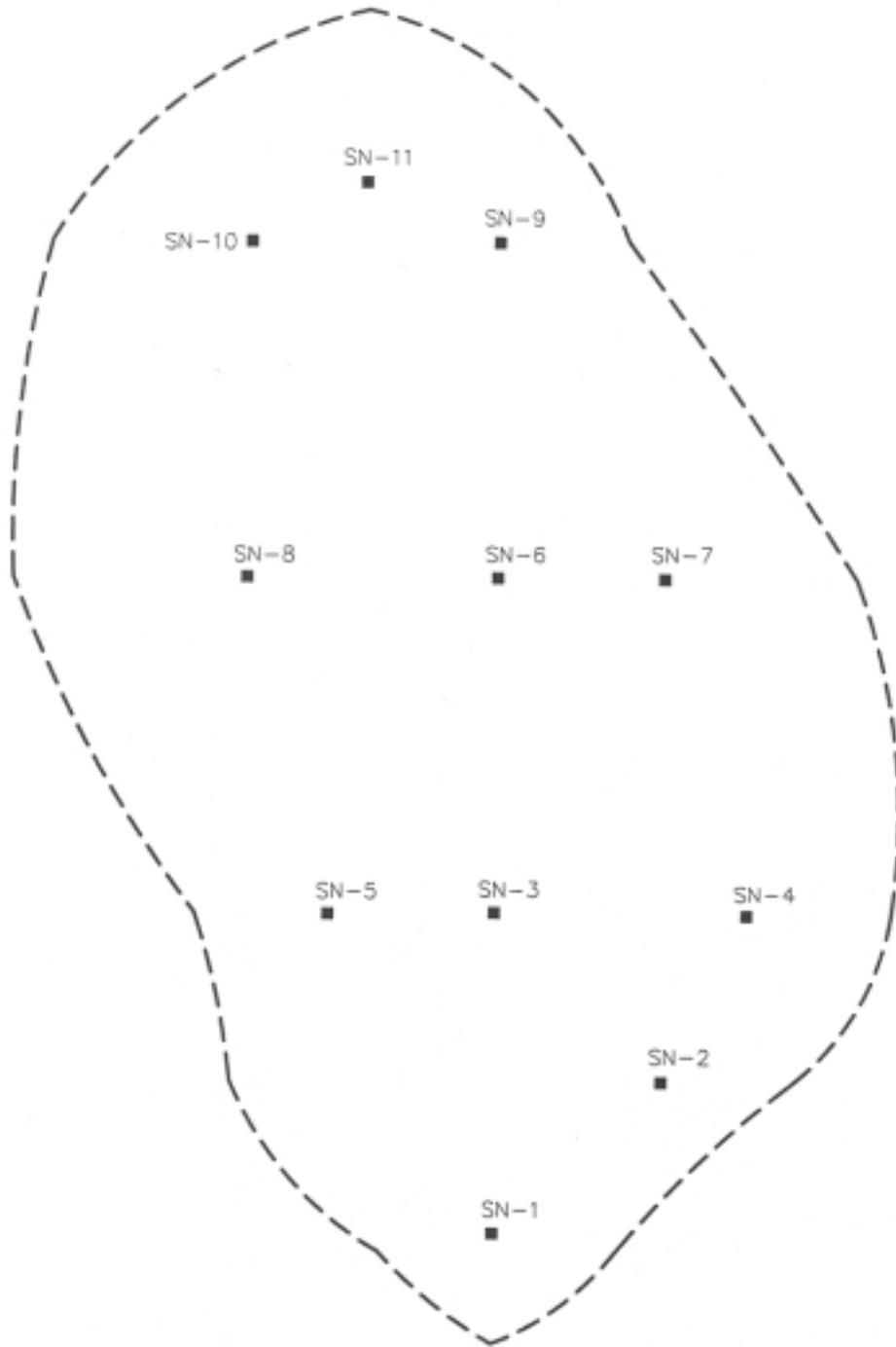
CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Sea Grass Areas (Palmer Point and Jim Neville Preserve)

WILLIAMS PROJECT NO.: C398322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits		
																LL	PI	
SG-1 12/99	---	Grey shelly fine sand with grasses (SP) (Sampled off of Palmer Point)		100	96	96	90	90	85	82	74	64	35	2				
SG-2 12/99	---	Dark gray slightly silty slightly shelly fine sand with grasses (SP-SM) (Sampled off of Jim Neville Preserve)				100	99	99	97	93	89	85	59	9				

\*NOTE: Borings SG-1 and SG-2 were completed in sea grass areas.

# SNAKE ISLAND



**WILLIAMS EARTH SCIENCES, INC.**

CORPORATE OFFICE:  
10600 Endeavour Way, Largo, FL 33777

Largo: (727) 541-3444 FAX: (727) 541-1510  
 Jacksonville: (904) 262-8852 FAX: (904) 262-8864  
 Panama City: (850) 747-9419 FAX: (850) 763-2454

**SNAKE ISLAND  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA**

**BORING LOCATION PLAN**

Drawn By: TEJ	Date: 1-12-00	Scale: AS SHOWN
Checked By: SK	Report No. C399322	Figure No. 2

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo, (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 262-8832 Fax: (904) 262-8864  
 Dunedin, (850) 342-9418 Fax: (850) 353-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Snake Island

WILLIAMS PROJECT N°: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SN-1	12/10/99	0.0-1.5	Light grayish brown phosphatic fine sand	SP	1.1	1.8
		1.5-2.5	Light gray phosphatic slightly shelly fine sand	SP		
SN-2	12/10/99	0.0-1.0	Light gray fine sand	SP	1.9	2.8
		1.0-2.5	Light grayish brown phosphatic fine sand	SP		
		2.5-3.5	Light grayish brown shelly phosphatic fine sand	SP		
SN-3	12/10/99	0.0-1.8	Light grayish brown slightly shelly fine sand	SP	3.9	4.0
		1.8-3.0	Light brown shelly fine sand	SP		
		3.0-3.5	Light brown slightly shelly fine sand	SP		
		3.5-4.5	Grayish brown slightly shelly fine sand	SP		
SN-4	12/10/99	0.0-1.0	Light brown fine sand	SP	2.2	3.7
		1.0-2.0	Dark grayish brown shelly slightly silty fine sand	SP-SM		
		2.0-3.5	Slightly silty shell hash	SP		
SN-5	12/10/99	0.0-2.5	Light grayish brown shelly fine sand	SP	4.1	4.0
		2.5-3.0	Light brown shelly fine sand with decaying roots	SP		
		3.0-4.5	Grayish brown fine sand	SP		

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE:  
 10600 Endeavour Way, Largo, FL 33777  
 Largo: (727) 561-2444 Fax: (727) 561-1510  
 Jacksonville: (904) 262-8652 Fax: (904) 262-8666  
 Panama City: (904) 872-8433 Fax: (904) 872-2454

## REPORT OF AUGER BORINGS

**CLIENT: HDR Engineering, Inc.**  
**PROJECT: Sarasota Bay Ecosystem - Snake Island**

**WILLIAMS PROJECT Nº: C399322**

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SN-6	12/10/99	0.0-1.0	Light brown slightly shelly fine sand	SP	5.6	6.0
		1.0-2.8	Light brown shelly fine sand	SP		
		2.8-5.0	Light brown fine sand	SP		
		5.0-6.0	Interlayered light brown fine sand and dark grayish brown organic silt	PT		
SN-7	12/10/99	0.0-2.5	Grayish brown shelly fine sand	SP	5.0	5.0
		2.5-4.0	Light brown shelly fine sand	SP		
		4.0-5.0	Light brown shelly fine sand with large oyster shells	SP		
		5.0-6.0	Interlayered light gray fine sand and dark brown organic silt	PT		
SN-8	12/10/99	0.0-1.5	Light grayish brown fine sand	SP	6.9	7.0
		1.5-6.0	Light brown shelly fine sand	SP		
		6.0-7.0	Brown slightly shelly fine sand	SP		
		7.0-8.0	Interlayered grayish brown fine sand and dark grayish brown organic silt	PT		
SN-9	12/10/99	0.0-1.8	Light brown fine sand with minor roots	SP	3.0	3.6
		1.8-4.0	Brown fine sand	SP		
		4.0-6.0	Dark brown fine sand	SP		


**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo: (727) 541-3444 Fax: (727) 541-1518  
 Jacksonville: (904) 262-8852 Fax: (904) 262-8844  
 Panama City: (904) 874-3113 Fax: (904) 874-3111

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Snake Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SN-10	12/10/99	0.0-2.5	Light brown fine sand	SP	4.8	5.1
		2.5-4.5	Light brown medium to fine sand	SP		
		4.5-5.5	Light grayish brown shelly fine sand	SP		
		5.5-6.0	Dark brown very silty fine sand with finely divided organic matter	PT		
SN-11	12/10/99	0.0-1.0	Light brown fine sand with minor roots	SP	2.1	2.7
		1.0-2.8	Light brown fine sand	SP		
		2.8-5.5	Dark brown fine sand with minor finely divided organic matter	SP		
		5.5-6.0	Gray silty fine sand with minor finely divided organic matter and shell fragments	SM		

\*Approximate surface elevation noted from topographic maps.

F:\PROJECTS\C399322\HANDAUG.DOC

**WILLIAMS**  
EARTH SCIENCES, INC.

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Snake Island

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1 1/2"	1"	% <sup>w</sup>	1/2"	% <sup>w</sup>	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
																LL	PI
SN-2 12/99	1.0-2.5	Light grayish brown phosphatic fine sand (SP)				100			99	98	96	77	13	0			
SN-3 12/99	0.0-1.8	Light grayish brown slightly shelly fine sand (SP)		100		97			95	93	84	73	37	1			
SN-4 12/99	2.0-3.5	Slightly silty shelly hash (SP)		100	95	69	73	84	59	51	40	37	24	7			
SN-5 12/99	0.0-2.5	Light grayish brown shelly fine sand with decaying roots (SP)				99	100		92	82	63	50	19	1			
SN-6 12/99	5.0-6.0	Interlayered light brown fine sand and dark grayish brown organic silt (PT)	50											13	7		
SN-7 12/99	0.0-2.5	Grayish brown shelly fine sand (SP)		100		85	88		74	63	46	34	11	1			

**WILLIAMS**  
EARTH SCIENCES, INC.

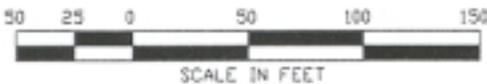
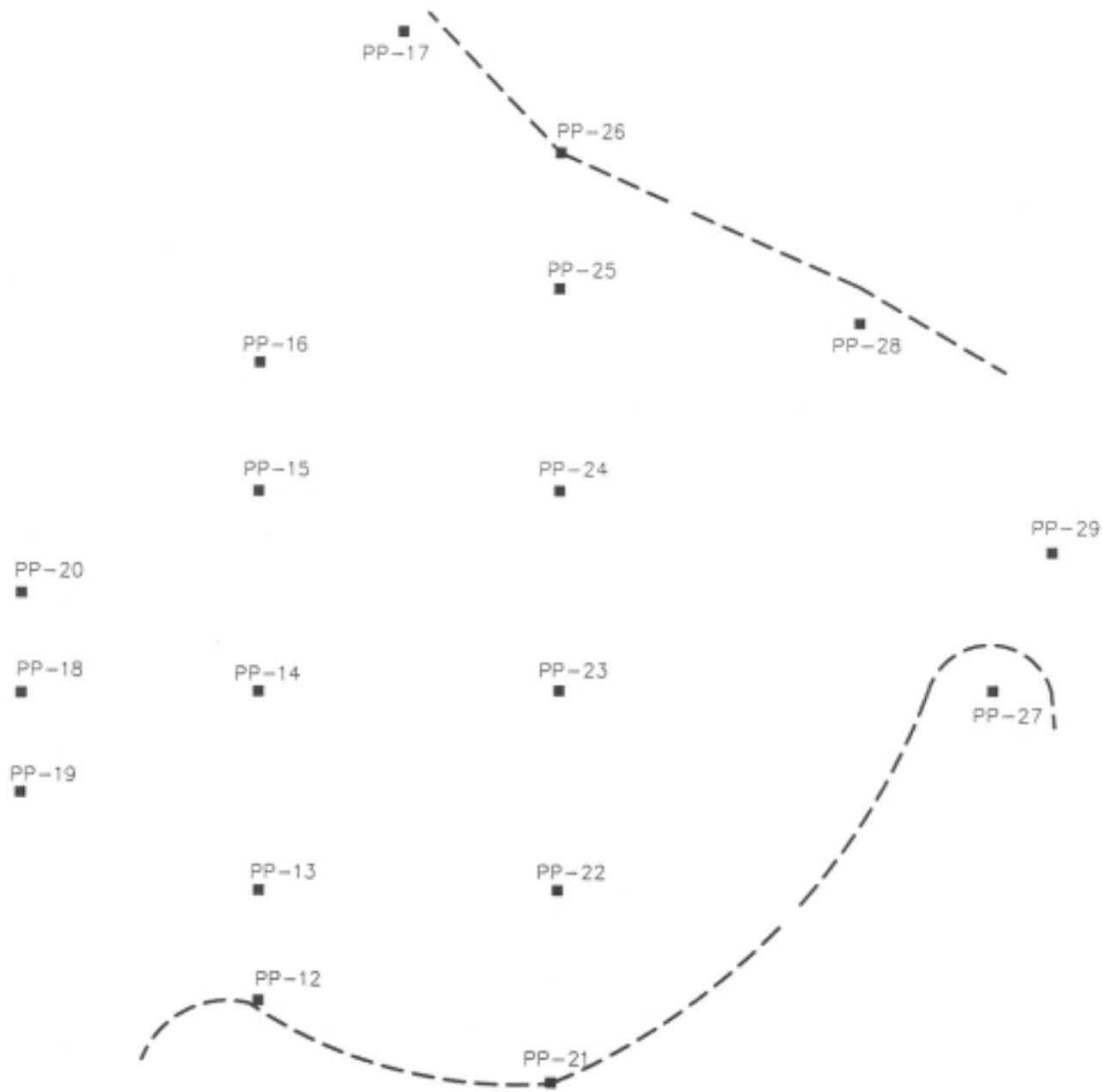
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Snake Island

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
																LL	PI
SN-9 12/99	0.0-1.8	Light brown fine sand with minor roots (SP)								100	99	96	41	1			
SN-9 12/99	4.0-6.0	Dark brown fine sand (SP)						100	99	99	97	90	47	3			
SN-10 12/99	2.5-4.5	Light brown medium to fine sand (SP)					100	99	96	91	53	37	14	1			
SN-11 12/99	2.8-5.5	Dark brown fine sand with minor finely divided organic matter (SP)	46											4	3.8		

# PALMER POINT PARK



**WILLIAMS EARTH SCIENCES, INC.**

CORPORATE OFFICE:  
10800 Endeavour Way, Largo, FL 33777

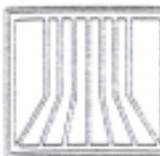
Largo:	(727) 541-3444	FAX: (727) 541-1510
Jacksonville:	(904) 282-8852	FAX: (904) 282-8854
Panama City:	(850) 747-9419	FAX: (850) 763-2454

**PALMER POINT PARK  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA**

**BORING LOCATION PLAN**

Drawn By: TEJ	Date: 1-12-00	Scale: AS SHOWN
Checked By: SK	Report No. C399322	Figure No. 3

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo: (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville: (904) 262-6637 Fax: (904) 262-8864  
 Phoenix, AZ: (602) 242-5818 Fax: (602) 263-2454



## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Palmer Point

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
PP-12	12/28/99	0.0-0.5	Grayish brown slightly shelly fine sand with minor cementations	SP	0.9	0.5
PP-13	12/28/99	0.0-1.0	Grayish brown slightly shelly slightly silty fine sand with minor roots	SP-SM	1.3	1.0
PP-14	12/28/99	0.0-1.5 1.5-2.0	Light brown fine sand Light grayish brown silty fine sand	SP SM	2.3	2.0
PP-15	12/28/99	0.0-1.5 1.5-2.0	Light brown slightly shelly fine sand Mottled light gray and reddish brown slightly shelly slightly silty fine sand	SP SP-SM	2.0	2.0
PP-16	12/28/99	0.0-0.5	Grayish brown silty fine sand	SM	0.6	0.5
PP-17	12/28/99	0.0-1.0	Light brown slightly shelly medium to fine sand	SP	1.3	1.0
PP-18	12/28/99	0.0-1.0	Light grayish brown slightly silty fine sand with minor roots	SP-SM	2.7	1.0

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1516  
 Jacksonville (904) 263-8652 Fax: (904) 263-8884  
 Panama City (904) 263-3433 Fax: (904) 263-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Palmer Point

WILLIAMS PROJECT N<sup>o</sup>: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
PP-19	12/28/99	0.0-1.0	Brown silty fine sand with minor limnerock fragments	SM	2.7	1.0
PP-20	12/28/99	0.0-1.0	Gray shelly fine sand	SP	2.8	1.0
PP-21	12/28/99	0.0-1.0	Light gray fine sand	SP	0.8	1.0
PP-22	12/28/99	0.0-1.5	Light gray fine sand	SP	2.0	1.5
PP-23	12/28/99	0.0-1.5	Light gray fine sand	SP	3.5	3.5
		1.5-3.0	Light gray shelly fine sand with minor roots	SP		
		3.0-3.5	Light gray slightly shelly fine sand	SP		
PP-24	12/28/99	0.0-2.5	Light brown shelly fine sand	SP	3.9	4.0
		2.5-4.0	Light brown slightly shelly fine sand with minor roots	SP		
PP-25	12/28/99	0.0-1.0	Light grayish brown slightly shelly fine sand	SP	1.2	1.0

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-0510  
 Jacksonville (904) 262-8832 Fax (904) 262-8864  
 Duval County (904) 262-3333 Fax (904) 262-3254

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Palmer Point

WILLIAMS PROJECT №: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
PP-26	12/28/99	0.0-0.5	Gray shelly fine sand	SP	0.7	0.5
PP-27	12/28/99	0.0-0.5	Light grayish brown fine sand	SP	0.5	0.5
PP-28	12/28/99	0.0-0.5	Brown slightly shelly fine sand with minor roots	SP	0.9	0.5
PP-29	12/28/99	0.0-0.5	Dark brown silty peat	PT	0.2	0.5

\* Approximate surface elevation noted from topographic maps.

F:\PROJECTS\C399XX\C399322-Hand-Aug\Palmer Point.DOC

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Palmer Point

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1"	¼"	½"	%*	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
															LL	PI
PP-13 12/99	0.0-1.0	Grayish brown slightly shelly slightly silty fine sand with minor roots (SP-SM)							100	97	93	63	10			
PP-14 12/99	1.5-2.0	Light grayish brown silty fine sand (SM)							100	99	96	75	12			
PP-15 12/99	1.5-2.0	Mottled light gray and reddish brown slightly shelly slightly silty fine sand (SP-SM)		100	99	99	99	99	99	94	86	49	6			
PP-17 12/99	0.0-1.0	Light brown slightly shelly medium to fine sand (SP)					100	96	97	84	51	6	1			
PP-20 12/99	0.0-1.0	Gray shelly fine sand (SP)					100	99	97	87	79	53	4			
PP-22 12/99	0.0-1.5	Light gray fine sand (SP)							100	99	94	38	1			

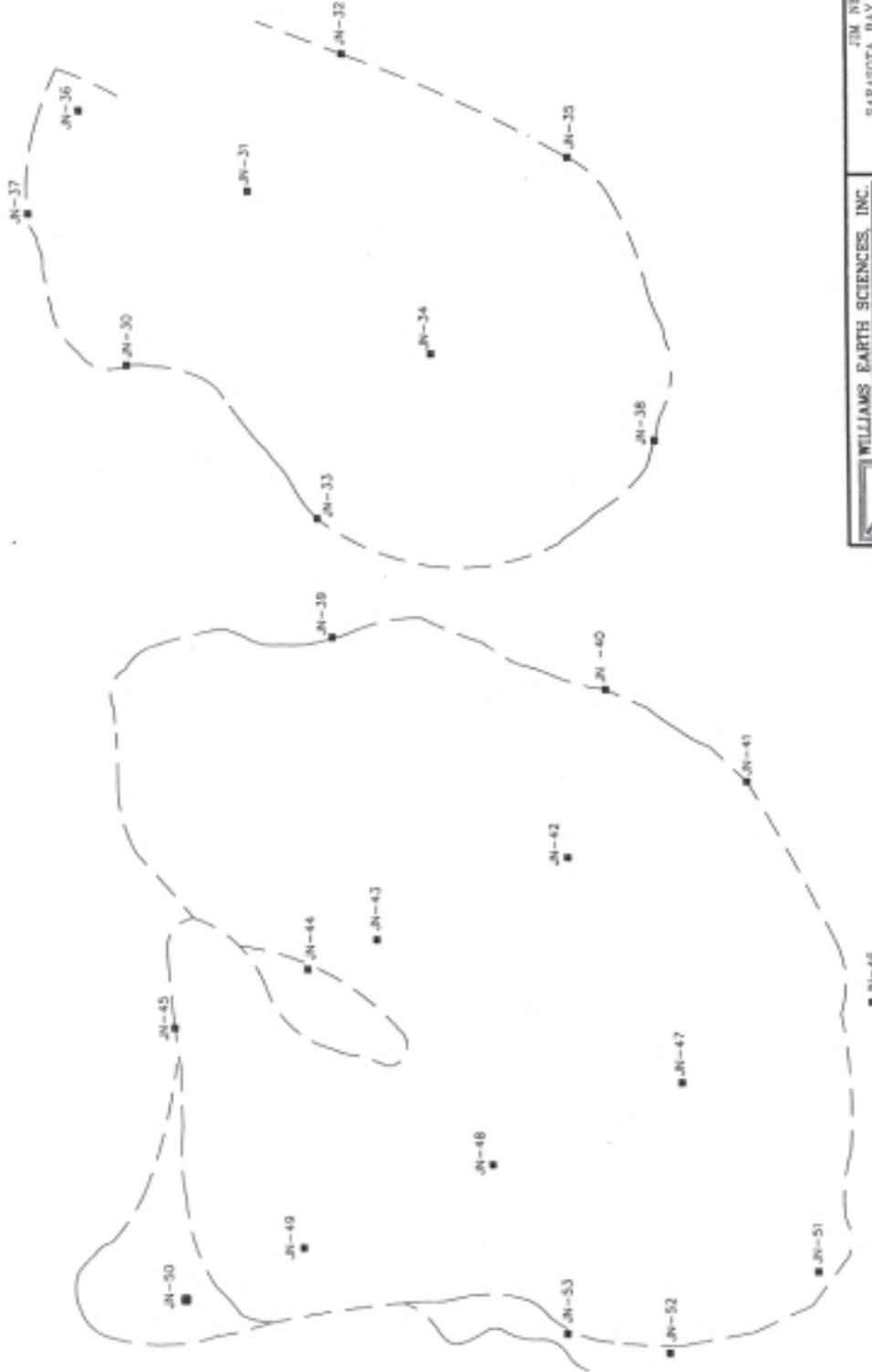
**WILLIAMS**  
EARTH SCIENCES, INC.

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Palmer Point

WILLIAMS PROJECT NO.: C398322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	Moisture						Organic Content (%)	Atterberg Limits				
				1"	3/8"	1/2"	3/4"	#4	#10		#40	#60	#100	#200	LL
PP-24 12/99	0.0-2.5	Light brown shelly fine sand (SP)					100	98	95	75	62	16	0		
PP-25 12/99	0.0-1.0	Light grayish brown slightly shelly fine sand (SP)							100	96	92	51	1		
PP-29 12/99	0.0-0.5	Dark brown silty peat (PT)	147												24



**WILLIAMS EARTH SCIENCES, INC.**

12000 E. 97th Ave.  
1988 Contractor Wbs. Camp, P. 33717  
Large (200) 341-1444 Fax (200) 341-1445  
Medium (200) 341-1444 Fax (200) 341-1444  
Petroleum (200) 341-1443 Fax (200) 341-1444

JIM NEVILLE PRESERVE  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA

BORING LOCATION PLAN

Drawn By: T.E.J.  
Checked By: SK  
Date: 1-12-00  
Resort No. C-399322  
Scale: AS SHOWN  
Figure No. 4

jm

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 262-8852 Fax: (904) 262-8864  
 Panama City (904) 241-3415 Fax: (904) 241-3454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve

WILLIAMS PROJECT No: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-30	12/28/99	0.0-0.7	Light grayish brown slightly silty fine sand with minor roots	SP-SM	0.6	1.0
		0.7-1.0	Gray slightly silty fine sand	SP-SM		
JN-31	12/28/99	0.0-0.1	Root material	PT	5.6	6.0
		0.1-0.8	Light grayish brown phosphatic shelly fine sand	SP		
		0.8-2.0	Light grayish brown phosphatic shelly silty fine sand	SM		
		2.0-6.0	Light gray phosphatic shelly fine sand	SP		
		6.0-6.4	Gray slightly shelly fine sand with minor roots	SP		
		6.4-6.5	Gray silty fine sand	SM		
		6.5-7.0	Reddish brown peat	PT		
JN-32	12/28/99	0.0-0.7	Light grayish brown slightly shelly fine sand	SP	0.5	1.0
		0.7-1.3	Light gray slightly shelly slightly silty fine sand	SP-SM		
JN-33	12/28/99	0.0-1.0	Gray slightly shelly fine sand	SP	0.5	0.3
JN-34	1/4/00	0.0-2.0	Gray shelly fine sand with limestone gravel	SP-GP	7.5	7.5
		2.0-7.5	Light brown shelly fine sand with limestone fragments	SP-GP		
		7.5-8.0	Light gray fine sand	SP		

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-1518  
 Jacksonville (904) 262-8852 Fax (904) 262-8864  
 Duval County (904) 242-8418 Fax (904) 242-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve  
 WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-35	12/28/99	0.0-0.8	Light brown fine sand	SP	0.8	1.0
		0.8-2.0	Gray slightly phosphatic slightly silty fine sand	SP-SM		
JN-36	1/4/00	0.0-3.5	Light brown shelly fine sand with limestone fragments	SP	3.7	4.3
		3.5-4.3	Tan shelly slightly silty fine sand with limestone gravel	SP-GP		
		4.3-5.0	Gray very shelly fine sand with limestone gravel	SP-GP		
JN-37	12/29/99	0.0-0.3	Grayish brown shelly fine sand with roots	SP	2.5	1.5
		0.3-1.0	Grayish brown shelly slightly silty fine sand with gravel	SP-SM		
		1.0-1.5	Gray slightly phosphatic fine sand	SP		
JN-38	12/28/99	0.0-0.7	Light brown fine sand	SP	0.7	1.0
		0.7-0.8	Gray sandy clayey silt	MH		
		0.8-2.0	Dark brown peat	PT		
JN-39	12/28/99	0.0-0.8	Grayish brown slightly silty fine sand with minor roots	SP-SM	0.5	1.0
		0.8-1.5	Reddish brown sandy peat	PT		

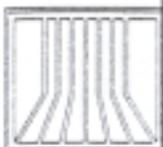
**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1516  
 Jacksonville (904) 262-8652 Fax: (904) 262-8664  
 Panama City (850) 142-3433 Fax: (850) 142-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve

WILLIAMS PROJECT Nº: C399322

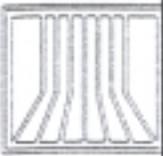
LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-40	12/28/99	0.0-0.7	Light tan fine sand	SP	1.0	1.0
		0.7-1.3	Light gray slightly silty fine sand	SP-SM		
		1.3-2.0	Reddish brown silty peat	PT		
JN-41	12/28/99	0.0-0.5	Light brown silty fine sand	SM	0.6	0.5
JN-42	1/4/00	0.0-4.0	Light brown shelly fine sand with limestone gravel	SP-GP	5.6	5.4
		4.0-6.0	Light brown slightly shelly slightly silty fine sand	SP-SM		
JN-43	12/28/99	0.0-1.0	Light gray shelly fine sand	SP	2.0	2.0
		1.0-2.0	Gray slightly shelly fine sand	SP		
JN-44	12/28/99	0.0-0.5	Light grayish brown slightly shelly slightly silty fine sand with minor roots	SP-SM	0.4	0.5
JN-45	12/28/99	0.0-0.5	Gray sandy silt with roots	PT	0.5	0.5
JN-46	12/28/99	0.0-0.5	Light brown silty fine sand with minor roots	SM	0.5	0.5


**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-3510  
 Jacksonville (904) 262-8852 Fax (904) 262-8866  
 Dunwoody, GA (770) 433-3410 Fax (770) 433-3454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve  
 WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-47	12/28/99	0.0-3.5 3.5-5.0	Light brown shelly fine sand with limestone gravel Light brown slightly shelly fine sand	SP-GP SP	5.2	5.0
JN-48	1/4/00	0.0-6.0	Tan shelly fine sand with limestone gravel Unable to penetrate further due to large rocks	SP-GP	10.6	Not Encountered
JN-49	12/28/99	0.0-3.5 3.5-4.0	Tan shelly slightly silty fine sand with limestone gravel Gray slightly shelly fine sand	SP-GP SP	3.2	3.5
JN-50	12/28/99	0.0-0.5	Light grayish brown slightly silty fine sand with minor roots	SP-SM	0.5	0.5
JN-51	12/28/99	0.0-0.5	Brown silty fine sand with minor roots	SM	0.7	0.5


**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10800 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-5444 Fax (727) 541-1510  
 Jacksonville (904) 262-8852 Fax (904) 262-8864  
 Dallas, TX (950) 241-5415 Fax (950) 241-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Jim Neville Preserve

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	* APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
JN-52	12/28/99	0.0-0.5	Grayish brown silty fine sand with minor roots	SM	0.5	0.5
JN-53	12/28/99	0.0-0.5	Grayish brown silty fine sand	SM	0.5	0.5

\* Approximate surface elevation noted from topographic maps.

F:\PROJECTS\C399322\Hand Aug\Jim Neville Preserve.DOC

**WILLIAMS**  
EARTH SCIENCES, INC.

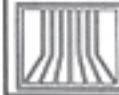
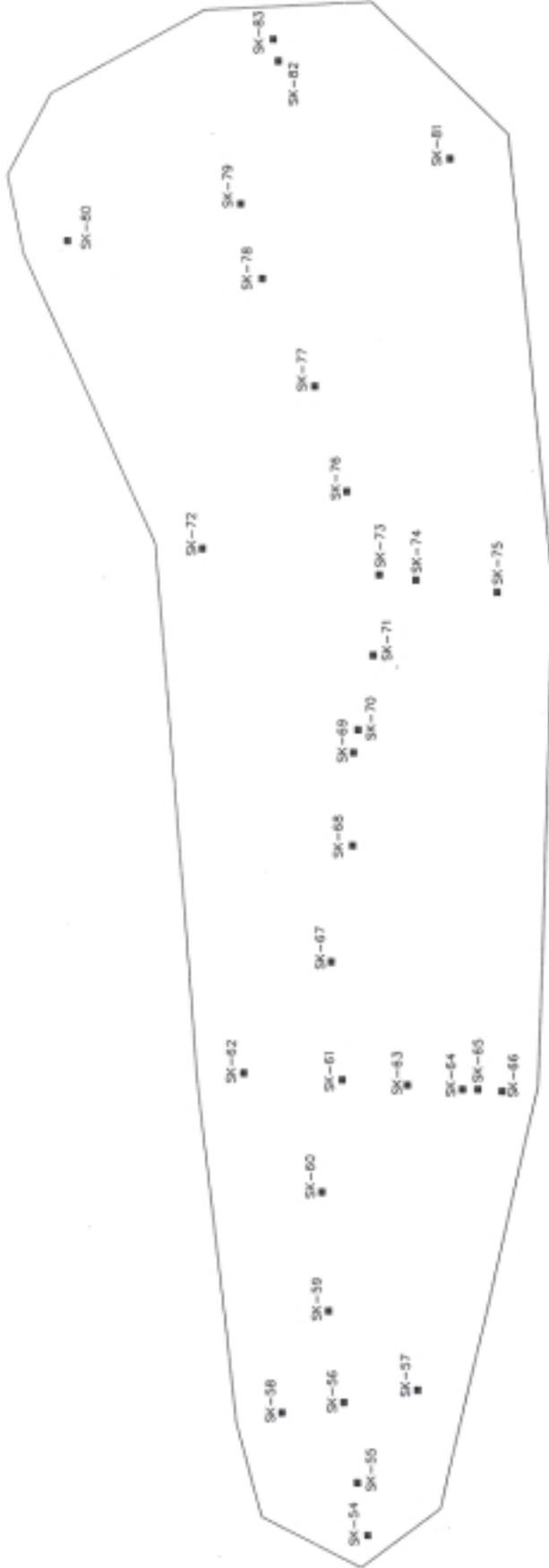
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Jim Neville Preserve

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1"	¾"	½"	%"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
															LL	PI
JN-30 1/00	0.7-1.0	Gray slightly silty fine sand (SP-SM)					100	95	94	93	91	70	9			
JN-31 1/00	2.0-6.0	Light gray phosphatic shelly fine sand (SP)			100		96	94	88	73	64	40	2			
JN-32 1/00	0.7-1.3	Light gray slightly shelly slightly silty fine sand (SP-SM)						100	99	98	96	82	7			
JN-33 1/00	0.0-1.0	Gray slightly shelly fine sand (SP)					100	99	99	96	90	62	5			
JN-35 1/00	0.8-2.0	Gray slightly phosphatic slightly silty fine sand (SP-SM)							100	99	99	80	8			
JN-37 1/00	0.3-1.0	Grayish brown shelly slightly silty fine sand with gravel (SP-SM)		100	88		88	79	69	55	49	33	6			
JN-39 1/00	0.0-0.8	Grayish brown slightly silty fine sand with minor roots (SP-SM)					100	99	99	95	89	60	7			
JN-40 1/00	1.3-2.0	Reddish brown silty peat (PT)	167										22	23		





**WILLIAMS EARTH SCIENCES, INC.**

LABORATORY OFFICE  
12800 Collier Ave., Suite 11, 33977  
Largo, FL 34707  
Tallahassee, FL 32304  
Panama City, FL 32404

748 (127) 34-1343  
748 (904) 282-8884  
748 (904) 783-1104

**SKIERS ISLAND  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA**

**BORING LOCATION PLAN**

Drawn By: TEJ Date: 1-12-00 Scale: AS SHOWN  
Checked By: SK Report No. C399.322 Figure No. 5

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 262-8852 Fax: (904) 262-8864  
 Panama City (904) 242-0419 Fax: (904) 242-2454

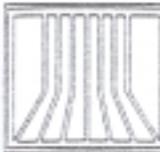
## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-54	1/5/00	0.0-1.0	Dark gray shelly fine sand	SP	0.0	0.0
SK-55	1/6/00	0.0-4.5	Light brown shelly fine sand with abundant limestone gravel and boulders	GP	3.3	4.2
SK-56	1/6/00	0.0-3.3	Brown shelly fine sand with limestone gravel	SP-GP	2.5	2.9
SK-57	1/6/00	0.0-3.5	Sandy shell hash with limestone boulders and gravel	GP	2.0	3.0
SK-58	1/6/00	0.0-1.0 1.0-1.8 1.8-2.5	Light brown shelly fine sand Light grayish brown shelly fine sand Gray shelly fine sand	SP SP SP	1.6	2.2
SK-59	1/6/00	0.0-6.0	Light brown shelly fine sand with limestone gravel	GP	5.8	5.8
SK-60	1/6/00	0.0-4.0 4.0-5.5 5.5-6.3	Sandy shell hash with limestone boulders and gravel Sandy shell hash with limestone gravel Light brown calcareous very sandy silt with limestone gravel	GP GP ML	5.6	5.8

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10000 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-5444 Fax: (727) 541-1510  
 Jacksonville (904) 262-8852 Fax: (904) 262-8884  
 Panama City (850) 241-3418 Fax: (850) 243-2454

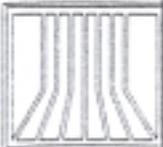


## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-61	1/6/00	0.0-4.8	Light brown calcareous very silty fine sand with limestone gravel	SM	4.8	5.7
		4.8-6.0	Light brown calcareous sandy silt with limestone gravel	ML		
SK-62	1/5/00	0.0-1.5	Light brown very shelly silty fine sand	SM	0.4	0.3
SK-63	1/5/00	0.0-2.5	Brown shelly fine sand with large shell fragments and gravel	GP	2.2	3.0
		2.5-3.5	Light brown shelly silty fine sand with limestone fragments			
SK-64	1/5/00	0.0-1.5	Grayish brown shelly fine sand with roots	SP	0.1	0.3
SK-65	1/5/00	0.0-1.5	Shell hash	SP	1.8	2.3
		1.5-2.0	Gray shelly silty fine sand with abundant roots	PT		
		2.0-3.0	Grayish brown slightly shelly fine sand with minor roots	SP		

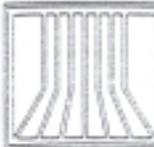

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 551-2444 Fax (727) 551-1510  
 Jacksonville (904) 252-6532 Fax (904) 252-6564  
 Panama City (904) 242-5415 Fax (904) 242-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-66	1/5/00	0.0-0.5 0.5-1.0	Light gray shelly fine sand with minor roots Gray shelly fine sand	SP SP	-0.2	0.3
SK-67	1/5/00	0.0-4.0	Light brown fine sand with limestone gravel and large shell fragments	GP	3.4	3.8
SK-68	1/5/00	0.0-2.5	Shell hash with limestone gravel and light brown fine sand	GP	1.7	2.2
SK-69	1/5/00	0.0-2.0 2.0-2.5	Shell hash with brown shelly fine sand Shell hash	GP GP	1.7	2.2
SK-70	1/5/00	0.0-1.8 1.8-2.5	Shell hash with light brown shelly fine sand Gray shelly fine sand	GP SP	0.9	1.6
SK-71	1/5/00	0.0-3.5	Light brown shelly slightly silty fine sand with large shell fragments and limestone gravel	SP-GP	3.5	3.2

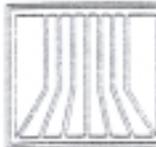

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-0510  
 Jacksonville (904) 262-8832 Fax (904) 262-8864  
 Panama City (850) 341-3415 Fax (850) 363-3454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-72	1/5/00	0.0-0.5	Grayish brown slightly silty fine sand with roots	SP-SM	0.3	0.5
		0.5-1.3	Gray slightly shelly slightly silty fine sand	SP-SM		
SK-73	1/5/00	0.0-4.8	Light brown shelly fine sand	SP	4.6	4.3
SK-74	1/5/00	0.0-2.5	Light brown shelly fine sand with large shell fragments and limestone gravel	SP-GP	1.2	2.2
SK-75	1/7/00	0.0-3.0	Light brown shelly fine sand with limestone gravel	SP	5.2	6.0
		3.0-5.0	Tan shelly silty fine sand with limestone gravel	SM		
		5.0-6.3	Shell hash with limestone gravel and sand	GP		
SK-76	1/7/00	0.0-3.0	Light brown very shelly fine sand	SP	3.4	4.7
		3.0-4.0	Light gray shelly fine sand	SP		
		4.0-4.5	Light brown shelly fine sand	SP		
		4.5-5.8	Gray shelly fine sand	SP		
SK-77	1/7/00	0.0-5.0	Light brown very shelly fine sand	SP	5.7	6.7
		5.0-6.5	Light brown shelly fine sand with limestone gravel	SP		
		6.5-7.5	Light brown shelly silty fine sand	SM		



WILLIAMS EARTH SCIENCES, INC.  
CORPORATE OFFICE  
10000 Endeavour Way, Largo, FL 33777  
Largo (727) 541-3444 Fax (727) 541-1510  
Jacksonville (904) 262-6653 Fax (904) 262-8864  
P.O. Box 241111 Jacksonville, FL 32224-1111

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem - Skier's Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
SK-78	1/7/00	0.0-5.0 5.0-8.0	Light brown fine sand with large shell fragments and limestone gravel Light brown shelly silty fine sand with minor limestone gravel	GP SM	7.2	7.7
SK-79	1/7/00	0.0-7.0 7.0-8.0	Light brown shelly fine sand with limestone gravel Shell hash	SP GP	7.0	7.0
SK-80	1/7/00	0.0-2.0	Light brown shelly silty fine sand with limestone gravel Unable to penetrate further	SM	5.3	Not Encountered
SK-81	1/7/00	0.0-6.3	Light brown silty fine sand with limestone gravel	SM-GP	4.7	5.8
SK-82	1/7/00	0.0-3.0 3.0-5.5 5.5-6.0	Shell hash with light gray fine sand Light brown shelly fine sand with limestone gravel Tan silty fine sand with limestone gravel	GP SP-GP SP-GP	4.8	5.5

\*Approximate surface elevation noted from topographic maps.

F:\PROJECTS\C399XXX\C399322\HandAug\Skiers Island.DOC

**WILLIAMS**  
EARTH SCIENCES, INC.

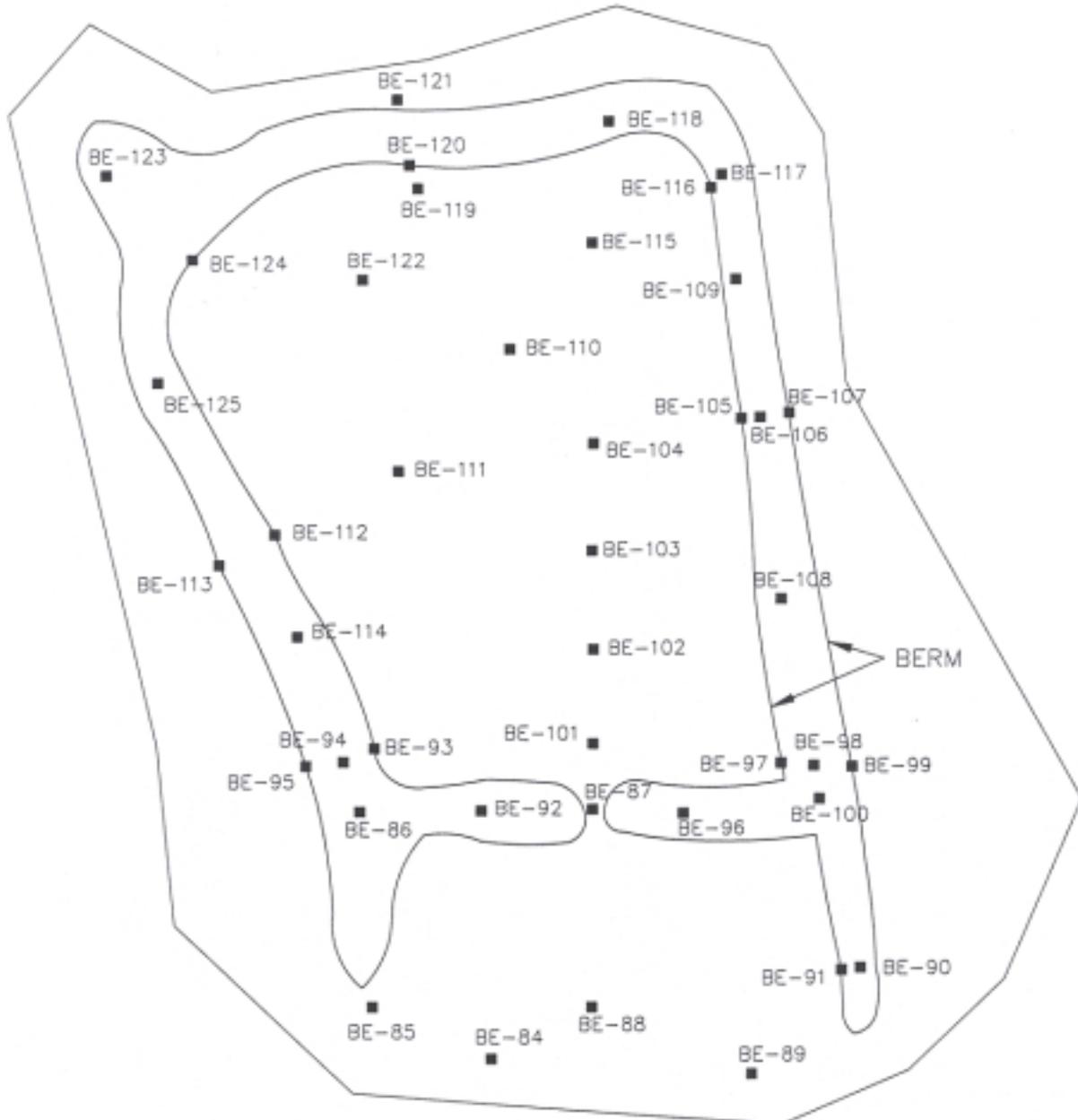
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Skier's Island

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1"	¾"	½"	¾"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
															LL	PI
SK-54 1/00	0.0-1.0	Dark gray shelly fine sand (SP)			100	95	92	87	79	58	42	23	4			
SK-62 1/00	0.0-1.5	Light brown very shelly silty fine sand (SM)		100	97	88	83	71	61	49	44	34	22			
SK-65 1/00	0.0-1.5	Shell hash (SP)			100	99	90	77	55	14	4	2	1			
SK-66 1/00	0.5-1.0	Gray shelly fine sand (SP)					100	97	93	83	75	43	4			
SK-72 1/00	0.5-1.3	Gray slightly shelly fine sand (SP)					100	99	96	90	86	64	4			
SK-80 1/00	0.0-2.0	Light brown shelly silty fine sand with gravel (SM)		100	89	84	70	56	40	36	32	24				

# BIG EDWARDS ISLAND



**WILLIAMS EARTH SCIENCES, INC.**

CORPORATE OFFICE:  
10800 Endeavour Way, Largo, FL 33777

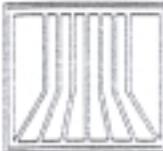
Largo: (727) 541-3444 FAX: (727) 541-1510  
Jacksonville: (904) 262-8852 FAX: (904) 262-8864  
Panama City: (850) 747-9419 FAX: (850) 763-2454

**BIG EDWARDS ISLAND  
SARASOTA BAY ECOSYSTEM RESTORATION  
SARASOTA COUNTY, FLORIDA**

**BORING LOCATION PLAN**

Drawn By: TEJ	Date: 1-12-00	Scale: AS SHOWN
Checked By: SK	Report No. C399322	Figure No. 6

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3464 Fax: (727) 541-1510  
 Jacksonville (904) 267-8852 Fax: (904) 267-8864  
 Panama City (850) 241-9419 Fax: (850) 263-2454



## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

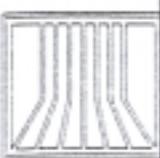
LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-88	1/7/00	0.0-2.5	Light grayish brown slightly shelly fine sand	SP	2.9	4.5
		2.5-3.0	Brown silty fine sand	SM		
		3.0-4.0	Gray sandy silt	ML		
		4.0-5.5	Grayish brown shelly silty fine sand with finely divided organic matter	PT		
BE-89	1/7/00	0.0-2.0	Light brown silty fine sand	SM	4.5	4.5
		2.0-3.5	Light grayish brown fine sand	SP		
		3.5-4.5	Grayish brown sandy silt	ML		
		4.5-5.0	Grayish brown shelly silty fine sand	SM		
BE-90	1/12/00	0.0-6.0	Tan shelly silty fine sand with limestone gravel	SM	8.3	6.6
		6.0-7.0	Brown shelly fine sand	SP		
BE-91	1/12/00	0.0-2.5	Light grayish brown slightly silty fine sand	SP-SM	5.3	4.5
		2.5-4.5	Light brown very shelly fine sand with limestone gravel	SP		
		4.5-5.0	Light gray slightly shelly fine sand	SP		

## REPORT OF AUGER BORINGS

**CLIENT:** HDR Engineering, Inc.  
**PROJECT:** Sarasota Bay Ecosystem - Big Edwards Island

**WILLIAMS PROJECT N°:** C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-92	1/12/00	0.0-8.0	Light brown shelly fine sand with minor limestone gravel	SP	12.5	Not Encountered
		8.0-10.0	Light brown shelly fine sand with limestone gravel Unable to penetrate further	SP-GP		
BE-93	1/7/00	0.0-3.0	Light brown slightly shelly slightly silty fine sand with limestone gravel	SP-SM	5.8	5.7
		3.0-5.5	Light brown shelly fine sand	SP		
		5.5-6.0	Light gray fine sand	SP		
BE-94	1/13/00	0.0-7.5	Light brown shelly fine sand with large shell fragments and limestone gravel	SP-GP	10.2	10.7
		7.5-9.0	Light brown fine sand	SP		
		9.0-10.0	Light brown shelly fine sand with large shell fragments and minor limestone gravel	SP		
		10.0-11.0	Dark gray slightly shelly silty fine sand with roots	SM		
BE-95	1/7/00	0.0-1.5	Shell hash with light brown fine sand	GP	2.2	2.2
		1.5-2.5	Light gray slightly shelly fine sand	SP		


**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (772) 541-3444 Fax: (772) 541-1510  
 Jacksonville (904) 262-8832 Fax: (904) 262-8864  
 Panama City (904) 341-3418 Fax: (904) 341-3454

## REPORT OF AUGER BORINGS

**CLIENT:** HDR Engineering, Inc.  
**PROJECT:** Sarasota Bay Ecosystem - Big Edwards Island

**WILLIAMS PROJECT No:** C399322

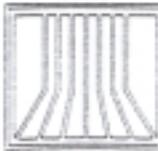
LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-96	1/12/00	0.0-8.5	Light grayish brown shelly fine sand with minor limestone gravel	SP	11.7	11.2
		8.5-11.0	Light brown shelly fine sand with limestone gravel	SP		
		11.0-12.0	Gray silty fine sand	SM		
BE-97	1/12/00	0.0-4.5	Light grayish brown fine sand	SP	6.3	6.1
		4.5-5.0	Light brown very silty fine sand	SM		
		5.0-6.3	Brown shelly slightly silty fine sand with limestone gravel	SP-GP		
BE-98	1/12/00	0.0-7.0	Light grayish brown shelly fine sand with limestone gravel	SP	13.7	Not Encountered
		7.0-8.0	Light brown slightly shelly fine sand	SP		
		8.0-9.0	Light brown slightly shelly fine sand with limestone gravel Unable to penetrate further	SP-GP		
BE-99	1/10/00	0.0-1.0	Mottled gray and reddish brown slightly shelly fine sand	SP	1.8	1.0
		1.0-2.0	Grayish brown fine sand	SP		

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-100	1/12/00	0.0-12.0	Light brown shelly fine sand with large shell fragments and limestone gravel Unable to penetrate further	SP-GP	13.3	Not Encountered
		0.0-3.0	Light brown slightly shelly fine sand	SP	4.9	5.8
3.0-4.0	Light brown silty fine sand	SM				
4.0-5.5	Gray very silty fine sand	SM				
BE-101	1/7/00	5.5-6.0	Brown silty fine sand with abundant roots	PT	7.0	7.5
		0.0-2.0	Light brown shelly fine sand	SP		
		2.0-5.5	Light brown slightly shelly fine sand	SP		
		5.5-7.5	Brown very shelly fine sand	SP		
BE-102	1/10/00	0.0-3.0	Light brown shelly fine sand	SP	7.1	6.2
		3.0-5.0	White fine sand	SP		
		5.0-6.0	Light brown fine sand	SP		
		6.0-6.4	Grayish brown fine sand	SP		
BE-103	1/10/00	0.0-6.0	Light brown shelly fine sand with limestone gravel	SP-GP	9.9	9.7
		6.0-7.8	Light brown fine sand	SP		
		7.8-10.0	Light grayish brown very sandy silt	ML		



WILLIAMS EARTH SCIENCES, INC.  
CORPORATE OFFICE  
10600 Endeavour Way, Largo, FL 33777  
Largo: (727) 541-3445 Fax: (727) 541-1510  
Jacksonville: (904) 262-8832 Fax: (904) 282-4684  
Panama City: (904) 242-2413 Fax: (904) 242-2154

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT N°: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)	
BE-105	1/11/00	0.0-4.5	Light brown shelly fine sand with large shell fragments and limestone gravel	SP-GP	7.9	7.0	
		4.5-6.0	Light brown fine sand	SP			
		6.0-7.0	Light brown very sandy silt	ML			
		7.0-8.5	Light gray slightly shelly fine sand	SP			
BE-106	1/11/00	0.0-9.0	Light brown shelly fine sand with large shell fragments and limestone gravel	SP-GP	10.9	9.8	
		9.0-10.0	Light brown slightly shelly medium to fine sand	SP			
		10.0-11.0	Gray slightly silty fine sand	SP-SM			
BE-107	1/10/00	0.0-1.0	Grayish brown shelly fine sand	SP	1.1	1.0	
		1.0-2.0	Gray shelly silty fine sand with minor roots	SM			
BE-108	1/11/00	0.0-8.0	Light brown slightly shelly fine sand with minor limestone gravel	SP	13.1	12.3	
		8.0-11.0	Light grayish brown fine sand	SP			
		11.0-12.0	Light brown slightly shelly fine sand with minor limestone gravel	SP			
		12.0-13.0	Gray fine sand	SP			

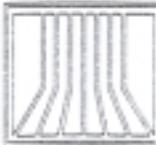
WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10500 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-1510  
 Jacksonville (904) 262-8837 Fax (904) 262-8884  
 Panama City (850) 247-3418 Fax (850) 253-2154

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	* APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-109	1/11/00	0.0-9.5	Light grayish brown shelly fine sand with limestone gravel Unable to penetrate further	SP	12.7	Not Encountered
BE-110	1/10/00	0.0-5.0 5.0-8.5	Brown slightly silty fine sand with limestone gravel Light brown slightly shelly fine sand with limestone gravel Unable to penetrate further	SP-SM SP	16.7	Not Encountered
BE-111	1/10/00	0.0-3.0 3.0-4.0 4.0-6.0 6.0-9.0 9.0-10.0	Light brown fine sand with limestone gravel Light brown shelly fine sand Light grayish brown fine sand Light brown shelly fine sand with minor limestone gravel Light grayish brown fine sand	SP-GP SP SP SP SP	9.2	8.5
BE-112	1/10/00	0.0-5.0 5.0-6.2 6.2-7.0	Light brown fine sand with shell and limestone gravel Light grayish brown very shelly fine sand Grayish brown fine sand	SP-GP SP SP	6.7	6.1



**WILLIAMS EARTH SCIENCES, INC.**  
CORPORATE OFFICE  
10600 Endeavour Way, Largo, FL 33777  
Largo: (727) 541-3444 Fax: (727) 541-1510  
Jacksonville: (904) 262-8832 Fax: (904) 262-8864  
Pasadena, CA: (951) 262-2419 Fax: (951) 262-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT No: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-113	1/10/00	0.0-1.5	Light gray shelly fine sand	SP	2.6	2.7
		1.5-3.0	Light brown shelly slightly silty fine sand	SP-SM		
BE-114	1/13/00	0.0-10.0	Light brown shelly fine sand with large limestone gravel and cobbles	GP	12.4	11.7
		10.0-11.0	Light grayish brown slightly silty fine sand	SP-SM		
		11.0-12.0	Gray shelly slightly silty fine sand	SM		
BE-115	1/10/00	0.0-5.0	Light grayish brown shelly fine sand with limestone gravel (2" to 8" diameter)	SP-GP	13.9	Not Encountered
		5.0-9.0	Shell fragments and light brown very shelly fine sand with limestone gravel Unable to penetrate further	SP-GP		
BE-116	1/11/00	0.0-8.0	Light brown shelly fine sand with limestone gravel	SP	10.6	11.2
		8.0-9.5	Light brown fine sand	SP		
		9.5-10.5	Gray sandy silt	ML		
		10.5-11.5	Light brown limestone gravel	GP		
BE-117	1/11/00	0.0-9.5	Light brown shelly fine sand with limestone gravel Unable to penetrate further	SP	13.0	Not Encountered

**WILLIAMS EARTH SCIENCES, INC.**

CORPORATE OFFICE  
10600 Endeavour Way, Largo, FL 33777  
Largo (727) 541-3444 Fax: (727) 541-1510  
Jacksonville (904) 262-6657 Fax: (904) 262-8664  
Panama City (904) 242-9419 Fax: (904) 242-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT N<sup>o</sup>: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-118	1/11/00	0.0-10.5	Light brown fine sand with limestone gravel Unable to penetrate further	SP-GP	12.8	Not Encountered
BE-119	1/12/00	0.0-8.5 8.5-9.5 9.5-11.0	Light grayish brown shelly fine sand with limestone gravel Grayish brown fine sand Gray sandy silt	SP SP ML	10.2	11.0
BE-120	1/12/00	0.0-9.0 9.0-10.0 10.0-11.5	Light brown shelly fine sand with minor limestone gravel Light brown fine sand Gray very silty fine sand	SP SP SM	10.2	11.5
BE-121	1/12/00	0.0-1.5	Gray shelly fine sand with minor roots	SP	-0.2	0.8
BE-122	1/13/00	0.0-8.0 8.0-11.0 11.0-12.0	Light brown slightly shelly slightly silty sand with large shell fragments Limestone gravel with brown fine sand Grayish brown slightly silty fine sand	SP-GP GP SP-SM	10.2	10.10

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 267-6057 Fax: (904) 267-8884  
 Panama City (904) 241-5419 Fax: (904) 243-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-123	1/12/00	0.0-4.0	Light grayish brown shelly fine sand	SP	14.3	Not Encountered
		4.0-8.5	Tan silty fine sand with limestone gravel	SM		
		8.5-10.0	Light brown silty fine sand with limestone gravel Unable to penetrate further	SM-GP		
BE-124	1/12/00	0.0-9.2	Light brown fine sand with minor limestone gravel Unable to penetrate further	SP	8.5	Not Encountered
BE-125	1/13/00	0.0-5.0	Light brown slightly shelly silty fine sand with limestone gravel	SM	12.2	9.0
		5.0-11.0	Light brown silty limestone gravel	GM		
		11.0-13.0	Gray very shelly fine sand with limestone gravel	SP-GP		

\*Approximate surface elevation noted from topographic maps.

**WILLIAMS**  
EARTH SCIENCES, INC.

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Big Edwards Island

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1"	3/4"	1/2"	%"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
															LL	PI
BE-85 1/00	0.0-2.0	Tan calcareous sandy silt (ML)									100	98	96			
BE-88 1/00	3.0-4.0	Gray sandy silt (ML)	50										82		41	16
BE-90 1/00	0.0-6.0	Tan shelly silty fine sand with limestone gravel (SM)		100		89	84	74	63	50	46	30	22			
BE-95 1/00	0.0-1.5	Shell hash with light brown fine sand (GP)				100	99	86	50	13	10	6	3			
BE-104 1/00	7.8-10.0	Light grayish brown very sandy silt (ML)							100	99	99	93	56			
BE-109 1/00	0.0-9.5	Light grayish brown shelly fine sand with limestone gravel (SP)		100	98	94	93	89	80	67	59	30	2			
BE-110 1/00	0.0-5.0	Brown silty fine sand with limestone gravel (SM)		100	87	85	83	71	58	38	34	29	22			
BE-123 1/00	4.0-8.5	Tan silty fine sand with limestone gravel (SM)				100	97	91	81	70	65	44	32			

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10800 Endeavour Way, Largo, FL 33777  
 Largo: (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville: (904) 262-8652 Fax: (904) 262-8864  
 Panama City: (904) 242-5119 Fax: (904) 242-3151

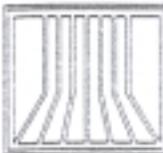
**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-84	1/7/00	0.0-1.5	Light brown fine sand with minor roots	SP	2.7	2.0
		1.5-2.0	Grayish brown very silty fine sand	SM		
		2.0-4.0	Light grayish brown very sandy silt	ML		
BE-85	1/7/00	0.0-2.0	Tan calcareous sandy silt	ML	2.4	2.3
		2.0-2.5	Light gray clayey silt	MH		
		2.5-3.0	Gray shelly slightly silty fine sand	SP-SM		
BE-86	1/12/00	0.0-8.0	Shell hash with light brown fine sand	GP	12.5	Not Encountered
		8.0-10.0	Light brown shelly fine sand Unable to penetrate further	SP		
BE-87	1/7/00	0.0-1.5	Light brown slightly shelly fine sand	SP	4.5	5.7
		1.5-3.5	Light brown shelly fine sand	SP		
		3.5-4.5	Tan sandy silt with minor roots	ML		
		4.5-6.0	Gray very shelly fine sand	SP		

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3464 Fax: (727) 541-1510  
 Jacksonville (904) 267-8852 Fax: (904) 267-8864  
 Panama City (850) 241-9419 Fax: (850) 263-2454



## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

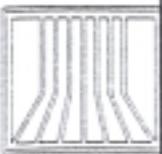
LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-88	1/7/00	0.0-2.5	Light grayish brown slightly shelly fine sand	SP	2.9	4.5
		2.5-3.0	Brown silty fine sand	SM		
		3.0-4.0	Gray sandy silt	ML		
		4.0-5.5	Grayish brown shelly silty fine sand with finely divided organic matter	PT		
BE-89	1/7/00	0.0-2.0	Light brown silty fine sand	SM	4.5	4.5
		2.0-3.5	Light grayish brown fine sand	SP		
		3.5-4.5	Grayish brown sandy silt	ML		
		4.5-5.0	Grayish brown shelly silty fine sand	SM		
BE-90	1/12/00	0.0-6.0	Tan shelly silty fine sand with limestone gravel	SM	8.3	6.6
		6.0-7.0	Brown shelly fine sand	SP		
BE-91	1/12/00	0.0-2.5	Light grayish brown slightly silty fine sand	SP-SM	5.3	4.5
		2.5-4.5	Light brown very shelly fine sand with limestone gravel	SP		
		4.5-5.0	Light gray slightly shelly fine sand	SP		

## REPORT OF AUGER BORINGS

**CLIENT:** HDR Engineering, Inc.  
**PROJECT:** Sarasota Bay Ecosystem - Big Edwards Island

**WILLIAMS PROJECT N°:** C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-92	1/12/00	0.0-8.0	Light brown shelly fine sand with minor limestone gravel	SP	12.5	Not Encountered
		8.0-10.0	Light brown shelly fine sand with limestone gravel Unable to penetrate further	SP-GP		
BE-93	1/7/00	0.0-3.0	Light brown slightly shelly slightly silty fine sand with limestone gravel	SP-SM	5.8	5.7
		3.0-5.5	Light brown shelly fine sand	SP		
		5.5-6.0	Light gray fine sand	SP		
BE-94	1/13/00	0.0-7.5	Light brown shelly fine sand with large shell fragments and limestone gravel	SP-GP	10.2	10.7
		7.5-9.0	Light brown fine sand	SP		
		9.0-10.0	Light brown shelly fine sand with large shell fragments and minor limestone gravel	SP		
		10.0-11.0	Dark gray slightly shelly silty fine sand with roots	SM		
BE-95	1/7/00	0.0-1.5	Shell hash with light brown fine sand	GP	2.2	2.2
		1.5-2.5	Light gray slightly shelly fine sand	SP		


**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (775) 541-3444 Fax: (727) 561-1510  
 Jacksonville (904) 262-8832 Fax: (904) 262-8864  
 Panama City (904) 341-3418 Fax: (904) 341-3454

## REPORT OF AUGER BORINGS

**CLIENT:** HDR Engineering, Inc.  
**PROJECT:** Sarasota Bay Ecosystem - Big Edwards Island  
**WILLIAMS PROJECT N°:** C399322

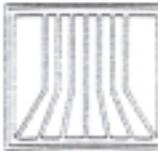
LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-96	1/12/00	0.0-8.5	Light grayish brown shelly fine sand with minor limestone gravel	SP	11.7	11.2
		8.5-11.0	Light brown shelly fine sand with limestone gravel	SP		
		11.0-12.0	Gray silty fine sand	SM		
BE-97	1/12/00	0.0-4.5	Light grayish brown fine sand	SP	6.3	6.1
		4.5-5.0	Light brown very silty fine sand	SM		
		5.0-6.3	Brown shelly slightly silty fine sand with limestone gravel	SP-GP		
BE-98	1/12/00	0.0-7.0	Light grayish brown shelly fine sand with limestone gravel	SP	13.7	Not Encountered
		7.0-8.0	Light brown slightly shelly fine sand	SP		
		8.0-9.0	Light brown slightly shelly fine sand with limestone gravel Unable to penetrate further	SP-GP		
BE-99	1/10/00	0.0-1.0	Mottled gray and reddish brown slightly shelly fine sand	SP	1.8	1.0
		1.0-2.0	Grayish brown fine sand	SP		

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-100	1/12/00	0.0-12.0	Light brown shelly fine sand with large shell fragments and limestone gravel Unable to penetrate further	SP-GP	13.3	Not Encountered
		0.0-3.0	Light brown slightly shelly fine sand	SP	4.9	5.8
3.0-4.0	Light brown silty fine sand	SM				
4.0-5.5	Gray very silty fine sand	SM				
BE-101	1/7/00	5.5-6.0	Brown silty fine sand with abundant roots	PT	7.0	7.5
		0.0-2.0	Light brown shelly fine sand	SP		
		2.0-5.5	Light brown slightly shelly fine sand	SP		
		5.5-7.5	Brown very shelly fine sand	SP		
BE-102	1/10/00	0.0-3.0	Light brown shelly fine sand	SP	7.1	6.2
		3.0-5.0	White fine sand	SP		
		5.0-6.0	Light brown fine sand	SP		
		6.0-6.4	Grayish brown fine sand	SP		
BE-104	1/10/00	0.0-6.0	Light brown shelly fine sand with limestone gravel	SP-GP	9.9	9.7
		6.0-7.8	Light brown fine sand	SP		
		7.8-10.0	Light grayish brown very sandy silt	ML		



WILLIAMS EARTH SCIENCES, INC.  
CORPORATE OFFICE  
10600 Endeavour Way, Largo, FL 33777  
Largo: (727) 541-3445 Fax: (727) 541-1510  
Jacksonville: (904) 262-8832 Fax: (904) 282-4684  
Panama City: (904) 242-2413 Fax: (904) 242-2154

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT N°: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)	
BE-105	1/11/00	0.0-4.5	Light brown shelly fine sand with large shell fragments and limestone gravel	SP-GP	7.9	7.0	
		4.5-6.0	Light brown fine sand	SP			
		6.0-7.0	Light brown very sandy silt	ML			
		7.0-8.5	Light gray slightly shelly fine sand	SP			
BE-106	1/11/00	0.0-9.0	Light brown shelly fine sand with large shell fragments and limestone gravel	SP-GP	10.9	9.8	
		9.0-10.0	Light brown slightly shelly medium to fine sand	SP			
		10.0-11.0	Gray slightly silty fine sand	SP-SM			
BE-107	1/10/00	0.0-1.0	Grayish brown shelly fine sand	SP	1.1	1.0	
		1.0-2.0	Gray shelly silty fine sand with minor roots	SM			
BE-108	1/11/00	0.0-8.0	Light brown slightly shelly fine sand with minor limestone gravel	SP	13.1	12.3	
		8.0-11.0	Light grayish brown fine sand	SP			
		11.0-12.0	Light brown slightly shelly fine sand with minor limestone gravel	SP			
		12.0-13.0	Gray fine sand	SP			

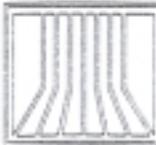
WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10500 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax (727) 541-1510  
 Jacksonville (904) 262-8837 Fax (904) 262-8884  
 Panama City (850) 247-3418 Fax (850) 253-2154

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	* APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-109	1/11/00	0.0-9.5	Light grayish brown shelly fine sand with limestone gravel Unable to penetrate further	SP	12.7	Not Encountered
BE-110	1/10/00	0.0-5.0 5.0-8.5	Brown slightly silty fine sand with limestone gravel Light brown slightly shelly fine sand with limestone gravel Unable to penetrate further	SP-SM SP	16.7	Not Encountered
BE-111	1/10/00	0.0-3.0 3.0-4.0 4.0-6.0 6.0-9.0 9.0-10.0	Light brown fine sand with limestone gravel Light brown shelly fine sand Light grayish brown fine sand Light brown shelly fine sand with minor limestone gravel Light grayish brown fine sand	SP-GP SP SP SP SP	9.2	8.5
BE-112	1/10/00	0.0-5.0 5.0-6.2 6.2-7.0	Light brown fine sand with shell and limestone gravel Light grayish brown very shelly fine sand Grayish brown fine sand	SP-GP SP SP	6.7	6.1



**WILLIAMS EARTH SCIENCES, INC.**  
CORPORATE OFFICE  
10600 Endeavour Way, Largo, FL 33777  
Largo: (727) 541-3444 Fax: (727) 541-1510  
Jacksonville: (904) 262-8832 Fax: (904) 262-8864  
Panama City: (904) 262-2419 Fax: (904) 262-2454

## REPORT OF AUGER BORINGS

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT No: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-113	1/10/00	0.0-1.5	Light gray shelly fine sand	SP	2.6	2.7
		1.5-3.0	Light brown shelly slightly silty fine sand	SP-SM		
BE-114	1/13/00	0.0-10.0	Light brown shelly fine sand with large limestone gravel and cobbles	GP	12.4	11.7
		10.0-11.0	Light grayish brown slightly silty fine sand	SP-SM		
		11.0-12.0	Gray shelly slightly silty fine sand	SM		
BE-115	1/10/00	0.0-5.0	Light grayish brown shelly fine sand with limestone gravel (2" to 8" diameter)	SP-GP	13.9	Not Encountered
		5.0-9.0	Shell fragments and light brown very shelly fine sand with limestone gravel Unable to penetrate further	SP-GP		
BE-116	1/11/00	0.0-8.0	Light brown shelly fine sand with limestone gravel	SP	10.6	11.2
		8.0-9.5	Light brown fine sand	SP		
		9.5-10.5	Gray sandy silt	ML		
		10.5-11.5	Light brown limestone gravel	GP		
BE-117	1/11/00	0.0-9.5	Light brown shelly fine sand with limestone gravel Unable to penetrate further	SP	13.0	Not Encountered

**WILLIAMS EARTH SCIENCES, INC.**  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 262-6657 Fax: (904) 262-8664  
 Panama City (904) 242-2415 Fax: (904) 242-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island  
 WILLIAMS PROJECT N#: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-118	1/11/00	0.0-10.5	Light brown fine sand with limestone gravel Unable to penetrate further	SP-GP	12.8	Not Encountered
BE-119	1/12/00	0.0-8.5 8.5-9.5 9.5-11.0	Light grayish brown shelly fine sand with limestone gravel Grayish brown fine sand Gray sandy silt	SP SP ML	10.2	11.0
BE-120	1/12/00	0.0-9.0 9.0-10.0 10.0-11.5	Light brown shelly fine sand with minor limestone gravel Light brown fine sand Gray very silty fine sand	SP SP SM	10.2	11.5
BE-121	1/12/00	0.0-1.5	Gray shelly fine sand with minor roots	SP	-0.2	0.8
BE-122	1/13/00	0.0-8.0 8.0-11.0 11.0-12.0	Light brown slightly shelly slightly silty sand with large shell fragments Limestone gravel with brown fine sand Grayish brown slightly silty fine sand	SP-GP GP SP-SM	10.2	10.10

WILLIAMS EARTH SCIENCES, INC.  
 CORPORATE OFFICE  
 10600 Endeavour Way, Largo, FL 33777  
 Largo (727) 541-3444 Fax: (727) 541-1510  
 Jacksonville (904) 262-6052 Fax: (904) 262-8884  
 Panama City (904) 241-5419 Fax: (904) 243-2454

**REPORT OF AUGER BORINGS**

CLIENT: HDR Engineering, Inc.  
 PROJECT: Sarasota Bay Ecosystem - Big Edwards Island

WILLIAMS PROJECT Nº: C399322

LOCATION	DATE PERFORMED	DEPTH (ft) FROM/TO	SOIL DESCRIPTION	UNIFIED CLASSIF.	*APPROX. SURFACE ELEVATION (MSL)	GROUNDWATER LEVEL (ft)
BE-123	1/12/00	0.0-4.0	Light grayish brown shelly fine sand	SP	14.3	Not Encountered
		4.0-8.5	Tan silty fine sand with limestone gravel	SM		
		8.5-10.0	Light brown silty fine sand with limestone gravel Unable to penetrate further	SM-GP		
BE-124	1/12/00	0.0-9.2	Light brown fine sand with minor limestone gravel Unable to penetrate further	SP	8.5	Not Encountered
BE-125	1/13/00	0.0-5.0	Light brown slightly shelly silty fine sand with limestone gravel	SM	12.2	9.0
		5.0-11.0	Light brown silty limestone gravel	GM		
		11.0-13.0	Gray very shelly fine sand with limestone gravel	SP-GP		

\*Approximate surface elevation noted from topographic maps.

**WILLIAMS**  
EARTH SCIENCES, INC.

**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT: HDR Engineering, Inc.  
PROJECT: Sarasota Bay Ecosystem Restoration  
LOCATION: Big Edwards Island

WILLIAMS PROJECT NO.: C399322

Boring No. and Date	Depth (ft)	Soil Description	Natural Moisture Content (%)	1"	3/4"	1/2"	%"	#4	#10	#40	#60	#100	#200	Organic Content (%)	Atterberg Limits	
															LL	PI
BE-85 1/00	0.0-2.0	Tan calcareous sandy silt (ML)									100	98	96			
BE-88 1/00	3.0-4.0	Gray sandy silt (ML)	50										82		41	16
BE-90 1/00	0.0-6.0	Tan shelly silty fine sand with limestone gravel (SM)		100		89	84	74	63	50	46	30	22			
BE-95 1/00	0.0-1.5	Shell hash with light brown fine sand (GP)				100	99	86	50	13	10	6	3			
BE-104 1/00	7.8-10.0	Light grayish brown very sandy silt (ML)							100	99	99	93	56			
BE-109 1/00	0.0-9.5	Light grayish brown shelly fine sand with limestone gravel (SP)		100	98	94	93	89	80	67	59	30	2			
BE-110 1/00	0.0-5.0	Brown silty fine sand with limestone gravel (SM)		100	87	85	83	71	58	38	34	29	22			
BE-123 1/00	4.0-8.5	Tan silty fine sand with limestone gravel (SM)				100	97	91	81	70	65	44	32			