Report
OF
GEOTECHNICAL ENGINEERING SERVICES

CURTIS PARK POOL FACILITY
MIAMI, FLORIDA

-PREPARED FOR-
CITY OF MIAMI
444 SW 2ND AVENUE, 10TH FLOOR
MIAMI, FL 33130

-PREPARED BY-
MACTEC ENGINEERING AND CONSULTING, INC. (MACTEC)
5845 NW 158TH STREET
MIAMI LAKES, FLORIDA 33014

MACTEC PROJECT NO. 6785-10-2054

JANUARY 26, 2010

MACTEC

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engineering and constructing a better tomorrow

January 26, 2010

Mr. André Bryan
City of Miami
444 SW 2nd Avenue, 10th Floor
Miami, FL 33130

Subject: **REPORT OF GEOTECHNICAL EXPLORATION**
Curtis Park Pool Facility
190 NW 24nd Avenue
Miami, Florida 33125
MACTEC Project No. 6785-10-2054 Task 01

Dear Mr. Bryan:

MACTEC Engineering and Consulting, Inc. (MACTEC), is pleased to submit this report of Geotechnical Exploration for the subject project. Our services were provided in accordance with the scope of services contained in our Proposal Number PROP09MIAM, Task 112, dated June 10, 2009. The attached report presents a review of the project information provided to us, a description of the site and subsurface conditions encountered.

We have enjoyed assisting you and look forward to serving as your geotechnical consultant on the remainder of this project and on future projects. If you have any questions, please contact us at your earliest convenience.

Sincerely,

MACTEC Engineering and Consulting, Inc.
Florida Board of Professional Engineers Authorization No. 6090

Oscar Rodriguez
Staff Engineer

G. Thomas McDaniel, P.E.
Principal Geotechnical Engineer
Florida Registration 26158

1-26-10

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1.0 INTRODUCTION

The purpose of this geotechnical exploration was to develop information concerning the site and subsurface conditions to evaluate site preparation requirements for the planned reconstruction of existing pool facility. This report briefly describes the field activities and presents the findings. The enclosed guideline recommendations for site preparation and foundation design and construction represent approaches that would be appropriate for the planned construction.

The purpose of this investigation was:

- To investigate the general subsurface conditions at the site.
- To interpret and review the subsurface conditions with respect to the proposed reconstruction of existing pool facility.
- To provide geotechnical engineering parameters for pool foundation design.

The soil test borings were drilled to a depth of 25 feet below site grade. This report represents an evaluation of site conditions based on traditional geotechnical procedures for site characterization. The recovered soil samples were not examined, either visually or analytically for environmental hazards.

Our exploration program involved various geotechnical studies and collection of subsurface data at the proposed pool area. Your office proposed and we conducted five soil test boring tests around the existing pool facility. One percolation test was performed as designated by André Bryan of the City of Miami.

2.0 PROJECT INFORMATION AND STRUCTURAL CONDITION

Project information has been provided by Mr. André of the City of Miami via email on May 11, 2009. The project site is located along off of NW North River Drive, southeast of NW 24 Avenue in Miami, Florida. A boring location map is presented in the Appendix of this report. It is our understanding that the project will involve reconstruction existing buildings and pool facility for Gerry Curtis Park. The new swimming pool is understood to be 6 feet in depth.

3.0 FIELD TESTING AND SITE OBSERVATIONS

3.1 FIELD TESTING

Prior to our explorations, we conducted a utility clearance to check for conflicts with existing utilities at the proposed borings. Following utility clearance, we conducted our subsurface exploration program that consisted of five soil test borings and one percolation test. The soil borings were drilled from the top of the slope of the existing fill embankment surrounding the swimming pool. The percolation test was performed near the surrounding ground surface. The information on the number of soil boring tests and there locations were provided to MACTEC by Mr. André Bryan of the City of Miami. The locations of the field tests are shown on the boring location plan in the Appendix. The soil test borings were established in the field by our personnel using tape measurements and existing landmarks. These locations should be considered accurate only to the degree implied by the method used to locate them. Ground surface elevation at the test locations have not been provided to us.

The test boring records in the Appendix graphically show the penetration resistances and present the soil descriptions for each test boring. These Soil Boring Records represent our interpretation of the subsurface conditions based on the field logs and visual examination of field samples by our engineer. The stratification lines and depth designations on the boring records represent the approximate boundaries between soil types. In some instances, the transition between soil types may be gradual. A brief description of the exploratory drilling and sampling techniques used is presented in the field procedures section of the Appendix.

3.2 SITE OBSERVATIONS

On January 4, 2009 a Geotechnical Engineer from this office conducted a site visit in order to observe the area. During our site visit, the existing pool facility is built on an embankment with an approximate height of three feet. The pool facility is adjacent to the Miami River at an approximate distance of a hundred feet.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 SITE CONDITIONS

The site for the proposed neighborhood wall is located at the southeast along SW 16th Street between 34th and 32nd Avenue and along 32nd Avenue between 16ths and 18th Street in the City of Miami, Florida. The site topography observed was open level existing grass vegetation except for the raised fill embankment for the existing swimming pool.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The soil conditions outlined below highlight the major subsurface stratification. The test boring records in the appendix should be consulted for a detailed description of the subsurface conditions encountered at each boring location. When reviewing the boring records and the subsurface profile, it should be understood that soil conditions may vary between boring locations. The topography of the general area of the pool facility which is built on an approximate three foot embankment makes it hard to examine side by side the different borings because the ground surface elevation of each boring change.

4.2.2 Soils

The generalized subsurface conditions encountered in the test borings, in the order of depth below the ground surface, follows:

In general, most of the test borings in the proposed general pool facility area encountered approximately 2 to 4 feet of dark brown silty fine sand with organics. Underlying the topsoil to a depth of approximately eight feet is a loose fine sand with few to trace of limestone fragments. The underlying natural LIMEROCK layer extended to the boring termination a depth of twenty-five feet.

4.3 GROUNDWATER

The groundwater level was measured at the test boring locations at the time of drilling. In the test borings, the groundwater was encountered at a depth of approximately six to eight feet below the existing ground surface at the time of drilling. Fluctuation in the observed groundwater levels should be expected due to seasonal climatic changes, construction activity, rainfall variations, surface water runoff, and other site-specific factors. Since groundwater level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on the assumption that variations will occur.

4.3.1 Seasonal High Water Table for Design

Since the groundwater measurements at the test boring locations may not necessarily reflect the Seasonal High Water Table (SHWT), a review of historical groundwater data was conducted. Based on Miami-Dade County Public Works Department Design Standards for Area Yearly Highest Ground Water Levels, the seasonal high water level ranges from +3.5 to +4.0 feet above mean sea level. Standing water was observed in the central portions of the site after two recent heavy rains.

5.0 RECOMMENDED FOUNDATION DESIGN & SITE PREPARATION

5.1 BASIS FOR RECOMMENDATIONS

The following recommendations are based upon the previously presented project information and structural conditions along with the data obtained in this exploration. The field data has been compared with previous performances of structures bearing on soils similar to those encountered at this site. If the structural information is incorrect or the location of the structure changed, please contact us so that our recommendations can be reviewed. The discovery of any site and/or subsurface condition during construction, which deviates from the data obtained in this exploration, should also be reported to us for our evaluation.

The assessment of site environmental conditions or the presence of pollutants in the soil, rock or groundwater of the site is beyond the proposed scope of this exploration.

Regardless of the thoroughness of a geotechnical exploration program, there is always a possibility that conditions between borings will be different from those at specific boring locations and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered. Unanticipated conditions and inadequate procedures should be reported to the design team along with timely recommendations to solve the problems created.

5.2 FOUNDATION DESIGN

We consider the site suitable for support of the proposed building additions to be designed on a shallow foundation system after the site preparation outlined in Section 5.5 is carried out accordingly. Individual column and continuous footings may bear on compacted existing fill, compacted structural fill or limestone. Standard strip/continuous footings or individual column foundations may be designed using an allowable soil bearing pressure of 2,500 psf if bearing on compacted structural fill soils or acceptable compacted existing soils. Footings should bear at least 18 inches below the finished exterior grade in order to provide confinement for the fine sandy bearing soils. Interior footings may bear at nominal depths below the floor slab. It is generally advantageous; however, to design the foundations to bear as high as possible in order to reduce groundwater control requirements and associated costs during construction. Care should also be taken that the existing slab and foundations of the library are not undermined during excavation for the additions.

Minimum footings widths of 18 and 24 inches are recommended for continuous and individual footings, respectively, even though the allowable bearing pressure may not be fully developed in all cases. A density equivalent to at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557) should be achieved in the sandy footing bearing level soils.

5.3 SETTLEMENT POTENTIAL

We have compared the field test data obtained in this exploration with our experience with similar structures and empirical relationships for bearing and settlement. We have estimated that the total settlement of the building additions should be less than 3/4 inch using a bearing pressure on the order of 2,500 psf if bearing on compacted structural fill soils or acceptable compacted existing fill. Differential settlements (between adjacent columns or along the length of a continuous wall footing) should be approximately ½ of the total settlement.

5.4 GROUND FLOOR SLAB SUPPORT

The ground floor slab for the proposed building additions may be constructed directly on a compacted structural fill subgrade, acceptable existing soil subgrade or limestone subgrade after the site preparation recommendation have been performed. A modulus of subgrade reaction of 150 pci may be used to design the floor slab. A gravel frost barrier protection layer is not considered necessary. The natural sandy soils should be compacted to a density of at least 95 percent of the Modified Proctor maximum dry density to a depth of at least 12 inches. A vapor barrier should be installed on top of the subgrade to help reduce dampness on the surface of the floor slab. Consideration should be given to using two sheets of a vapor barrier material in order to reduce friction between the bottom of the slab and the top of the underlying subgrade so that associated shrinkage cracking in the concrete can be reduced. We recommend that slabs be jointed around columns and walls to permit slabs and foundations to settle differentially.

5.5 SITE PREPARATION

5.5.1 Surface Stripping

All vegetation, topsoil, roots, organic zones, and other deleterious material should be stripped and removed from the construction area for a distance of at least 5.0 feet beyond the exterior building limits and from all areas to be paved. The depth of top soil ranges from 6 inches, near boring B-1 and B-2, 2 feet depth at borings B-3 and B-4, and 4 feet at boring B-5. After demolition of the existing structures, we recommend that the existing fill embankment be excavated and removed down to the adjacent ground surface, approximately three to four feet below top of embankment. Any remaining topsoil or soils containing organic material should also be removed.

5.5.2 Surficial Soil Compaction

After the site grades have been stripped and reasonably leveled, the exposed soils at the stripped surface in the building and pavement areas should be compacted with overlapping passes of a vibratory drum roller having a total operating static weight (including fuel and water) of 4 to 8 tons and a drum diameter of 2.0 to 4.0 feet. Densities equivalent to at least 95 percent of the Modified Proctor Maximum Dry Density (ASTM D-1557) should be uniformly obtained to a depth of at least 12 inches below the compacted surface. Regardless of the degree of compaction achieved, a minimum of eight complete coverage's should be made in the building and pavement areas with the roller in order to help increase the density and improve the uniformity of the underlying bearing soils. The roller coverage's should be divided evenly into two perpendicular directions. The roller's vibratory action should be disengaged within 20 feet of existing structures and if any movement or cracking of existing facilities is noted.

A MACTEC geotechnical engineer or experienced geotechnical technician should observe the fill material and the proofrolling operations as well as to check fill materials and the proofrolling operations to check for pockets of organics, deleterious, or other unsuitable material. If encountered during construction, these unsuitable materials should be removed and replaced with suitable compacted fill as discussed below.

5.5.3 Surface Water and Shallow Groundwater Control

The need for significant groundwater control is anticipated for excavation deeper than six feet. If required, however, groundwater can generally be lowered one to three feet by pumping from barrel sumps located in perimeter ditches or pits if gravity drainage cannot be established. All sump inlets should belocated outside the bearing areas to avoid loosening of the fine sandy bearing soils. The groundwater level should be maintained at least one foot below the bottom of any excavations made during construction and two feet below the surface of any vibratory compaction operations. In areas where deeper groundwater drawdown or control is required or where more positive groundwater control is desired for prolonged periods, a single-stage, fully sanded vacuum wellpoint system may be required.

The need for surface water runoff control should be anticipated during the site preparation and foundation construction process. Lack of proper controls could result in ponding of surface water in foundation bearing areas and on compaction surfaces. The ponded water, combined with machine or foot traffic during construction operations or other activities, could disturb otherwise acceptable soils or previously compacted soils, causing instability, pumping, and generally unacceptable conditions. The ponded water will also impede or prevent necessary soil compaction operations and make construction trafficability difficult.

No pumping of groundwater should be allowed adjacent to the existing structure.

5.5.4 Structural Filling and Backfilling

Structural fill, as required, may then be placed in lifts not exceeding 12.0 inches in loose thickness when using the roller described previously, or 4 inches when the vibratory action is disengaged. Each lift should be thoroughly compacted with the vibratory roller until densities equivalent to at least 95 percent of the Modified Proctor Maximum Dry Density are uniformly obtained. The structural fill, in those areas not accessible with the roller, should be compacted with a vibratory plate, or a small walk behind vibratory roller, and should be placed in lifts not exceeding 4 inches in loose thickness.

Structural fill should consist of an inorganic, non-plastic, granular soil containing less than 10 percent material passing the No. 200 mesh sieve (relatively clean sand or a crushed limestone with a 3-inch maximum particle size with a Unified Soil classification of GP, GW, SP, SW, SP-GM, SW-GM, SW-SM or SP-SM.

5.6 FOUNDATION BEARING SURFACE PREPARATION

The upper 12 inches of sandy bearing soils in the footing excavation bottoms should be compacted to densities equivalent to 95 percent of the Modified Proctor Maximum Dry Density. Compaction or recompaction of the footing excavation bearing level soils (if loosened by the excavation process) can probably be best achieved by making several passes with a relatively light weight, walk-behind vibratory sled or roller. Care should be taken not to undermine the existing building slabs and foundations.

5.7 TEMPORARY EXCAVATION STABILITY

After the site has been prepared as previously outlined, shallow foundation and any shallow pit excavations can be made. Generally, for foundation and pit excavations less than 5 feet deep, the sides of the excavation can temporarily stand with vertical cut slopes as a result of the apparent cohesion from the soil moisture. For excavations greater than 5 feet deep, however, temporary side slopes in the sandy soils of 1½:1 (H:V) or flatter should be maintained or the excavation properly braced or shored. The flatness of the slope will depend upon the type of groundwater control employed. Where the groundwater is permitted to seep through the sides of the excavation, temporary side slopes of 2:1 (H:V) or flatter should be maintained for excavations deeper than about 5 feet. In areas where groundwater will be more effectively controlled through the use of vacuum wellpoint dewatering systems, temporary excavation side slopes should be cut no steeper than 1½:1 (H:V).

RECOMMENDED DESIGN PROPERTIES OF GENERALIZED SOIL STRATA

Strata	Approx. Depth Range (feet)	Undrained Cohesion, C_u (ksf)	Angle of Internal Friction, ϕ (degrees)	Unit Weight γ, (pcf)		
				Moist	Saturated	Submerged
Existing Loose Sands (Borings 99-4, 99-5)	0 – 6	0	32	105	115	53

Notes:
1 - Parameters for recommended fill/backfill are based on a compacted density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D 1557).

5.8 General Construction Monitoring and Testing Guidelines

Prior to initiating compaction operations, we recommend that representative samples of the structural fill material to be used and acceptable exposed in-place soils be collected and tested to determine their compaction and classification characteristics. The maximum dry density, optimum moisture content, gradation and plasticity characteristics should be determined. These tests are needed for compaction quality control of the structural fill and existing soils and to determine if the fill material is acceptable.

A representative number of in-place field density testes should be performed in the compacted existing soils and in each lift of structural fill or backfill to confirm that the required degree of compaction has been obtained. In-place density tests should also be performed at representative locations in the bearing level soils in the footing excavation bottoms.

We recommend that at least one density test be performed for every 2,500 square feet of compacted existing soils, subgrade, and each lift of compacted fill. In addition, we recommend that at least one density test be performed for every 75 square feet of spread footing bearing area, and for every 50 lineal feet of continuous footing.

We also recommend an engineering inspection by a staff engineer or senior engineering technician, for the footing excavations during the construction of proposed building additions.

5.9 Construction Plans and Specifications Review

It is recommended that these additions be provided the opportunity to make a general review of the foundation and earthwork plans and specifications prepared from the recommendations presented in this report. Our report has been written in a guideline recommendation format and is not appropriate for use as a specification-type format. It is recommended that this report not be made a part of the contract documents; however, it should be made available to prospective contractors for information purposes.

5.10 Sample Storage

The soil samples retrieved during this exploration will be kept at our office for a period of three months from the date of this report. Soil samples will then be discarded.

6.0 DRAINAGE CONSIDERATIONS

6.1 Percolation Testing

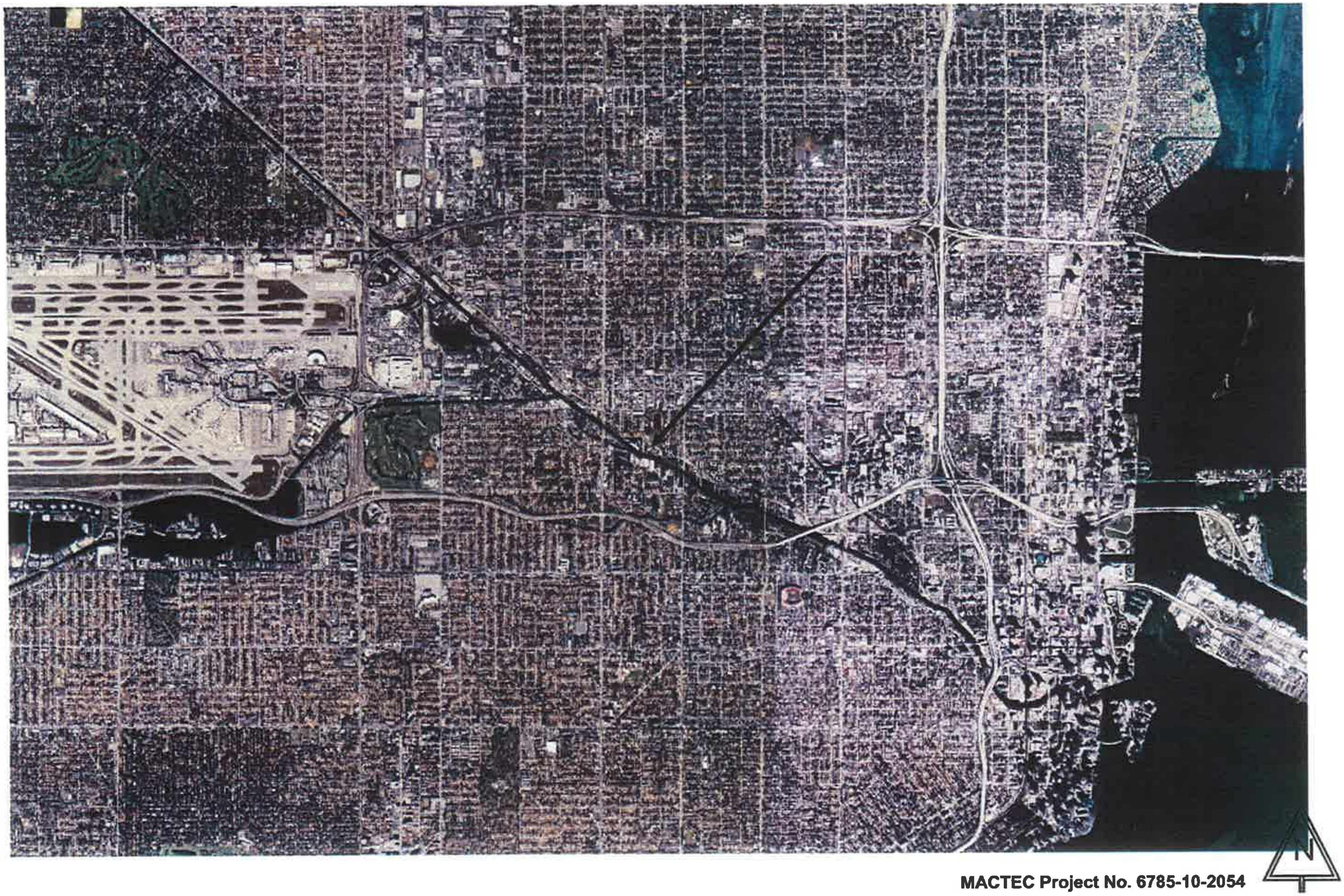
As mentioned earlier in the previous sections of this report, percolation test P-1was performed in conjunction with the subsurface exploration at the site in order to determine the permeability (hydraulic conductivity) characteristics of the subsurface soils. The calculated coefficient of hydraulic conductivity was obtained in accordance with the SFWMD Constant Head "Usual Condition" Open Hole Test Method. The percolation test was performed to a depth of 15 feet below the existing ground surface. The following table summarizes the calculated hydraulic conductivity coefficient:

USUAL OPEN-HOLE TEST CONSTANT HEAD	
TEST NO.	**k, Hydraulic Conductivity (cfs/ft^2 – ft of Head)**
P-1	**2.3E-04**

The Percolation Field Data Sheets along with a table including the test results is presented in Appendix of this report.

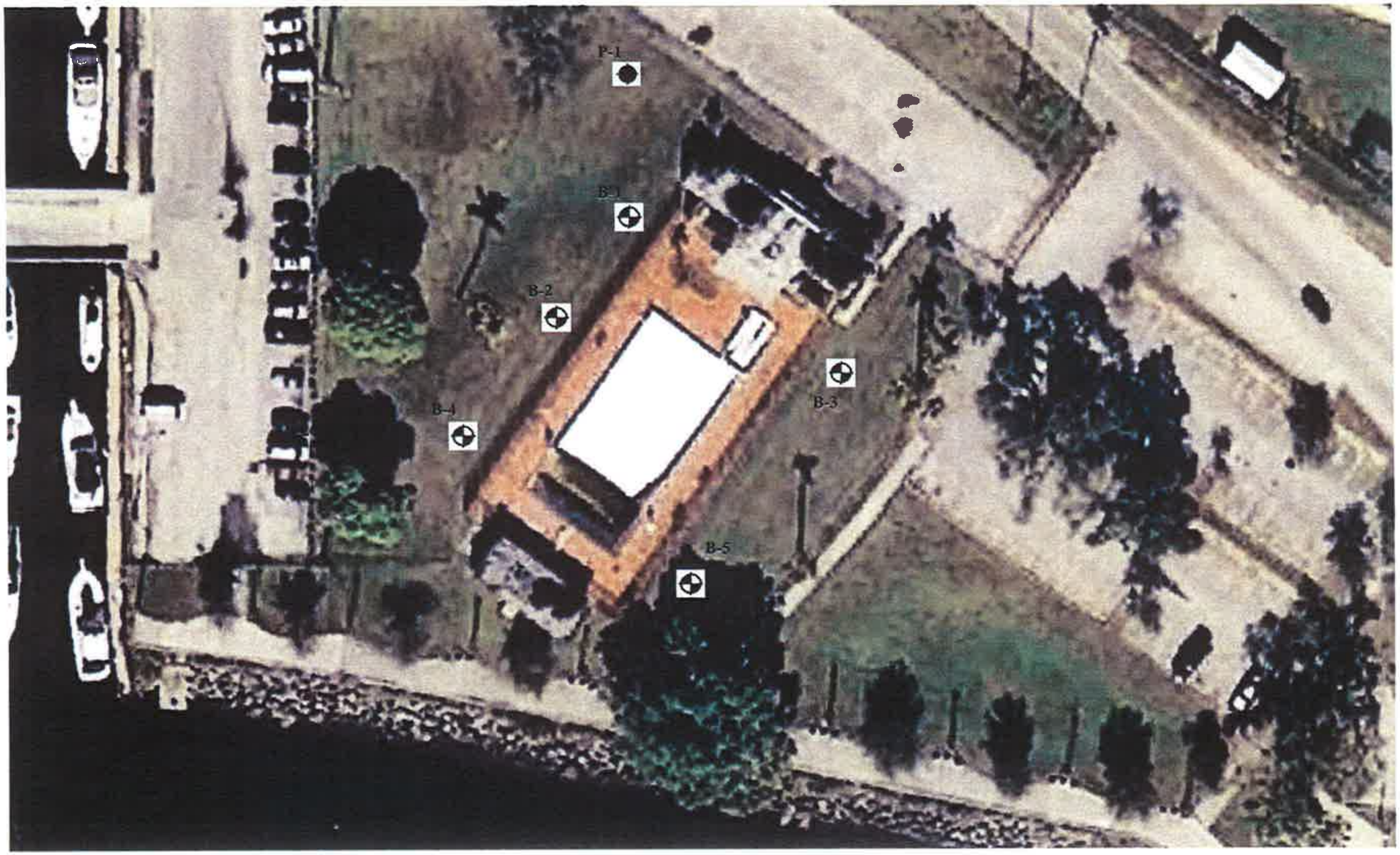
APPENDIX : Figures and Field Exploratory Data

Site Location Map
Field Exploration Plan
Generalized Subsurface Profile
Test Boring Records
Key Classification and Symbols
Summary of Percolation Test Results
Percolation Test Field Data Sheets
Field Procedures



MACTEC Project No. 6785-10-2054

Curtis Park Pool Facility 471901 NW 24 Avenue Miami , Florida 33125	MACTEC	SITE LOCATION MAP DRAWN BY: O.R.. DATE: 01/14/2010 CHECKED BY: SCALE: NTS

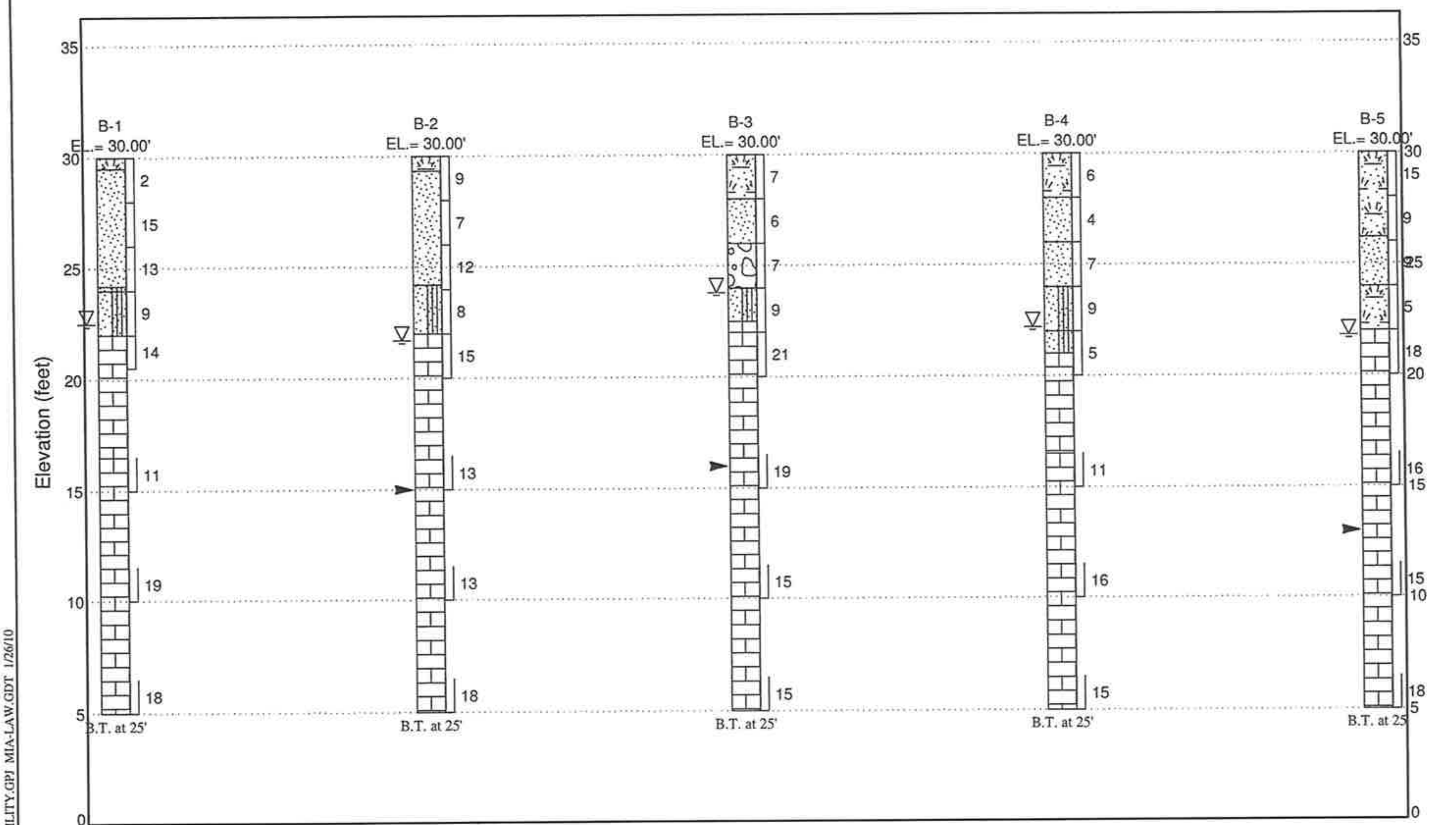


LEGEND

- B-1 Approximate test boring location and designation
- P-1 Approximate percolation test boring location and designation

MACTEC Project No. 6785-10-2054

Curtis Park Pool Facility 471901 NW 24 Avenue Miami , Florida 33125	MACTEC	FIELD EXPLORATION LOCATION PLAN DRAWN BY: O.R.. DATE: 01/14/2010 CHECKED BY: SCALE: NTS

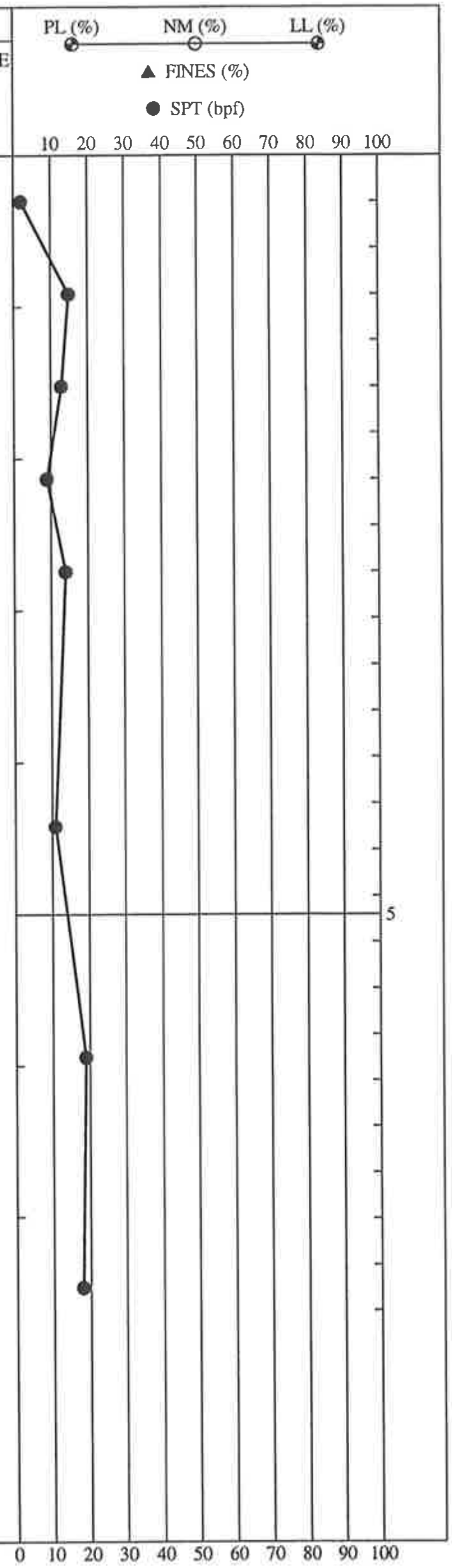


MACTEC

PROJECT NAME: Curtis Park Pool Facility
PROJECT NO.: 6785-10-2054
PROJECT LOC.: Miami, Florida

SOIL-MIA CURTIS PARK POOL FACILITY.GPJ MIA-LAW.GDT 1/26/10

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)	ELEV (ft)	N-COUNT (1st 6" / 2nd 6" / 3rd 6")	N-VALUE
0	Black to gray, slighly silty fine SAND with trace of limestone fragments (TOPSOIL).	NATURAL GROUND SURFACE ELEVATION NOT AVAILABLE AT TIME OF DRILLING		
	Light gray, fine SAND, with trace limestone fragments, very loose, moist (SP).		1-1-1	2
	- with few limestone fragments, medium dense.		5-8-7	15
5			6-6-7	13
	Dark gray, fine SAND, with few silt, medium dense, wet (SP-SM).			
	- stiff.		7-6-3	9
	Light tan, LIMESTONE, with few fine sand and trace silt, very soft, wet (LS).		6-7-7	14
10				
	White, LIMESTONE, with trace of fine sand, very soft (LS).		4-5-6	11
15				
20			9-9-10	19
			8-9-9	18
25	Boring terminated at 25 feet below grade.			
30				



SOIL-2 CURTIS PARK POOL FACILITY.GPJ MIA-LAW.GDT 1/26/10

DRILLER: O. Carrera
EQUIPMENT: CME 55 Automatic Hammer
METHOD: Standard Penetration Test
HOLE DIA.: 3-in
REMARKS:
ROTARY DRILLING:
GROUND WATER LEVEL: 7.5 feet
Checked By: [signature] Date: 1-26-10

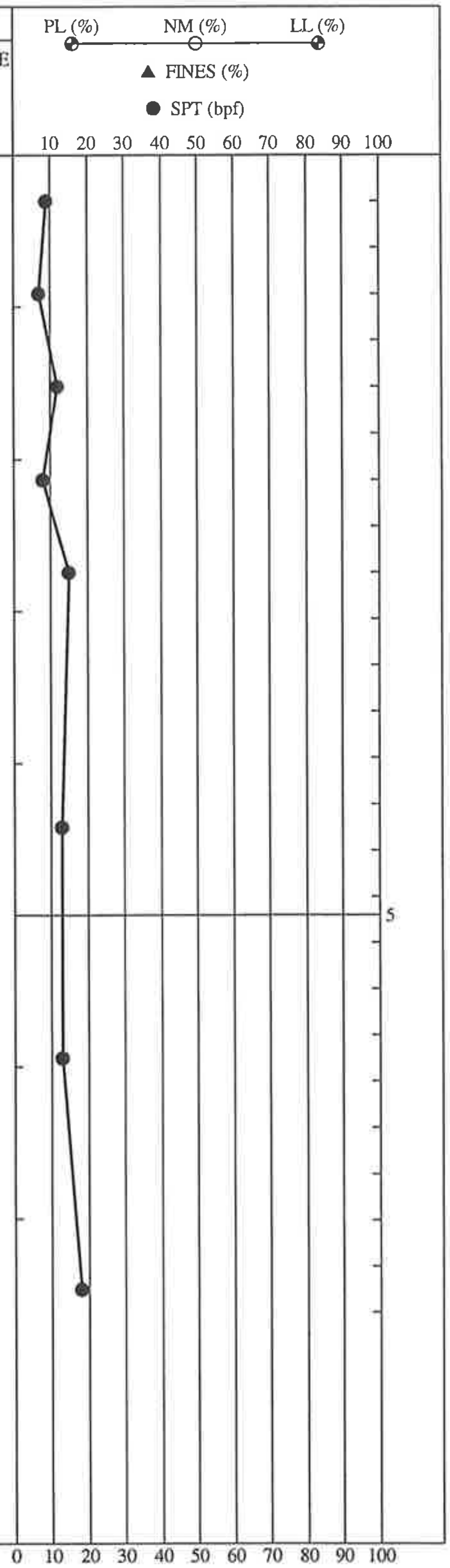
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

PROJECT NAME: Curtis Park Pool Facility
PROJECT LOC.: Miami, Florida
PROJECT No.: 6785-10-2054
DRILLED: 1/10/2010
BORING No.: B-1

MACTEC

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	N-COUNT (1st 6" / 2nd 6" / 3rd 6")	N-VALUE
0	Black to gray, slighly silty fine SAND with trace of limestone fragments (TOPSOIL).	NATURAL GROUND SURFACE ELEVATION NOT AVAILABLE AT TIME OF DRILLING		
	Brown, fine SAND, with few limestone fragments, medium dense, moist (SP).		3-4-5	9
	- Light tan, loose.		4-4-3	7
5	- medium dense.		4-5-7	12
	Gray, fine SAND, with few silt, medium dense (SP-SM).			
	- loose.		7-5-3	8
	Light tan, LIMESTONE, with trace of fine sand, very soft, wet (LS).		5-7-8	15
10				
15			6-6-7	13
20			7-7-6	13
			8-8-10	18
25	Boring terminated at 25 feet below grade.			
30				

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.



SOIL-2 CURTIS PARK POOL FACILITY.GPJ MIA-LAW.GDT 1/26/10

DRILLER: O. Carrera
EQUIPMENT: CME 55 Automatic Hammer
METHOD: Standard Penetration Test
HOLE DIA.: 3-in
REMARKS:
ROTARY DRILLING:
GROUND WATER LEVEL: 8.3 feet
Checked By: [signature] Date: 1-26-10

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT NAME: Curtis Park Pool Facility
PROJECT LOC.: Miami, Florida
PROJECT No.: 6785-10-2054
DRILLED: 1/10/2010
BORING No.: B-2

MACTEC

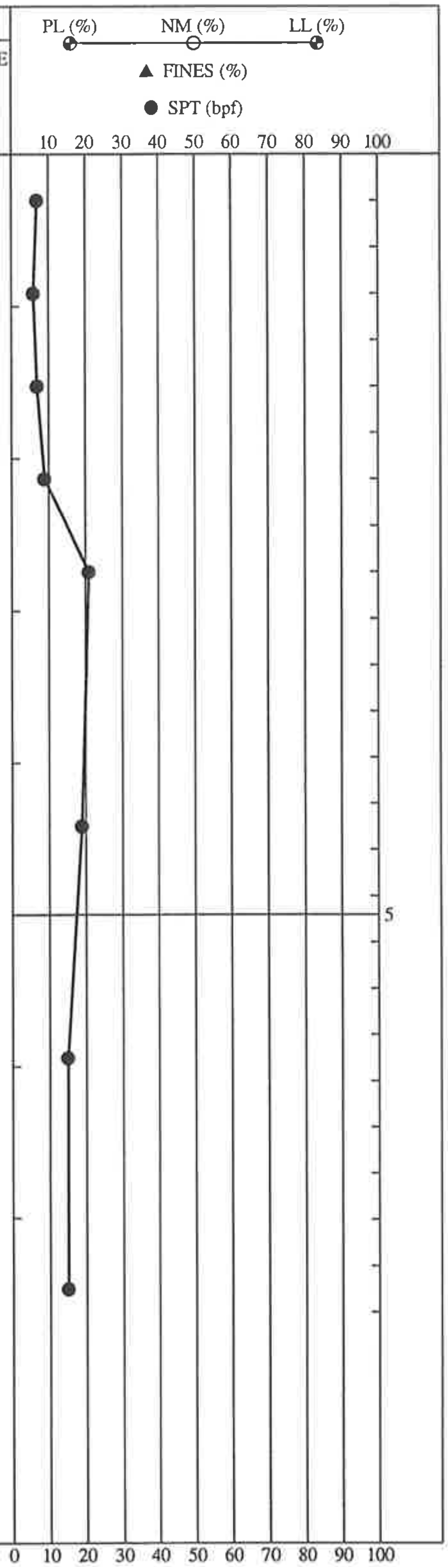
SOIL TEST BORING RECORD

SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

ELEV (ft): NATURAL GROUND SURFACE ELEVATION NOT AVAILABLE AT TIME OF DRILLING

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	SAMPLES N-COUNT (1st 6" - 2nd 6" - 3rd 6")	N-VALUE
0	Black to gray, slighly silty fine SAND with trace of limestone fragments (TOPSOIL).	3-3-4	7
	Dark gray, fine SAND, with few limestone fragments, with trace of silt, loose, moist (SP).	3-3-3	6
5	Light tan, LIMESTONE fill, with trace of fine sand, very soft, wet (LS).	3-3-4	7
	Brown, fine SAND, with few silt and limestone fragments, medium dense (SP-SM).	4-4-5	9
	Dark tan, LIMESTONE, with few silt and fine sand, very soft (LS).		
	Light tan, LIMESTONE, with few fine sand, soft.	9-11-10	21
10			
15	- White, very soft.	6-9-10	19
20		7-7-8	15
25		7-8-7	15
25	Boring terminated at 25 feet below grade.		
30			



DRILLER: O. Carrera
EQUIPMENT: CME 55 Automatic Hammer
METHOD: Standard Penetration Test
HOLE DIA.: 3-in
REMARKS:
ROTARY DRILLING:
GROUND WATER LEVEL: 6.2 feet
Checked By: [signature] Date: 1-26-10

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT NAME: Curtis Park Pool Facility
PROJECT LOC.: Miami, Florida
PROJECT No.: 6785-10-2054
DRILLED: 1/10/2010
BORING No.: B-3

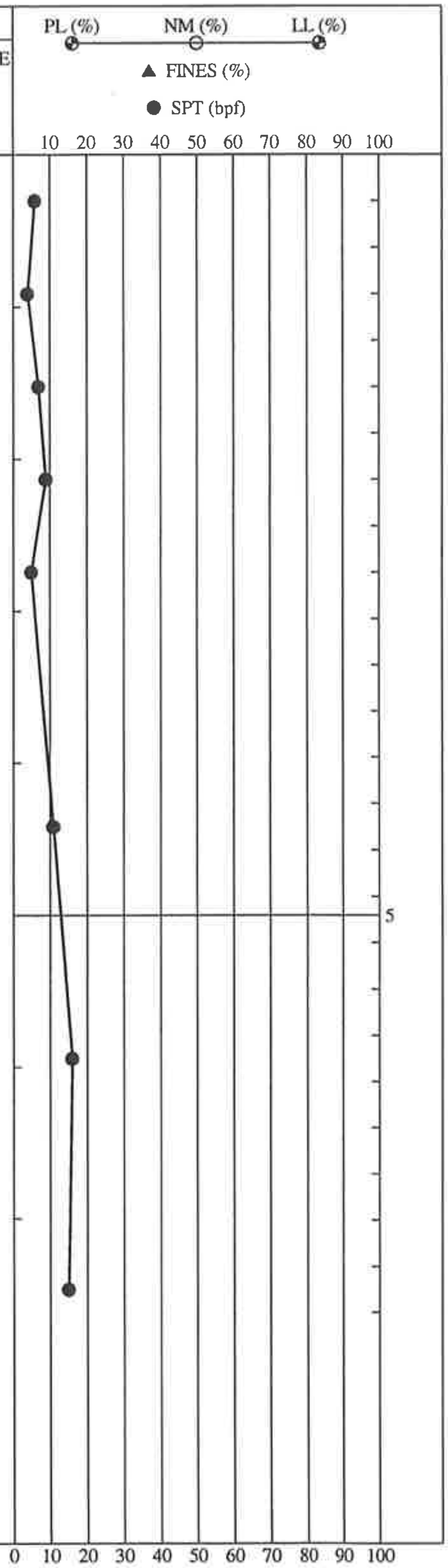
MACTEC

SOIL CLASSIFICATION AND REMARKS

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

ELEV (ft): NATURAL GROUND SURFACE ELEVATION NOT AVAILABLE AT TIME OF DRILLING

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	SAMPLES N-COUNT (1st 6" 2nd 6" 3rd 6")	N-VALUE
0	Black to gray, slighly silty fine SAND with trace of limestone fragments (TOPSOIL).	3-3-3	6
	Black, fine SAND, with few limestone fragments, loose, moist (SP).	3-2-2	4
5	Tan, fine SAND, with few to little limestone fragments, loose (SP).	3-3-4	7
	Dark gray, fine SAND, with few limestone fragments, few to trace silt, medium dense (SP-SM).	4-4-5	9
	Gray, fine SAND, with few peat and silt, loose, wet (SP-SM).	2-2-3	5
10	Light tan, LIMESTONE, with few fine sand and silt, very soft, wet (LS).		
15	Light tan, LIMESTONE, with trace of fine sand, very soft (LS).	4-5-6	11
20		8-7-9	16
		7-7-8	15
25	Boring terminated at 25 feet below grade.		
30			



SOIL-2 CURTIS PARK POOL FACILITY.GPJ MIA-LAW.GDT 1/26/10

DRILLER: O. Carrera
EQUIPMENT: CME 55 Automatic Hammer
METHOD: Standard Penetration Test
HOLE DIA.: 3-in
REMARKS:
ROTARY DRILLING:
GROUND WATER LEVEL: 7.8 feet
Checked By: [signature] Date: 1-26-10

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

PROJECT NAME: Curtis Park Pool Facility
PROJECT LOC.: Miami, Florida
PROJECT No.: 6785-10-2054
DRILLED: 1/10/2010
BORING No.: B-4

MACTEC

SOIL TEST BORING RECORD

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)	N-COUNT (1st 6" 2nd 6" 3rd 6")	N-VALUE
0	Black to gray, slighly silty fine SAND, with trace of limestone fragments (TOPSOIL).	4-7-8	15
		3-4-5	9
	Brown, fine SAND, with trace of limestone fragments, medium dense (SP).	4-4-5	9
	Black, TOPSOIL, with few peat and limestone fragments. **Organic Content=9.3%**	3-3-2	5
	Light tan, LIMESTONE, with trace of fine sand, very soft, wet (LS).	8-8-10	18
		7-8-8	16
		7-8-7	15
		8-9-9	18
25	Boring terminated at 25 feet below grade.		

ELEV (ft): NATURAL GROUND SURFACE ELEVATION NOT AVAILABLE AT TIME OF DRILLING

PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf)

SOIL-2 CURTIS PARK POOL FACILITY.GPJ MIA-LAW.GDT 1/26/10

DRILLER: O. Carrera
EQUIPMENT: CME 55 Automatic Hammer
METHOD: Standard Penetration Test
HOLE DIA.: 3-in
REMARKS:
ROTARY DRILLING:
GROUND WATER LEVEL: 8.2 feet
Checked By: [signature] Date: 1-26-10

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

PROJECT NAME: Curtis Park Pool Facility
PROJECT LOC.: Miami, Florida
PROJECT No.: 6785-10-2054
DRILLED: 1/10/2010
BORING No.: B-5

MACTEC

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KEY CLASSIFICATION AND SYMBOLS

CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

GRANULAR MATERIAL	SPT N VALUE (BLOWS/FOOT)		SILTS AND CLAYS	SPT N VALUE (BLOWS/FOOT)	
RELATIVE DENSITY	SAFETY HAMMER	AUTOMATIC HAMMER	CONSISTENCY	SAFETY HAMMER	AUTOMATIC HAMMER
VERY LOOSE	LESS THAN 4	LESS THAN 3	VERY SOFT	LESS THAN 2	LESS THAN 1
LOOSE	4 - 10	3 - 8	SOFT	2 - 4	1 - 3
MEDIUM DENSE	10 - 30	8 - 24	FIRM	4 - 8	3 - 6
DENSE	30 - 50	24 - 40	STIFF	8 - 15	6 -12
VERY DENSE	GREATER THAN 50	GREATER THAN 40	VERY STIFF	15 - 30	12 - 24
			HARD	GREATER THAN 30	GREATER THAN 24

ROCK HARDNESS DESCRIPTION

VERY SOFT	Rock core crumbles when handled **N < 20**
SOFT	Can break core easily with hands **N = 21-30**
MEDIUM HARD	Can break core with hands **N = 31-45**
MODERATELY HARD	Thin edges of rock can be broken with fingers **N = 46-60**
HARD	Thin edges of rock cannot be broken with fingers **N = 61-100**
VERY HARD	Rock core rings when struck with a hammer (cherts) **N > 50/2"**

MODIFIERS

APPROXIMATE PERCENTAGE	MODIFIERS
0 to 5%	Trace
5% to 10%	Few
15% to 25%	Little
30% to 45%	Some

The modifiers provide our estimate of the percentages of gravel, sand, and fines (silt or clay size particles).

SYMBOLS	DESCRIPTION
UD	Undisturbed sample (UD) recovered.
100/2"	N, Number of blows (100) to drive the support spoon or cone a number of inches (2").
NX, 4", 6"	Corel Barrel sizes which obtain cores 2-1/8", 3-7/8", and 5-7/8" diameter respectively.
65%	Percentage (65) of rock core and soil sample recovered
RQD	Rock Quality Design - Percent of rock core 4 or more inches long
▼	Water table at least 24 hours after drilling
△	Water table one hour or less after drilling
◀	Loss of drilling fluid

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 Sieve Size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand - silt mixtures
			SC	Clayey sands, sand - clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts and with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils.

Undisturbed Sample (UD)	Auger Cuttings
Split Spoon Sample (SS)	Bulk Sample
Rock Core (RC)	Crandall Sampler
Dilatometer	Pressure Meter
Packer	No Recovery
Water Table at time of drilling	Water Table after 24 hours
WOH - Weight of Hammer	

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

No.200 No.40 No.10 No.4 3/4" 3" 12"

U.S. STANDARD SIEVE SIZE

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

KEY TO SYMBOLS AND DESCRIPTIONS

MACTEC

SUMMARY OF PERCOLATION TEST RESULTS
USUAL CONDITION TEST CONSTANT HEAD
Project Name: Curtis Park Pool Facility

Prepared by/Date:OR 01/22/10 Checked by/Date: DM 1-26-10

MACTEC PROJECT NO. 6785-10-2054 Task 01 Date Performed January 10, 2010

Test No.	Depth to Grd. Water (ft)	Depth to Water during testing (ft)	(H2) (ft)	Borehole Depth (ft)	Borehole Diameter (inches)	Rate of Flow (gpm)	Rate of Flow (cfs)	k, Hydraulic Conductivity (cfs/ft^2-ft. Head):
P-1	4.8	0.0	4.8	15	6.0	9.80	0.02184	**2.3E-04**

Note: Screen depth -
from 0.0 ft
to 15.0 ft below existing ground surface.

H 3= Depth of water during testing
Dc = depth of perforations = 5 ft
H2 = depth of water table

SFWMD/DERM Percolation Test – Constant Head

Percolation Test No. P-1

Date:01/10/2010	Project Name: Curtis Park Pool Facility
Project No. 6785-10-2054	Task No. 01
Crew: Oscar Carrera	

Borehole Geometry

Borehole Diameter: 6 (inches)	Cased Hole Depth: from 0 (feet) to 15 (feet)
Casing Diameter: 4 (inches)	Perforated Casing Length: 15 (feet)
Borehole Depth: 15 (feet)	Groundwater Depth Measured from Ground Surface 4'9'' (feet-inches)

Percolation Test Data

Flushing Period: 60 seconds	Groundwater Depth during testing: 0 (feet) (measured from ground surface)

Test Results

Time (minutes)	Meter Reading		Time (minutes)	Meter Reading	
	Reading (Gallons)	Total (Gallons)		Reading (Gallons)	Total (Gallons)
Initial Reading	52040		8	52120	9
1	52051	11	9	52129	9
2	52062	11	10	52138	9
3	52071	9	11		
4	52082	11	12		
5	52093	11	13		
6	52102	9	14		
7	52111	9	15		

Boring Information

Sample No.	Depth (feet)		Soil/Rock Description
	From	To	
1	0	8	Brown to tan, fine SAND with few limestone fragments
2	8	15	Light tan, LIMESTONE, with few fine sand

FIELD PROCEDURES

Test Borings - The test borings were made in general accordance with ASTM-D-1586, "Penetration Test and Split-Barrel Sampling of Soils." The borings were advanced using either 3 ¼ -inch I.D. Hollow Stem Augers filled or a 3-inch ID casing (or 6-inch ID casing in borings with rock coring) and a rotary drilling process with water or bentonite drilling fluid circulated in the boreholes to flush the cuttings. At regular intervals, the drilling tools were removed and soil samples were obtained with a standard 1.4-inch I.D., 2.0 inch O.D., split-tube sampler. The sampler was first seated six inches and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance". The penetration resistance, when properly interpreted, is an index to the soil strength and density.

Representative portions of the soil samples, obtained from the sampler, were placed in glass jars and transported to our laboratory. The samples were then examined by an engineer in order to confirm the field classifications.

Percolation Testing - The percolation test was performed in order to estimate the hydraulic conductivity of the materials encountered. The Constant Head method was used. The general procedures outlined in the South Florida Water Management District Permit Information Manual (Volume IV) were followed. Test was performed in a 3-inch diameter perforated PVC pipe installed in a 6.0-inch diameter hole pre-drilled to a depth of 15 feet below the existing ground surface, using a rock coring casing. The borehole was then filled with water and the water level maintained at the surface. Once the inflow stabilized or came into equilibrium with the outflow rate or seepage, the amount of water added for a period of 10 minutes was recorded and the percolation rate calculated and reported in units of CFS/FT^2-FT of head.