2013

Ravine 8 Ecosystem Restoration

Appendix D – Geotechnical Analysis

Alternative Formulation Briefing Document

Chicago District
US Army Corps of Engineers
04/29/2013

Geotechnical Analysis
Ravine 8 Section 506
Great Lakes Fishery & Ecosystem Restoration Project

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INTRODUC TION

The Great Lakes Fishery & Ecosystem Restoration (GLFER) was authorized in Section 506 of the Water Resources Development Act of 2000. The purpose is to restore fishery, ecosystem, and beneficial uses of the Great Lakes in cooperation with non-Federal interests. This specific project is located along the Lake Michigan coastline, southeast of the intersection of Laurel Ave and Lake Ave in Highland Park, Illinois.

The proposed project will restore the ravine along the lakeside bluffs to a more natural state. The methods to accomplish this range from moving water around the ravine in pipes, detaining/retaining water in ponds or cisterns, placing in-stream features to alleviate localized hydraulic issues, and reconnecting the stream to be confluent with Lake Michigan once again. All features that are situated in a position to provide habitat will be constructed of natural materials and stone similar to those that currently exist within the ravines. Additionally, this project will remove invasive plant species and replant the area with native species.

The bluff slopes vary, but are generally around 45 degrees. There is considerable local variability in slope, and many segments of the bluff slope have been graded or terraced for erosion control along private lakeshore property as well as public lakeshore. The slopes are wooded with residential houses at the tops of both bluffs.

Project Background

The Lake Michigan coastal systems were once some of the most diverse ecosystems in Lake County, Illinois. When European settlers reached this area, the ecosystem started to degrade first from logging and then after the establishment of Ft. Sheridan in 1887. Extensive watershed development has increased the flow along the ravines, causing erosion and the continued degradation of quality habitat. Numerous stormwater pipes also outlet into these ravines, causing the steepness of the banks to decline as the ravine continues to widen to handle the increased flow. Some ravines have bulky manmade structures to reduce the geomorphology, but these are also degrading and have lost their effectiveness.

This study was conducted to ascertain the feasibility of restoring Ravine 8 by altering the hydrology, eliminating invasive plant species, planting native vegetation, and stabilizing ravine slopes.

The existing Ravine 8 stream has head cut the ravine due to increased runoff, causing bank instability and soil erosion. Within this ravine, a project was completed by the City of Highland Park in 2011 which involved installing a sanitary sewer line. This line was constructed with a 24-inch RCP which flows into a 36-inch interceptor near the mouth of the ravine. There are several manholes to allow the straight pipes to follow the natural path of the ravine. Water enters the ravine via a 30-inch RCP which carries stormwater under Lake Ave. Several triangular foam erosion protection measures were installed, although most have been washed out.

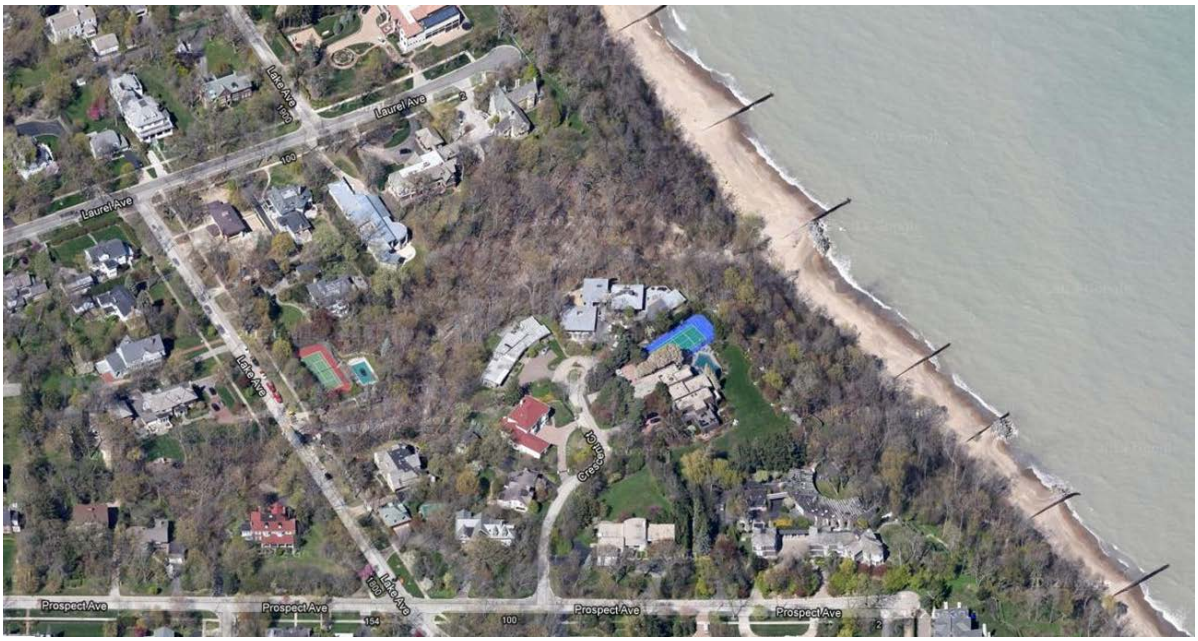


Figure 1. Aerial of Ravine 8

GEOLOGY

Silurian Age Bedrock – The underlying regional bedrock is Silurian-age dolomite, most likely of the Niagaran Series (Willman 1971). This rock resulted from marine deposition when all of northeastern Illinois and much of the neighboring Great Lakes region was the floor of a tropical sea from about 440 to 410 million years ago. As shown on the soil thickness map in Attachment 2, the bedrock is about 100 to 200 feet below the surface. This project does not anticipate encountering bedrock.

Wadsworth Till Member – The dominant material in the Illinois coastal zone is a compact, gray, silty and clayey till of the Wadsworth Till Member. The till may contain discontinuous layers of sand and gravel mixed with sand. This till, which is ubiquitous across the coastal zone, was deposited by glacial ice during the most recent (Wisconsinan) glacial episode. The till is exposed along the coastal bluffs, as well as the material first encountered beneath most of the soils in the area. It also occurs beneath the beach sand and it occurs on the lake bottom either beneath the shore sand or exposed where sand cover is absent. The cohesion of the till has contributed to the near-vertical bluffs along parts of the bluff coast.

Highland Park Moraine – Along the coast between North Chicago and Winnetka, the lakeshore and the Zion City and Highland Park Moraines dead-end into Lake Michigan. These end moraines formed about 14,000 years ago just prior to glacial ice permanently receding into the Lake Michigan basin. These are thus the youngest end moraines in Illinois. The Highland Park Moraine encompasses the entire study area. Long-term wave erosion along this morainal unit has resulted in bluffs that form the highest and steepest landscape along the Illinois coast. Maximum bluff heights of about 90-feet occur along the southern Highland Park lakeshore.

SOILS

As shown in Attachment 2, the soil types within the project area consist of all Ozaukee silt loam. These soils are typically found on ground moraines, in this case the Highland Park moraine. Slopes on the plateaus range from 2 to 6% and in the ravines from 20 to 30%. These soils formed in thin loess or other

silty material and in the underlying loamy dense till. These soils are moderately well drained and the potential for surface runoff ranges from medium to very high with a slow permeability. Native vegetation is mixed hardwood forest of northern red oak, American basswood, white ash, and sugar maple.

LOCAL GEOLOGY

There were no soil investigations completed along the Ravine 8 project area. However, there were several investigations completed near the project area; for Ft. Sheridan (AECOM & CTL) and Rosewood Park (SMC). These borings are about 1-½ miles north and south of the site and are both along the coastal bluffs, in the Ozaukee silt loam like Ravine 8. Therefore, the soil borings completed for these projects are likely to reflect the conditions found in Ravine 8. The maps and logs of these soil borings are included in Attachment 1.

The Ft. Sheridan investigation completed by AECOM was requested by USACE to perform soil borings near seven major ravine mouths, generally on the beach. Soil Borings SB-01, 02, 03, 05, 06A and 07 were completed using the General 550, a light dolly-mounted small gasoline powered rig. SB-04 was completed using the Mobile B-61, a truck-mounted drill rig and SB-06 was completed via hand auguring. All borings were scheduled to extend to a depth of 20 feet each, but several cobbles and boulders were encountered that prevented full depth from being attained. In general, the soil borings encountered a layer of fine to coarse grained sand and gravel (silty at some locations) typically ranging from about 2 to 7 feet in thickness. The shallow sands were loose to medium dense, while the deeper sands and gravels were medium dense to dense. Limestone riprap was present within the sand and visible on the surface in a few of the borings. These materials were underlain by stiff to very stiff gray silty clay (till). These profiles are likely very similar to the one located at the Ravine 8 mouth. Additional soil boring information can be found in the complete AECOM geotechnical engineering report in Attachment 3.

The Ft. Sheridan investigation completed by CTL was requested by Clauss Brothers, Inc. for their "Openlands Lakeshore Preserve" Project, which provides recommendations for the construction of three parking lots, a pathway/bike trail, overlook areas and a pedestrian bridge over Schenk Ravine. A total of 16 soil borings were taken using a truck mounted drill rig, with all but B-16 drilled to about 7-½ feet below grade. All of these were completed within the Ozaukee soil type. B-16 was drilled to about 50 feet below grade at the location of the proposed bridge. In general, the soil borings encountered medium stiff to hard silty clay with few localized exceptions, such as fill. These profiles are likely very similar to those found along Ravine 8. Additional soil boring information, along with recommended design parameters for the proposed structures, can be found in the CTL report in Attachment 4.

The Rosewood Park investigation completed by SMC was requested by the Park District of Highland Park for site improvements including a beach house, bike paths, and related underground improvements. A total of 10 soil borings were taken, with all but B-8 and B-9 completed with a CME 45B truck mounted drill rig. Borings B-8 and B-9 were completed with a hand auger. Boring B-1 was completed to about 15 ft, B-2 to about 50 ft, B-3 to about 10 ft, and the rest to 5 ft. Boring B-2 was completed at the top of the bluff and encountered about 18 ft of tough to hard clay underlain by about 10 ft of medium dense sand. Beneath the sand, tough to hard clay was encountered to the termination depth. Borings B-1, B-3 thru B-6 and B-10 were all completed near the base of the bluff on the lake side. These borings encountered fill in varying amounts from ½ to 3-½ ft thick underlain by sands. Of these, Borings B-1, B-3, and B-10 encountered tough to hard clay before the termination depth. Borings B-7 thru B-9 were completed on the interior slope of the bluff and encountered ½ to 2 ft of fill underlain by very tough to hard clay to the termination depth. Of these borings, B-7 thru B-9 most reflects the likely conditions in Ravine 8. The other borings completed are more along the beachfront and therefore encounter more sand than what is

anticipated in Ravine 8. Additional soil boring information, along with recommended design parameters for the proposed structures, can be found in the SMC report in Attachment 5.

RECOMMENDATIONS

There are several proposed measures for Ravine 8 to restore it to a more natural state. Each of these measures are discussed separately.

HA Open Channel Conveyance – This measure would restore the natural grading of the ravine by adding fill to the original elevation of the channel bottom. Based on the nearby borings, the existing subsurface consists of stiff to hard clay, which is appropriate to add additional fill. Prior to placement of the fill, topsoil should be stripped. The new fill should consist of similar clay materials as found on site and be compacted in lifts. Compacting the clay will make it less susceptible to erosion. Placement and compaction should account for the existing buried sanitary pipe, as well as, the proposed pipe in measure HB and use appropriate equipment to prevent damage to the pipes. This measure may also include half-buried boulders and concrete to reduce erosion if measure HB is not completed.

HB In-Ravine Pipe Conveyance – This measure would reduce flow through the ravine by encapsulating stormwater in a 24-inch pipe that extends the length of the ravine and outlets to the beach. This pipe would run alongside the existing sanitary sewer line constructed in 2011 and buried via the measures in HA. Based on the anticipated tough clay subsurface, the pipe would have acceptable support. If any areas of soft, organic, or otherwise unsuitable soil are encountered during excavation, the unsuitable soils should be removed and replaced with compacted clay or graded stone. The pipe should be supported by bedding stone as recommended by the manufacturer.

HC Retention with Cistern – This measure would divert flow from the head of the ravine into a retention cistern. This cistern would be installed near the beginning of the ravine, on the north side underneath an existing private tennis court. The subsurface is likely tough to hard clay and would support a cistern, although a base stone would likely be required, per manufacturer's recommendations. Pipes would need to be installed between the ravine and cistern, as well. This measure would only be considered if measure HB cannot be completed. It would also include partially buried boulders like HA, but the stones would not need to be as large.

HD Stream Connectivity – This measure would remove the defunct structures at the mouth of the ravine and regrade the area in order to connect the lake and ravine stream. Cobbles would be placed to provide erosion protection and fish habitat. Existing structures include a sheetpile retaining wall, large concrete riprap, and defunct DIP and CMP. The pipes could be either removed or buried in place, depending on the final proposed grades. Pipes abandoned and buried in place should be buried by at least 1 foot of clay. The sheetpile could also be buried since pulling them may lead to slope instability and will require additional equipment. The tops of the sheetpile can be cut so that the new grade buries the tops with at least 1 foot of clay. The broken concrete can be reused as riprap, if it is the appropriate size.

The remaining measures include removing invasive plant species and reestablishing native plant species. These measures are designated D and RB, for restoration of the dune and ravine & bluff, respectively. While performing these measures, it is important to maintain erosion protection such as straw, geotextile, etc. while the native species establish themselves. Without erosion protection or healthy plant roots, the soil can wash out during rain storms.

SUMMARY

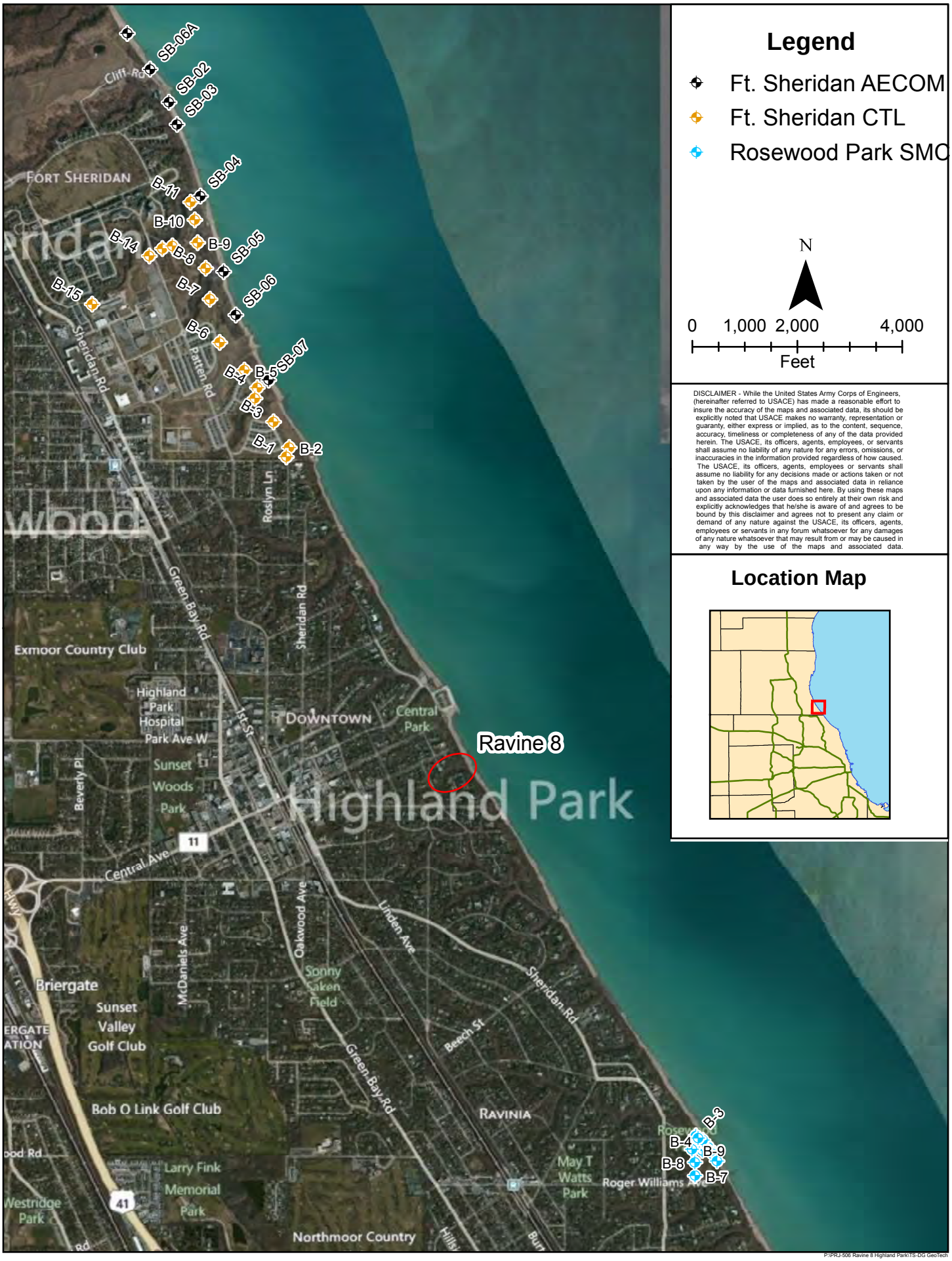
The measures proposed above are appropriate for the site subsurface conditions, but all should be reviewed by a geotechnical engineer once a final plan is developed. The site subsurface conditions are assumed to be essentially homogenous medium stiff to hard clay based on subsurface investigations within similar ravines. No soil borings were completed within Ravine 8. There could be pockets of unsuitable materials, however, and these areas should be mitigated accordingly during construction and it is not necessary to complete soil borings at this time. With the steep existing ravine slopes, measures should generally avoid work done on the slopes or work that cuts into the slopes. Any work that steepens the existing slope would likely require countermeasures to prevent instability. But by adding fill in the bottom of the ravine, the slopes should generally be more stable.

APPENDIX D – GEOTECHNICAL ANALYSIS

Attachment 1: Nearby Soil Boring Map & Logs

RAVINE 8 ADJACENT SOIL BORINGS

U.S. Army Corps of Engineers
Chicago District



Legend

- Ft. Sheridan AECOM
- Ft. Sheridan CTL
- Rosewood Park SMC

N

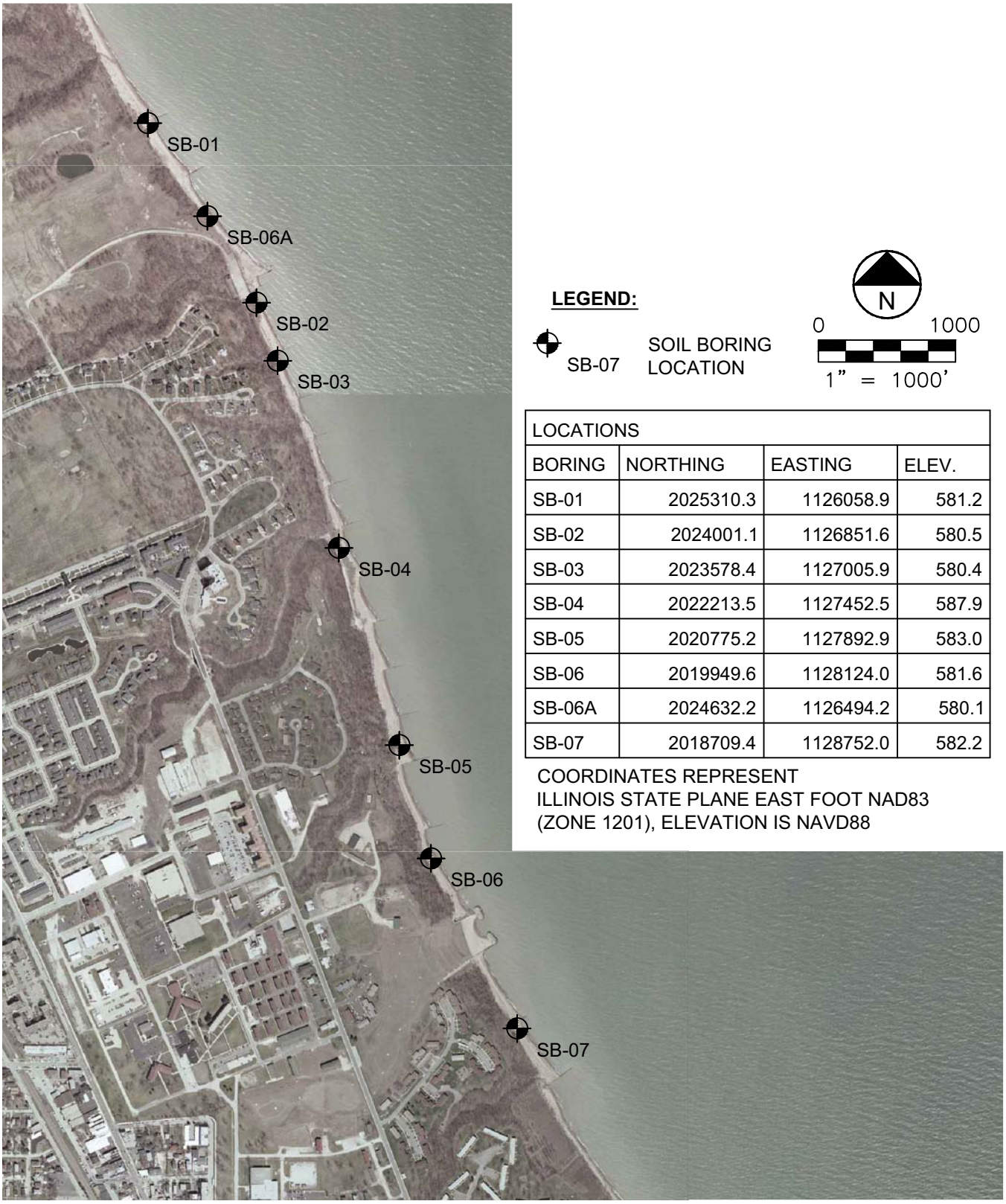
0 1,000 2,000 4,000

Feet

DISCLAIMER - While the United States Army Corps of Engineers, (hereinafter referred to USACE) has made a reasonable effort to insure the accuracy of the maps and associated data, its should be explicitly noted that USACE makes no warranty, representation or guaranty, either express or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. The USACE, its officers, agents, employees, or servants shall assume no liability of any nature for any errors, omissions, or inaccuracies in the information provided regardless of how caused. The USACE, its officers, agents, employees or servants shall assume no liability for any decisions made or actions taken or not taken by the user of the maps and associated data in reliance upon any information or data furnished here. By using these maps and associated data the user does so entirely at their own risk and explicitly acknowledges that he/she is aware of and agrees to be bound by this disclaimer and agrees not to present any claim or demand of any nature against the USACE, its officers, agents, employees or servants in any forum whatsoever for any damages of any nature whatsoever that may result from or may be caused in any way by the use of the maps and associated data.

Location Map

P:\PRJ-506 Ravine 8 Highland Park\TS-DG GeoTech



LEGEND:

SB-07 SOIL BORING LOCATION

N

0 1000

1" = 1000'

LOCATIONS			
BORING	NORTHING	EASTING	ELEV.
SB-01	2025310.3	1126058.9	581.2
SB-02	2024001.1	1126851.6	580.5
SB-03	2023578.4	1127005.9	580.4
SB-04	2022213.5	1127452.5	587.9
SB-05	2020775.2	1127892.9	583.0
SB-06	2019949.6	1128124.0	581.6
SB-06A	2024632.2	1126494.2	580.1
SB-07	2018709.4	1128752.0	582.2

COORDINATES REPRESENT
ILLINOIS STATE PLANE EAST FOOT NAD83
(ZONE 1201), ELEVATION IS NAVD88

AECOM

847.279.2500
www.aecom.com

SOIL BORING LOCATION PLAN
USACE - CHICAGO DISTRICT
FORT SHERIDAN COASTAL
HABITAT RESTORATION
FT SHERIDAN, IL.

Drawn :	DJD	10/22/2010
Checked:	JMB	10/27/2010
Approved:	RE	10/27/2010
PROJECT NUMBER	60163812	
FIGURE NUMBER	FIGURE 1	

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2025310.309 E 1126058.867
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-01
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	20.0 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	8 (DISTURBED 8, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	579.7 ft
16. DATE HOLE	STARTED 9/21/2010 COMPLETED 9/22/2010
17. ELEVATION TOP OF HOLE	581.2 ft
18. TOTAL CORE RECOVERY FOR BORING	65 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
579.2	2.0		Fine to coarse sand, trace gravel - brownish gray - loose to medium dense - moist (SP)	0.0 ft	1 0.0-2.0'	3-5-5-7, N=10, w=1.7%
577.2	4.0		Coarse sand and gravel - brown - medium dense - saturated (SP-GP)	0.9 ft	2 2.5-4.0'	10-12-16, N=28, w=10.2%
574.2	7.0		Fine to coarse sand, trace gravel - brown - medium dense - saturated (SP-GP)	1.2 ft	3 5.0-6.5'	13-15-20, N=35, w=19.1%, 10.5% Gravel, 83.1% Sand, 6.4% Fines
			Silty clay, trace sand, gravel and shale pebbles - gray - stiff to very stiff (CL)	1.3 ft	4 7.5-9.0'	11-10-11, N=21, w=18.3%, Qp=2.5 tsf
				1.0 ft	5 10.0-11.5'	10-10-10, N=20, w=16.1%, Qp=3.25 tsf, LL=29, PL=13
				1.3 ft	6 12.5-14.0'	12-15-21, N=36, w=18.4%, Qp=3.25 tsf
				1.3 ft	7 15.0-16.5'	13-16-20, N=36, w=17.7%, Qp=3.50 tsf
561.2	20.0			1.5 ft	8 18.0-20.0'	15-20-20-23, N = 40, w=18.5%, Qp=4.00 tsf
			End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon			

DRILLING LOG

DIVISION: Great Lakes - Chicago Dist.

INSTALLATION: AECOM

SHEET 1 OF 1 SHEETS

1. PROJECT: Ft Sheridan Coastal Habitat Restoration
JOB NUMBER: 60163812
2. LOCATION (Coordinates or Station): Ft. Sheridan, IL N 2024001.053 E 1126851.598
3. DRILLING AGENCY: AECOM
4. HOLE NO. (As shown on drawing title and file number): SB-02
5. NAME OF DRILLER: McCarthy
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: -
8. DEPTH DRILLED INTO ROCK: 0
9. TOTAL DEPTH OF HOLE: 15.0 ft
10. SIZE AND TYPE OF BIT: PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL: General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: 6 (DISTURBED: 6, UNDISTURBED: 0)
14. TOTAL NUMBER CORE BOXES: 0
15. ELEVATION GROUND WATER: 579.5 ft
16. DATE HOLE: STARTED 9/17/2010, COMPLETED 9/17/2010
17. ELEVATION TOP OF HOLE: 580.5 ft
18. TOTAL CORE RECOVERY FOR BORING: 61 %
19. SIGNATURE OF INSPECTOR: Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
			Fine to coarse sand, trace gravel - brown - very loose to loose - saturated (SP)			
578.5	2.0		Becomes medium to coarse grained below 1.5'	1.0 ft	1 0.0-2.0'	1-2-3-4, N=5, w=13.8%, 1.4% Gravel, 98.0% Sand, 0.6% Fines
			Medium to coarse sand, trace to little gravel - brownish gray - medium dense to dense - saturated (SP-GP)	1.4 ft	2 2.5-4.0'	13-19-19, N=38, w=9.2%
575.5	5.0				2A 4.0-4.5'	
			Clayey silt - gray - medium dense to dense - saturated (ML)			
573.0	7.5			1.0 ft	3 5.0-7.0'	7-17-15-23, N=32, w=17.7%, Qp=4.50 tsf
			Silty clay, trace sand, gravel and shale - gray - stiff to very stiff (CL)	0.8 ft	4 7.5-9.5'	7-15-18-29, N=33, w=15.1%, Qp=4.00 tsf
				1.2 ft	5 10.0-11.5'	6-7-9, N=16, w=21.1%, Qp=2.25 tsf
565.5	15.0			1.6 ft	6 12.5-14.5'	7-9-10-11, N=19, w=20.6%, Qp=2.75 tsf
			End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon			

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2023578.395 E 1127005.918
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-03
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	1.5 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	1 (DISTURBED: 1, UNDISTURBED: 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	580.1 ft
16. DATE HOLE	STARTED 9/17/2010 COMPLETED 9/17/2010
17. ELEVATION TOP OF HOLE	580.4 ft
18. TOTAL CORE RECOVERY FOR BORING	67 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
578.9	1.5		Silty fine sand, trace gravel - brown - medium dense - saturated (SM) Obstructed at 1.5' by boulder (riprap limestone) End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon	1.0 ft	1 0.0-1.5'	5-7-10, N=17, w=11.7%

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2022213.518 E 1127452.516
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-04
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	22.0 ft
10. SIZE AND TYPE OF BIT	HSA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	Mobile B-61
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	9 (DISTURBED 9, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	578.4 ft
16. DATE HOLE	STARTED 9/22/2010 COMPLETED 9/22/2010
17. ELEVATION TOP OF HOLE	587.9 ft
18. TOTAL CORE RECOVERY FOR BORING	83 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
			Fill: Silty clay, mixed with sand and gravel - dark brown - stiff	1.3 ft	1 0.0-2.0'	6-6-8-8, N=14, w=7.7%
585.4	2.5					
			Fill: Sandy silt, trace clay - brown - medium dense - moist	1.2 ft	2 2.5-4.0'	8-9-11, N=20, w=10.1%
582.9	5.0					
			Fill: Sand mixed with clay - brown - medium dense - moist	1.5 ft	3 5.0-7.0'	6-6-7-14, N=13, w=15.1%, Qp=2.50 tsf
580.4	7.5					
			Fine to medium sand, trace gravel - brown - medium dense - saturated (SP)	1.7 ft	4 7.5-9.5'	7-9-9-4, N=18, w=18.8%, 18.1% Gravel, 76.6% Sand, 5.3% Fines
577.9	10.0					
			Silty clay, trace sand, gravel and shale pebbles - gray - stiff to very stiff (CL)	1.7 ft	5 10.0-12.0'	7-8-8-10, N=16, w=18.9%, Qp=4.25 tsf
				1.2 ft	6 12.5-14.0'	10-12-16, N=28, w=16.1%, Qp=6.25 tsf
				1.5 ft	7 15.0-16.5'	8-8-10, N=18, w=18.8%, Qp=3.75 tsf
				1.5 ft	8 17.5-19.0'	9-10-12, N=22, w=18.8%, Qp=3.25 tsf
565.9	22.0			1.7 ft	9 20.0-22.0'	10-10-12-14, N=22, w=19.7%, Qp=3.25 tsf
			End of Boring Boring backfilled with bentonite chips upon completion 140 lb Automatic Hammer, 30" fall, 2" OD split spoon			

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2020775.177 E 1127892.923
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-05
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	20.0 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	8 (DISTURBED 8, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	580.5 ft
16. DATE HOLE	STARTED 9/20/2010 COMPLETED 9/21/2010
17. ELEVATION TOP OF HOLE	583.0 ft
18. TOTAL CORE RECOVERY FOR BORING	74 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
			Fine to medium sand, trace gravel - brownish gray - loose - moist (SP)	1.2 ft	1 0.0-2.0'	3-3-3-3, N=6, w=5.3%
580.5 ▼	2.5		Fine to medium sand, trace gravel - brownish gray - loose to medium dense - saturated (SP)	1.1 ft	2 2.5-4.5'	4-3-5-7, N=8, w=19.0%, 3.1% Gravel, 93.7% Sand, 3.2% Fines
				1.2 ft	3 5.0-6.5'	13-16-17, N=33, w=20.9%
575.5	7.5		Silty clay, trace sand, gravel and shale pebbles - gray - very stiff (CL)	1.1 ft	4 7.5-9.0'	11-13-17, N=30, w=19.0%, Qp=2.75 tsf
573.0	10.0		Silty sand, trace gravel - gray - medium dense - saturated (SM)	1.5 ft	5 10.0-11.5'	13-13-17, N=30, w=20.1%
570.5	12.5		Silty clay, trace sand, gravel and shale pebbles - gray - stiff to hard (CL)	1.2 ft	6 12.5-14.0'	9-13-16, N=29, w=20.4%, Qp=2.25 tsf
				1.2 ft	7 15.0-16.5'	10-12-16, N=28, w=20.2%, Qp=2.00 tsf
563.0	20.0		End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon	1.5 ft	8 18.0-20.0'	16-18-37-40, N=55, w=12.6%, Qp=3.75 tsf

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2019949.602 E 1128124.045
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-06
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	5.0 ft
10. SIZE AND TYPE OF BIT	HA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	Hand Auger
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	3 (DISTURBED 3, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	580.1 ft
16. DATE HOLE	STARTED 9/22/2010 COMPLETED 9/22/2010
17. ELEVATION TOP OF HOLE	581.6 ft
18. TOTAL CORE RECOVERY FOR BORING	70 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
580.1	1.5		Fine to medium sand, trace gravel - brownish gray - medium dense - moist (SP)	1.0 ft	1 0.0-1.5'	10-15-22, N=37, w=3.3%
			Fine to coarse gravel with sand - brown - dense to very dense - saturated (GP-SP)	1.2 ft	2 1.5-3.0'	30-40-45, N=85, w=8.2%
576.6	5.0			1.3 ft	3 3.0-5.0'	30-38-40-50, N=78, w=8.9%
			End of Boring Boring backfilled with bentonite chips upon completion 89 lb Donut Hammer, 12" fall, 2" OD split spoon Note: N-value shown corresponds to number of blows required to drive split spoon sampler 1 foot after the initial 6 inch increment with 89 lb hammer			

DRILLING LOG

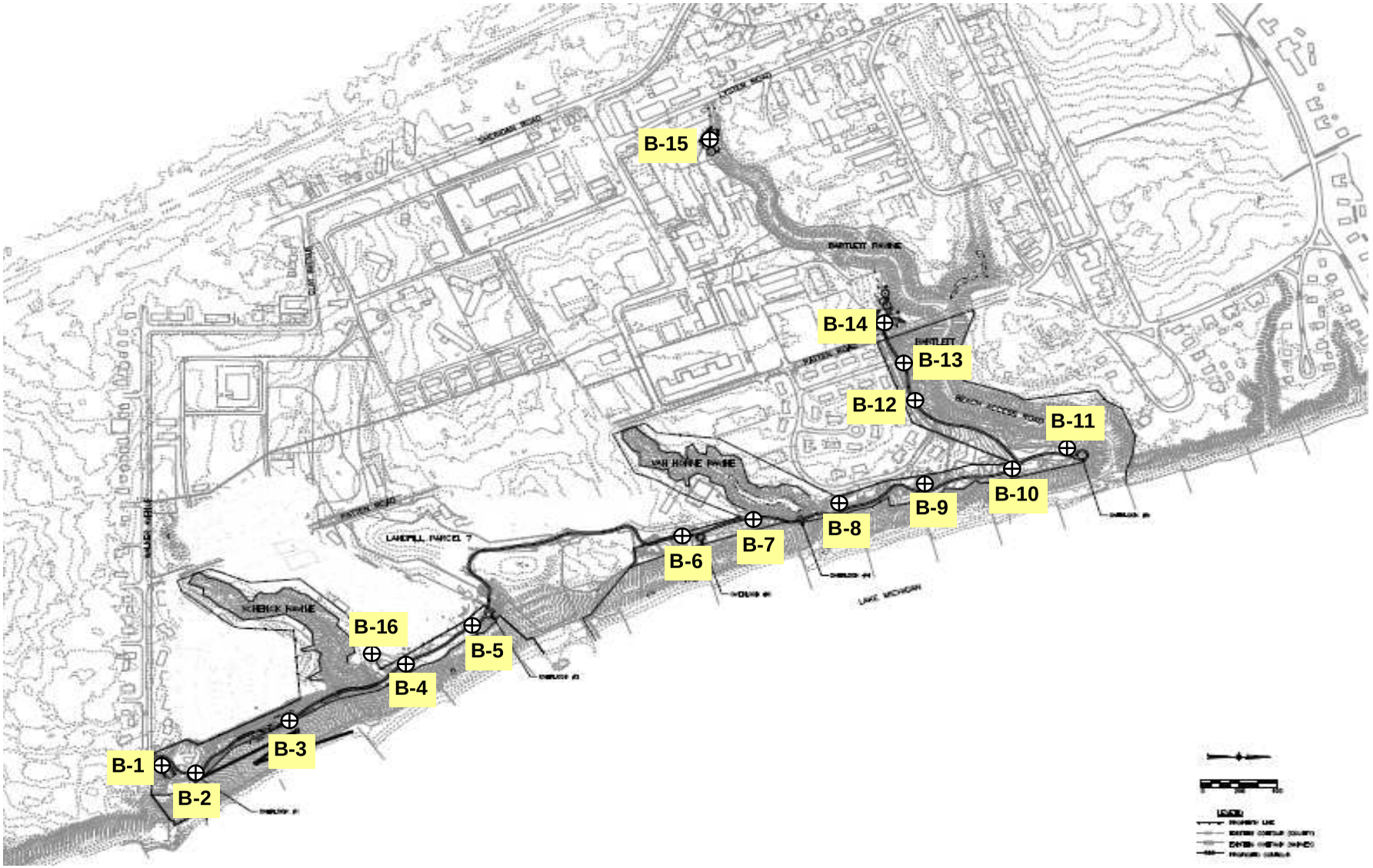
DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2024632.215 E 1126494.219
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-06A
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	1.5 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	1 (DISTURBED: 1, UNDISTURBED: 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	NE ft
16. DATE HOLE	STARTED 9/22/2010, COMPLETED 9/22/2010
17. ELEVATION TOP OF HOLE	580.1 ft
18. TOTAL CORE RECOVERY FOR BORING	45 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
578.6	1.5		Fine to medium sand, trace gravel - brownish gray - medium dnese - moist (SP) Obstructed at 1.5 ft by boulder (riprap limestone) End of Boring Boring backfilled with bentonite chips upon completion	0.7 ft	1 0.0-1.5'	4-9-15, N=24, w=6.4%

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2018709.448 E 1128752.006
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-07
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	19.5 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	8 (DISTURBED 8, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	579.7 ft
16. DATE HOLE	STARTED 9/21/2010 COMPLETED 9/21/2010
17. ELEVATION TOP OF HOLE	582.2 ft
18. TOTAL CORE RECOVERY FOR BORING	76 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
			Fine to coarse sand, trace gravel - brown - medium dense - saturated (SP)	1.0 ft	1 0.0-2.0'	3-8-9-9, N=17, w=9.3%
578.9	3.3		Silty clay, trace sand, gravel and shale pebbles - gray - stiff to hard (CL)	0.7 ft	2 2.5-3.75'	4-5-9-9, N=14, w=17.7%, 45.5% Gravel, 52.5% Sand, 2.0% Fines
				1.0 ft	2A 3.25-4.5'	w=20.6%, Qp=1.50 tsf
				1.5 ft	3 5.0-7.0'	5-8-12-12, N=20, w=22.2%, Qp=1.25 tsf
				0.6 ft	4 7.5-9.5'	8-11-12-14, N=23, w=21.4%, Qp=0.50 tsf
				1.2 ft	5 10.0-11.5'	14-16-16, N=32, w=17.6%, Qp=3.25 tsf
				1.4 ft	6 12.5-14.0'	11-17-24, N=41, w=17.1%, Qp=3.25 tsf
				1.5 ft	7 15.0-16.5'	20-16-25, N=43, w=18.0%, Qp=1.25 tsf, LL=29, PL=13
562.7	19.5		End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon	1.7 ft	8 18.0-19.5'	18-20-20, N=40, w=17.3%, Qp=1.75 tsf



CHICAGO TESTING LABORATORY, INC.	**SITE AND BORING LOCATION PLAN**	**EXHIBIT:** A	**DRAFTER:** TM	**PROJECT NO.** 10EG204
	Openlands Lakeshore Preserve **Highland park/Fort Sheridan, IL.**	**LEGEND:** ⊕ Approximate Boring Location	**ENGINEER:** CC	**SCALE:** NTS
			REVISION:	**DATE:** 5/6/2010

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-1

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						2" Black Clayey Topsoil					
							Brown with streaks of grey Silty CLAY, trace gravel					
			SS-1	9	18			21	3.25	48	18	
			SS-2	14	18			16	4.0			
	5		SS-3	20	18			15	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-1

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-2

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						3" Black Clayey Topsoil					
							Brown Silty CLAY, very stiff, trace gravel					
			SS-1	7	16			17	3.0			
			SS-2	14	18		Brown and grey Silty CLAY, trace to little gravel	19	1.5			
	5		SS-3	16	18		Brown Silty Clay LOAM, trace fine gravel, hard	15	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-2

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.ipj]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-3

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						3" Dark Brown Silty Clayey Topsoil					
							Brown with streaks of grey Silty CLAY, very stiff to medium stiff, trace fine gravel					
			SS-1	7	18			17	3.25			
			SS-2	5	14			20	0.75			
	5						Grey Silty Clay LOAM, trace gravel, very stiff					
			SS-3	13	18			15	2.5			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-3

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-4

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						2" Black Clayey Topsoil over 6" Brown Silty CLAY, FILL					
			SS-1	9	16		Brown and grey Clay LOAM, very stiff, trace fine gravel	20	2.75	27	14	
			SS-2	14	18		Brown Silty Clay LOAM, trace gravel, hard	15	4.5+			
	5		SS-3	12	18			17	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-4

P:\Elk Grove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-5

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: 4 feet ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						5" Dark Brown to Black Clayey Topsoil (possible FILL)					
							Brown (with streaks of white) Silty CLAY, hard					
			SS-1	15	18			15	4.5+			
			SS-2	10	18		Brown Clayey SILT, damp, very stiff (ATD)	18	2.25			
	5		SS-3	20	18		Brown Silty Clay LOAM, trace fine gravel	16	4.0			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-5

P:\IElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-6

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						Brown Clay LOAM, stiff (possible FILL)					No Topsoil observed
			SS-1	5	16			17	1.25			
			SS-2	9	18		Brown and grey Silty CLAY, trace gravel, very stiff	22	1.25			
	5		SS-3	9	18			12	2.75			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-6

P:\Elk Grove\Geo\200 Series\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-7

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						Brown to dark brown and black Silty CLAY, stiff, FILL					
			SS-1	9	18		Brown to dark brown Silty Clay LOAM, very stiff	26	1.25			
							Brown with streaks of grey Silty CLAY, trace gravel					
	5		SS-2	13	18			19	3.75			
			SS-3	21	18			15	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-7

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-8

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						9" Dark Brown Silty CLAY mixed with Pea Gravel, FILL					
			SS-1	9	18		Brown Clay LOAM, hard, trace gravel, FILL	16	4.5+			
			SS-2	11	18		Grey to Dark Grey Silty and Sandy CLAY, trace black cinders and brick fragments, hard, FILL	17	4.5+			
	5		SS-3	10	18		Brown with grey Silty CLAY, trace gravel, hard	18	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-8

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-9

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						6" Dark Brown Silty CLAY mixed with Pea Gravel, FILL					
							Brown Silty CLAY, very stiff, trace fine gravel, FILL					
			SS-1	6	18			17	3.5			
							Brown to dark brown with traces of black Silty CLAY, trace fine sand, stiff					
	5		SS-2	7	18			29	1.5			
							Brown and grey Silty Clay LOAM, trace gravel, hard					
			SS-3	20	18			15	4.25			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

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Figure B-9

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-10

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						6" Black Silty CLAY Topsoil, FILL					
			SS-1	10	16		Brown to dark brown LOAM, trace gravel, hard, FILL	17	4.5+	28	15	
	5		SS-2	6	18		Brown Silty CLAY, hard, trace gravel	17	4.5+			
			SS-3	12	18			15	4.5+			
	10						Bottom of Boring at 7.5 feet bgs					
	15											
	20											
	25											

P:\Elk Grove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Figure B-10

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-11

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						5" Dark Brown Silty CLAY Topsoil					
							Brown Sandy Clay LOAM, medium stiff to stiff					
			SS-1	4	18			22	0.75			
							Brown Silty CLAY, very stiff to hard, trace fine gravel					
	5		SS-2	7	18			18	3.0			
			SS-3	10	18			16	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-11

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-12

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						6" Black Silty CLAY Topsoil					
							Brown with streaks of grey Silty CLAY, very stiff to hard, trace fine gravel					
			SS-1	8	18			23	2.0			
			SS-2	13	16			15	4.5+			
	5		SS-3	21	18			15	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-12

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-13

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						12" Black Silty CLAY Topsoil, FILL					
			SS-1	11	18		Black SAND, Cinders and GRAVEL, FILL	27				
							Brown with streaks of grey Silty CLAY, very stiff to hard, trace gravel					
	5		SS-2	15	18			17	3.75			
			SS-3	20	18			16	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-13

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-14

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						8" Black Silty CLAY Topsoil, FILL					
							Black Silty CLAY mixed with gravel, FILL					
			SS-1	9	18		Brown Silty CLAY, very stiff, trace sand, trace gravel	20	3.5			
			SS-2	16	18		Brown with streaks of grey Silty CLAY, hard	16	4.5+			
	5		SS-3	20	18			16	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-14

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-15

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						3-3/4" Asphalt					
							Grey Crushed Stone mixed with some CLAY, FILL					
			SS-1	9	0		Brown Silty CLAY, Stiff, FILL	19				No recovery in sampler, auger sample.
							Grey to dark grey Silty CLAY, very stiff, FILL					
			SS-2	8	18			23	2.0			
	5						Brown and grey Silty CLAY, trace gravel, very stiff	17	2.75			
			SS-3	9	18			22	2.0			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-15

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.lpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-16

Sheet 1 of 2

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 50 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: 23.5 feet ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						Brown Silty CLAY, stiff					No Topsoil observed
			SS-1	5	16			22	1.25			
							Brown and Grey Silty CLAY, trace sand, trace fine gravel, very stiff to hard					
	5		SS-2	8	18			15	4.5+			
			SS-3	15	18			16	4.5+			
			SS-4	19	18			15	4.5+			
	10		SS-5	25	18			16	4.5+			
							Grey Silty Clay LOAM, trace gravel, trace shale, very stiff to hard					
			SS-6	14	18			15	3.5			
	15		SS-7	13	18			15	3.0			
			SS-8	15	18			15	3.75	31	14	
	20		SS-9	11	18			15	3.5			
							(ATD)					
			SS-10	15	14			15	3.25			
	25											

Figure B-16

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.lpj]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-16

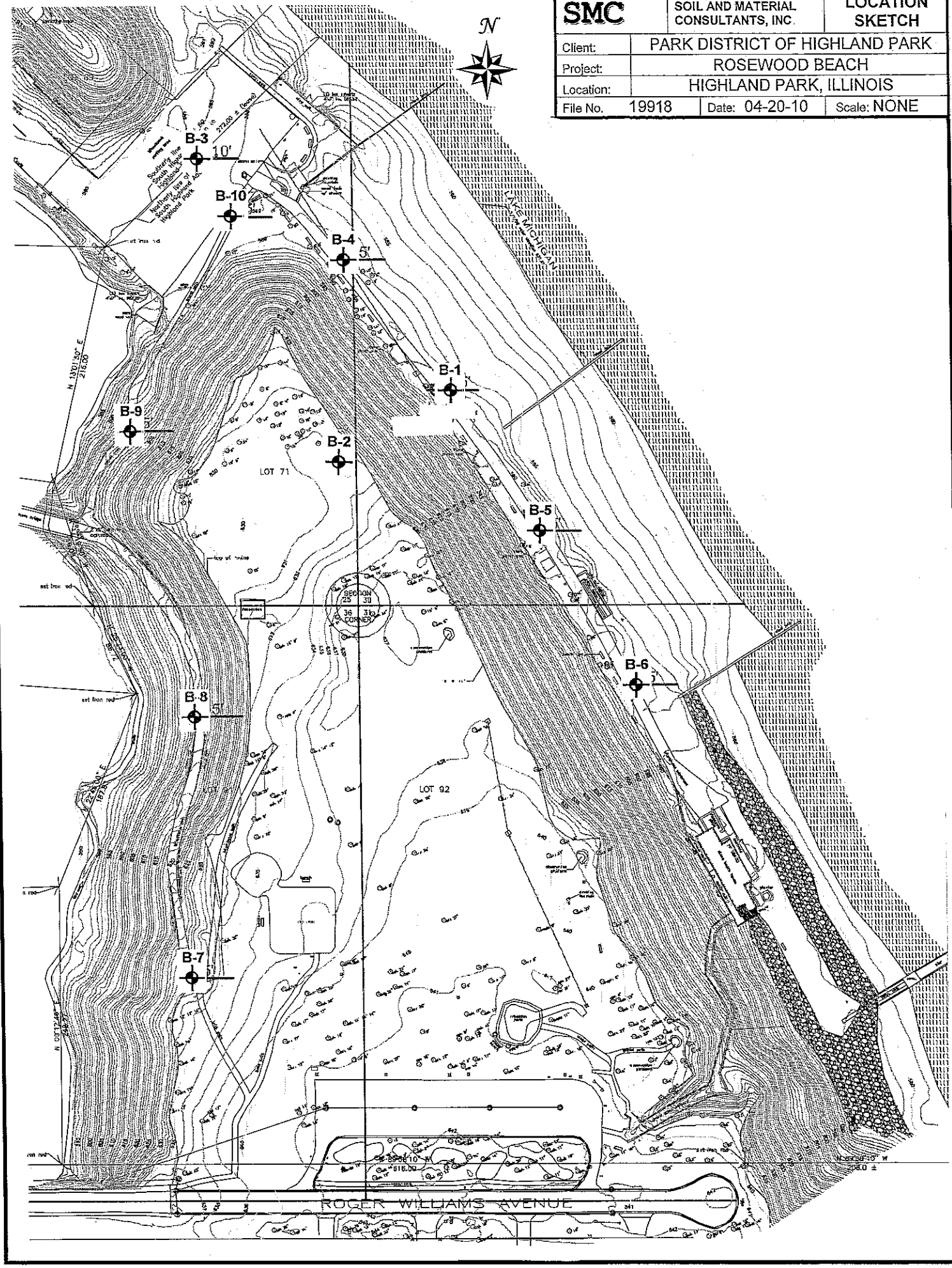
Sheet 2 of 2

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	25						Grey Silty Clay LOAM, trace gravel, trace shale, very stiff to hard (cont.)					
			SS-11	19	14			14	3.5			
			SS-12	18	18			15	2.5			
	30											
			SS-13	20	18			14	4.0			
	35											
			SS-14	15	18			15	3.5			
	40											
			SS-15	18	18			16	2.0			
	45											
			SS-16	25	18			14	4.5+			
	50						Bottom of Boring at 50 feet bgs					

Figure B-16

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

SMC	SOIL AND MATERIAL CONSULTANTS, INC.	LOCATION SKETCH
Client:	PARK DISTRICT OF HIGHLAND PARK	
Project:	ROSEWOOD BEACH	
Location:	HIGHLAND PARK, ILLINOIS	
File No. 19918	Date: 04-20-10	Scale: NONE



SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 1

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park **File No.** 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

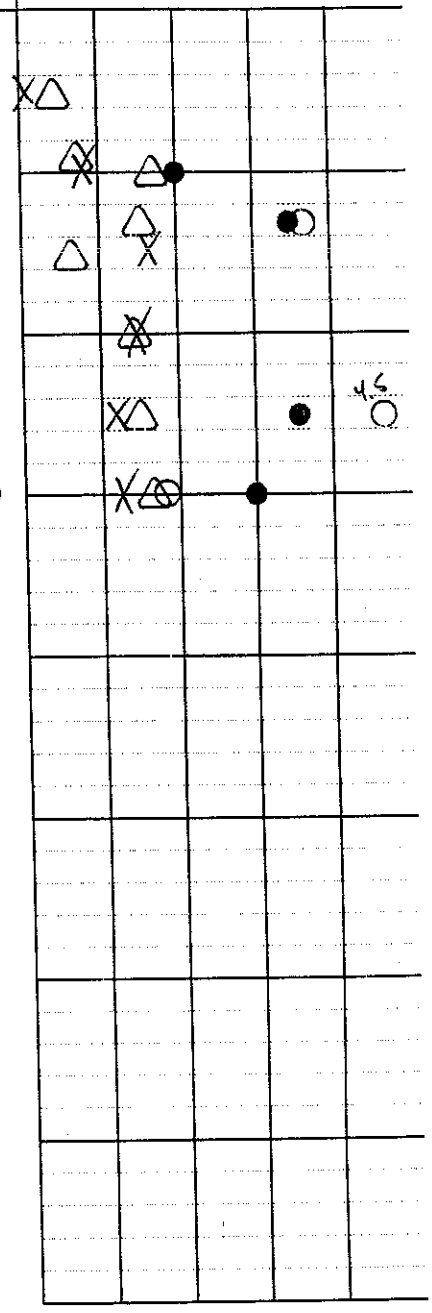
Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

Elevation 588.0' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
	Brown fine sand, trace roots, damp, very loose	1	3.6		
			8.2		
5	Brown clay, some silt, trace sand & gravel, damp, very tough	7	15.9		
			14.9	115.6	3.6
	Brown fine sand, damp-very damp, saturated, medium dense	16	6.5		
10	▽	15	14.4		
	Gray clay, some silt, trace sand & gravel, damp, hard to tough	12	14.7	128.4	4.5
15		13	16.1	124.8	1.9
	End of Boring				
20					
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40



Water encountered at 10.0 feet during drilling operations (W D)
Water recorded at 10.0 feet on completion of drilling operations (A D)
Water recorded at feet hours after completion of drilling operations (A D)

G-303

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 2

Logged By: DA **Page:** 1 of 2

Client: Park District of Highland Park **File No.** 19918 **Date Drilled:** 4/19/10

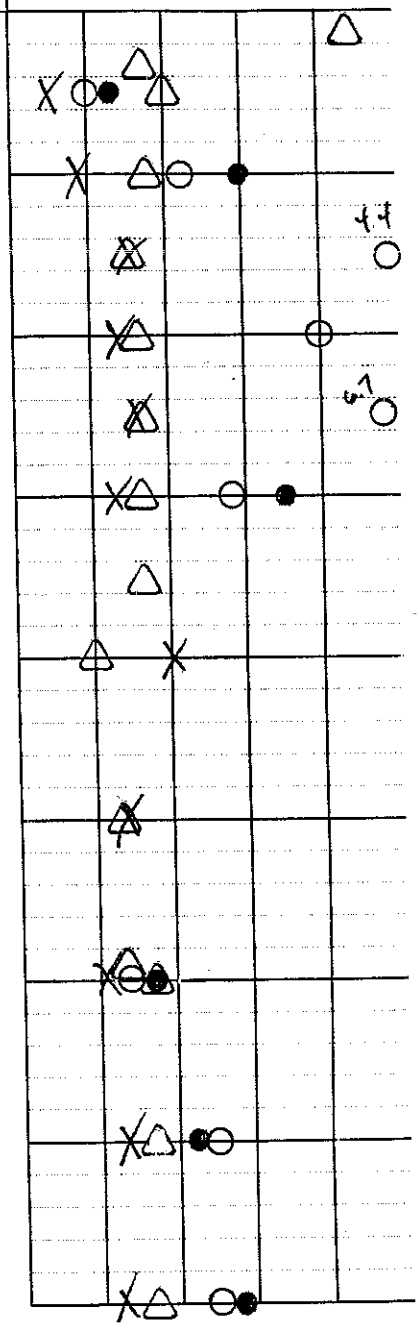
Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 631.5' Existing Surface	standard penetration ×	moisture content Δ	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	(a) see page 2 of 2 (b) see page 2 of 2		42.7 17.7		
	Brown clay & silt,trace sand & gravel, damp-very damp,tough	5	20.2	103.9	1.0
5	Brown-gray clay,some silt,trace sand & gravel,damp,very tough	9	19.3	111.1	2.2
	Brown clay,some silt,trace sand & gravel, damp,hard	15	15.4	118.6	4.4
10		14	16.4	119.1	4.0
		16	15.9	119.9	6.7
15	Brown-gray clay,some silt,trace sand & gravel,damp,very tough	14	16.2	119.4	2.9
	Gray clay,some silt,trace sand & gravel, damp		17.3		
20	Gray fine sand,trace medium-coarse sand & silt,damp,medium dense	21	10.1		
	Gray fine sand,trace medium-coarse sand & gravel,very damp-saturated,medium dense				
25		15	12.8		
	Gray fine-medium sand,some coarse sand & gravel,very damp-saturated,medium dense				
30		11	14.4 17.5	121.3	1.4
	Gray clay,some silt,trace sand & gravel, damp,tough to very tough				
35		14	17.6	120.6	2.5
40		13	16.7	119.4	2.5

○ unconfined compressive strength, tons/sq.ft.
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0
× standard penetration "N", blows/ft
Δ moisture content, %
10 20 30 40



Water encountered at 22.0 feet during drilling operations (W D)
Water recorded at 28.0 feet on completion of drilling operations (A D)
Water recorded at feet hours after completion of drilling operations (A D)

SOIL AND MATERIAL CONSULTANTS, INC.

Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 2

Logged By: DA **Page:** 2 of 2

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/19/10

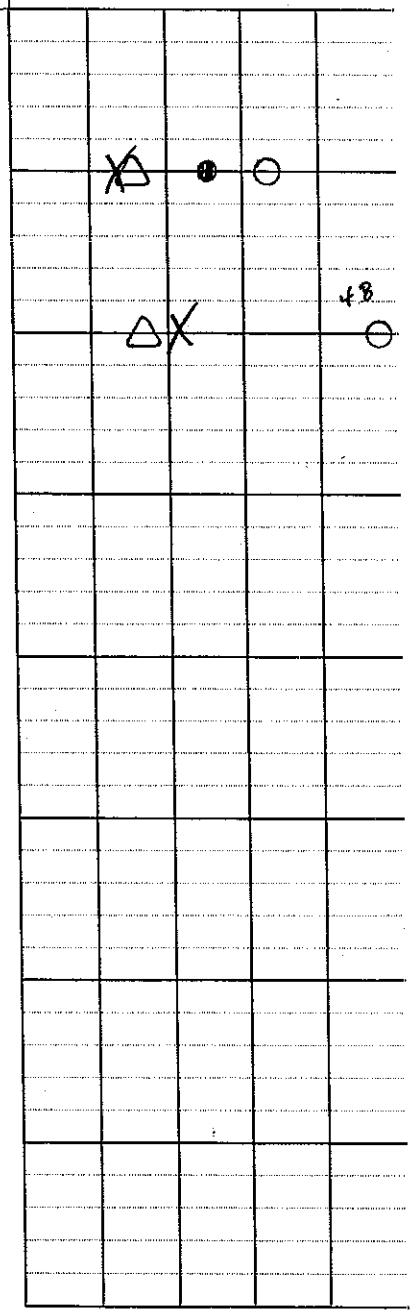
Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation	standard penetration ×	moisture content △	dry unit weight, lbs./cu.ft. ɣ	unconfined comp. strength ○
45	Gray clay,some silt,trace sand & gravel, damp,very tough to hard	14	15.4	119.1	3.3
50	End of Boring	22	16.1	123.3	4.8
55	(a) Dark brown silt,some fine sand, trace clay & roots,damp (topsoil) - 6.0" (b) Brown silt,some clay,trace sand, damp-very damp,loose				
60					
65					
70					
75					
80					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0
× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40



Water encountered at 22.0 feet during drilling operations (W D).
Water recorded at 28.0 feet on completion of drilling operations (A D)
Water recorded at feet hours after completion of drilling operations (A D)

SOIL AND MATERIAL CONSULTANTS, INC.

Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 3

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

Elevation 589.8' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	Bituminous concrete - 5.0"				
	Limestone - 7.0"				
1	Black-dark gray silt,some clay,trace sand & gravel,damp,medium dense - Fill		12.8		
2	Gray fine sand,trace gravel,damp,medium dense	13	5.6		
3					
4			6.1		
	Gray silt,some fine sand,damp-very damp, very loose				
5		3	19.9		
	Gray fine sand,trace medium-coarse sand & silt,damp				
6			9.5		
	Gray silt,some clay,trace sand,damp-very damp,very loose				
7			24.3		
	Gray clay & silt,trace sand,very damp, stiff ▼	2	23.5	107.3	0.7
8	▽				
	Gray silt,some clay,trace fine sand & organic matter,very damp,very loose				
9					
10		1	40.9		

End of Boring

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at 8.5 feet during drilling operations (W D)
Water recorded at 7.5 feet on completion of drilling operations (A D)
Water recorded at feet hours after completion of drilling operations (A D)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 4

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 588.4' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
	Bituminous concrete - 7.0" Dark brown-black sand & gravel,damp - 2.5"				
1	Brown-dark brown clay & silt,some sand, trace gravel,damp,medium dense - Fill		6.9		
2	Brown clay,some silt,trace sand & gravel, damp,very hard	14	12.2	124.6	8.3
3	Brown fine sand,damp,medium dense				
4					
5	End of Boring	10	4.7		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 5

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

Elevation 590.0' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration (×)	moisture content (△)	dry unit weight lbs./cu.ft. (ɣ)	unconfined compressive strength (○)
	Bituminous concrete - 4.5"				
	Dark brown-black silt & gravel,damp - 3.5"				
1	Brown clay & silt,trace sand,damp				
	Brown fine sand,damp,medium dense		10.8		
2		10	3.3		
3					
4	Brown fine sand,damp,loose				
5	End of Boring	9	4.4		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
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SOIL BORING LOG 6

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park **File No.** 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

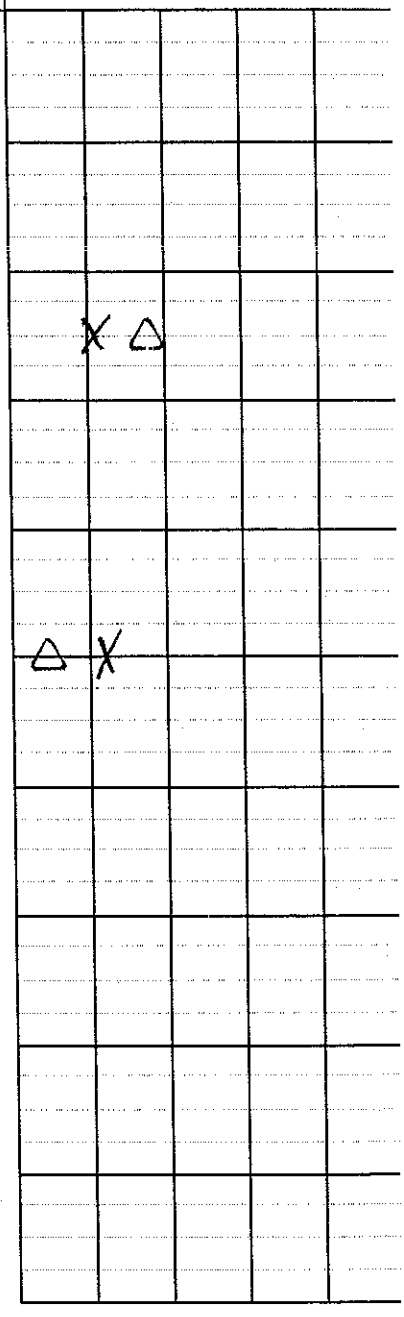
Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 589.2' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ⊗	unconfined compressive strength ○
1	Bituminous concrete - 4.5" Limestone,damp - 7.5"				
2	Brown-dark brown-black clay & silt,some sand & gravel,damp,medium dense - Fill	11	19.4		
3					
4	Brown fine sand,damp,medium dense				
5	End of Boring	13	4.3		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq.ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
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SOIL BORING LOG 7

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/19/10

Reference: Rosewood Beach
Highland Park, IL

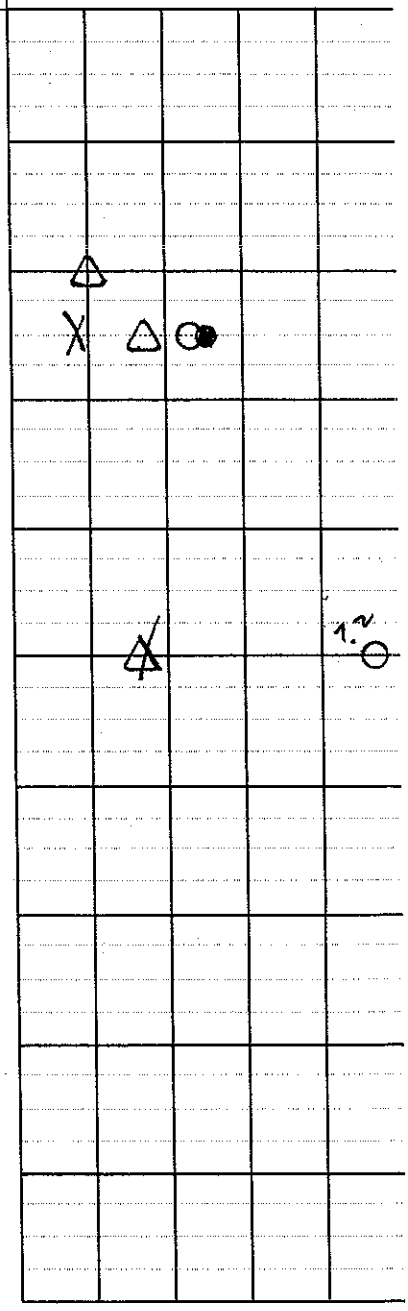
Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	Elevation 630.7' **Existing Surface** (a) see below				
1	Dark brown sand, some gravel, cinders & large limestone, damp - Fill				
2			10.3		
3	Brown clay, some silt, trace sand & gravel, damp, very tough to hard	8	17.5	109.7	2.4
4					
5		17	15.6	111.0	7.2
	End of Boring				
	(a) Bituminous concrete - 1.0"				
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq.ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 8

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☐ CME 45B ☐ CME 55 ☒ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 610.1' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
1	Dark brown silt,some sand,gravel,large limestone & asphalt,damp - Fill		13.0		
2	Brown clay,some silt,trace sand & gravel, damp,very tough				
3			20.8		
4					
5	End of Boring		23.3		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq.ft.
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 9

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☐ CME 45B ☐ CME 55 ☒ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 598.5' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
	Crushed gravel,damp - 4.0"				
1	Brown clay,some silt,trace sand & gravel, damp,very tough		19.0		
2					
3			17.4		
4					
5	End of Boring		15.8		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W D)
Water recorded at dry feet on completion of drilling operations (A.D)
Water recorded at feet hours after completion of drilling operations (A.D)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 10

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 589.3' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
1	Brown fine-medium sand,some coarse sand & gravel,damp - Fill		5.9		
2	Brown-dark brown-black silt,some clay, trace sand & gravel,damp,loose - Fill	5	17.1		
3					
4	Brown clay,some silt,trace sand & gravel, damp,hard				
5	End of Boring	11	16.4	116.4	4.4
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

APPENDIX D – GEOTECHNICAL ANALYSIS

Attachment 2: NRCS, Soil Type, & Soil Thickness Maps


87° 47' 26"
87° 47' 4"
42° 11' 22"
42° 11' 0"
434720
434800
434880
434960
435040
435120
435200
4671120
4671040
4670960
4670880
4670800
4670720
4670640
4670560
4670480
Central Ave
Central Ct
Lake Ave
Laurel Ave
Lake Ave
Crescent Ct
Prospect Ave
Forest Ave
Hazel Ave
530B
530F
530C
530B
Map Scale: 1:3,200 if printed on A size (8.5" x 11") sheet.
N
Meters
0 30 60 120 180
Feet
0 100 200 400 600

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:3,200 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County, Illinois
Survey Area Data: Version 6, Jan 20, 2012

Date(s) aerial images were photographed: 7/7/2007

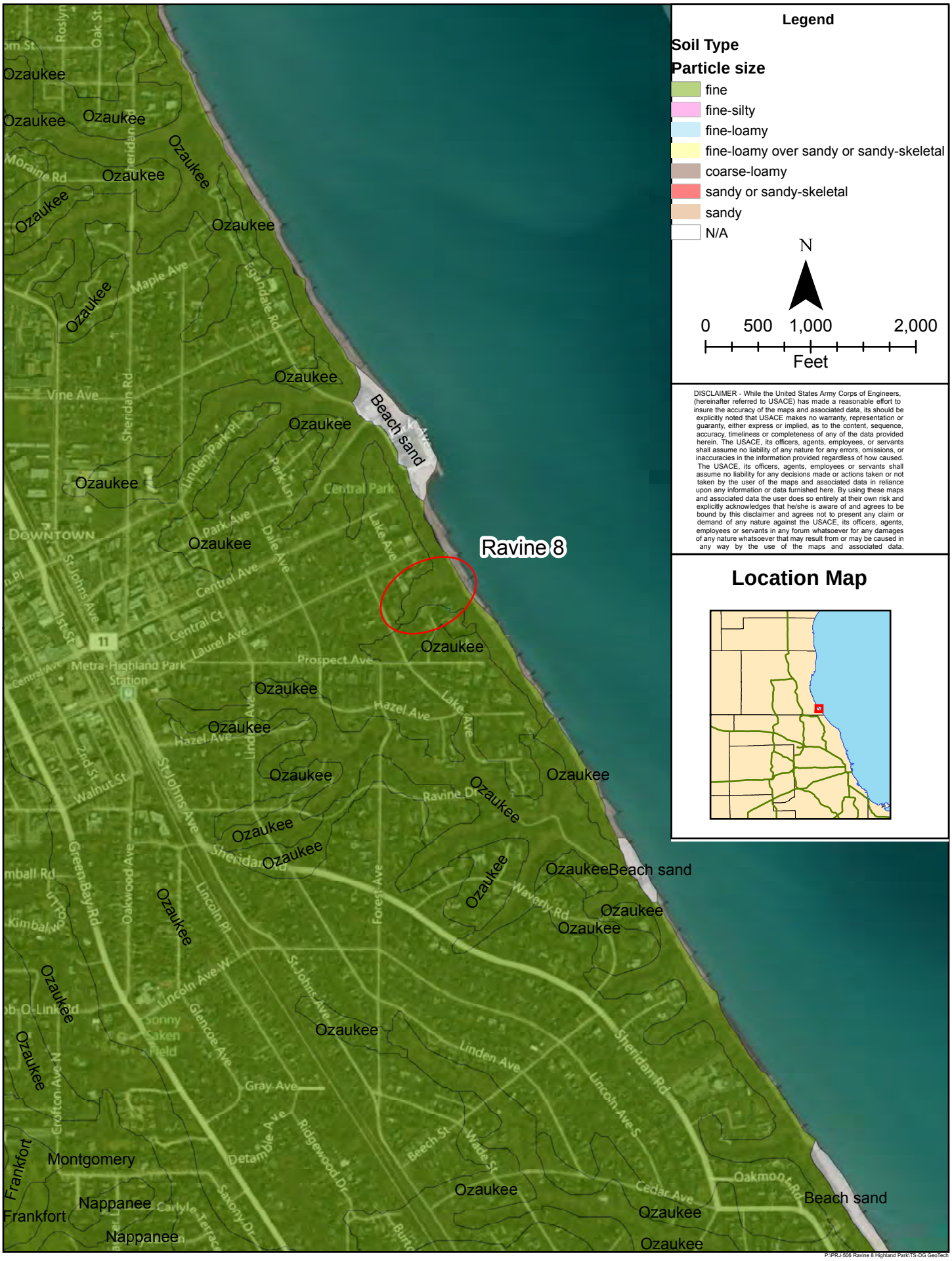
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Lake County, Illinois (IL097)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
530B	Ozaukee silt loam, 2 to 4 percent slopes	11.6	46.4%
530C	Ozaukee silt loam, 4 to 6 percent slopes	5.4	21.5%
530F	Ozaukee silt loam, 20 to 30 percent slopes	6.4	25.9%
Subtotals for Soil Survey Area		**23.4**	**93.8%**
Totals for Area of Interest		**24.9**	**100.0%**

RAVINE 8 SOIL TYPE

U.S. Army Corps of Engineers
Chicago District

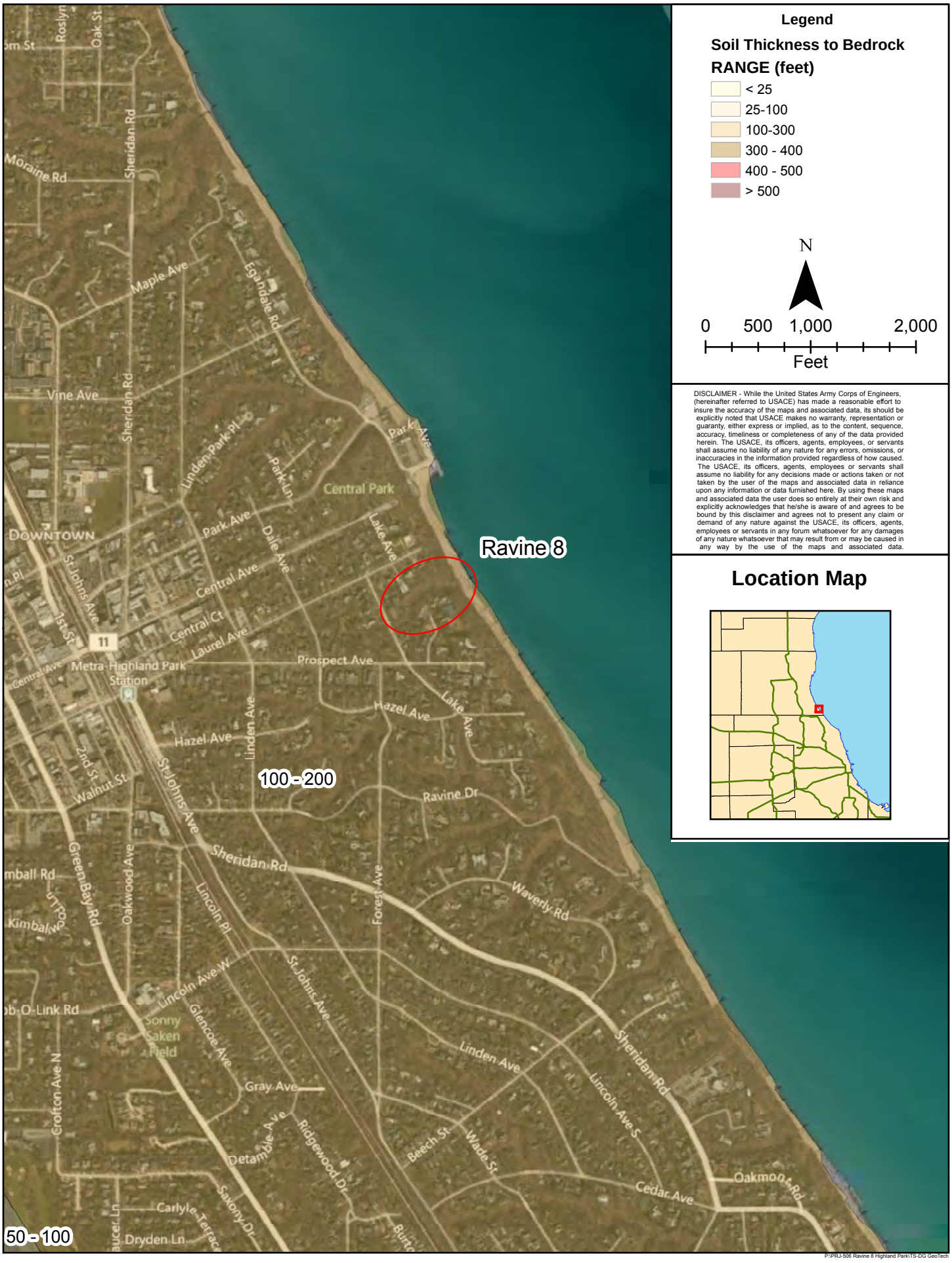


DISCLAIMER - While the United States Army Corps of Engineers, (hereinafter referred to USACE) has made a reasonable effort to insure the accuracy of the maps and associated data, its should be explicitly noted that USACE makes no warranty, representation or guaranty, either express or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. The USACE, its officers, agents, employees, or servants shall assume no liability of any nature for any errors, omissions, or inaccuracies in the information provided regardless of how caused. The USACE, its officers, agents, employees or servants shall assume no liability for any decisions made or actions taken or not taken by the user of the maps and associated data in reliance upon any information or data furnished here. By using these maps and associated data the user does so entirely at their own risk and explicitly acknowledges that he/she is aware of and agrees to be bound by this disclaimer and agrees not to present any claim or demand of any nature against the USACE, its officers, agents, employees or servants in any forum whatsoever for any damages of any nature whatsoever that may result from or may be caused in any way by the use of the maps and associated data.

P:\PRJ-506 Ravine 8 Highland Park\TS-DG GeoTech

RAVINE 8 SOIL THICKNESS

U.S. Army Corps of Engineers
Chicago District



Legend

Soil Thickness to Bedrock
RANGE (feet)

- < 25
- 25-100
- 100-300
- 300 - 400
- 400 - 500
- > 500

N

0 500 1,000 2,000

Feet

Location Map

P:\PRJ-506 Ravine 8 Highland Park\TS-DG GeoTech

APPENDIX D – GEOTECHNICAL ANALYSIS

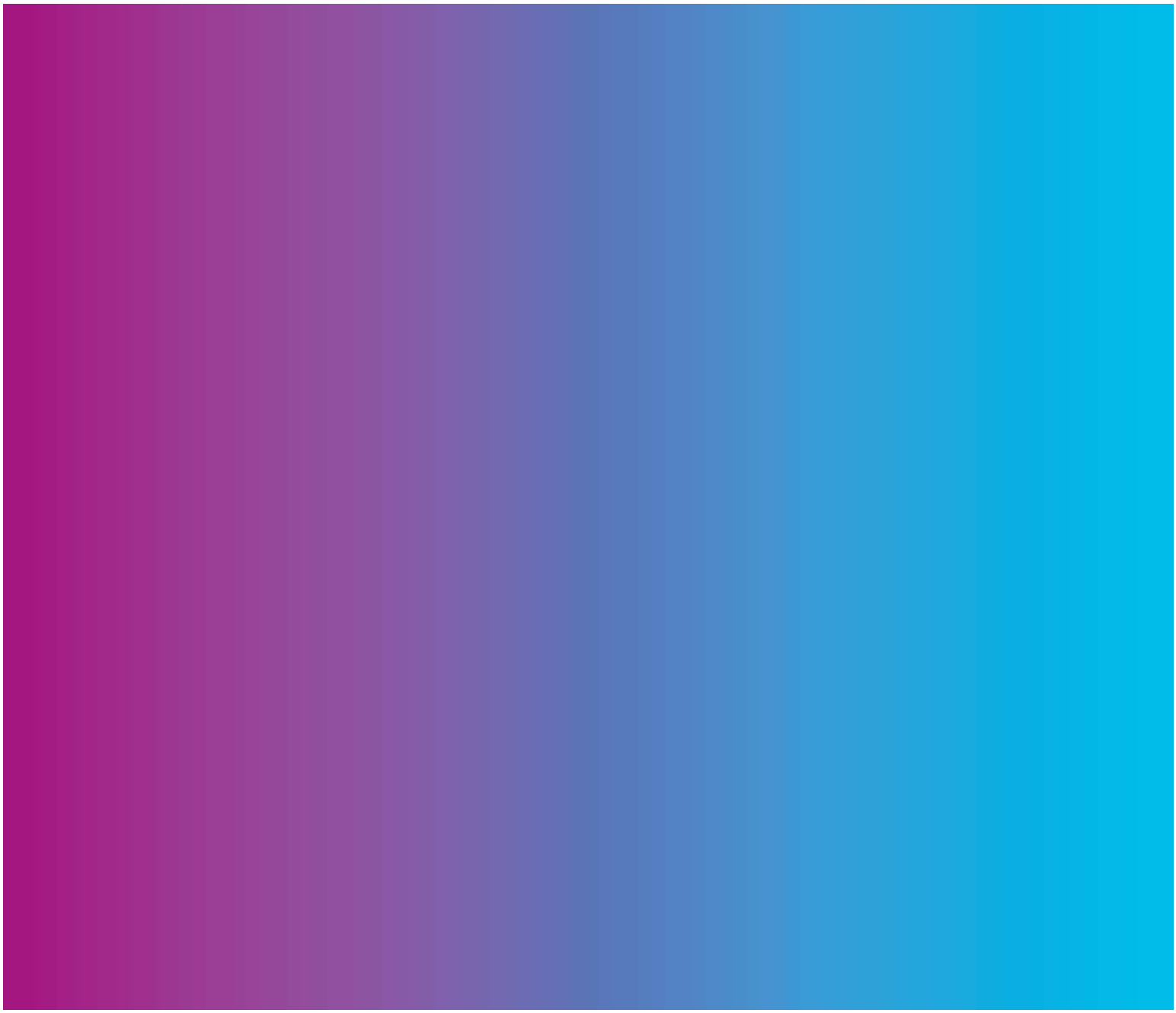
Attachment 3: Ft. Sheridan AECOM Geotechnical Engineering Report

Submitted to:
U.S. Army Corps of Engineers
Chicago, IL

Submitted by:
AECOM
Vernon Hills, IL
60163812
October 2010

Subsurface Investigation Report

Fort Sheridan Coastal Habitat Restoration
U.S. Army Corps of Engineers
Delivery Order No. CX 0013
Contract No. W911XK-09-D-0015



AECOM
750 Corporate Woods Parkway
Vernon Hills, Illinois 60061
T 847.279.2500 F 847.279.2510

October 29, 2010

Mr. Bill Rochford
U.S. Army Corps of Engineers
Geotechnical & Structural Engineering Branch
Chicago District
111 N Canal St # 600
Chicago, IL 60606

RE: Fort Sheridan Costal Habitat Restoration
Subsurface Investigation
AECOM Job Number 60163812

Dear Mr. Rochford,

AECOM has completed the Subsurface Investigation for the Fort Sheridan Costal Habitat Restoration project and is pleased to submit a report of our findings.

This report includes a summary of the field activities, the investigation completed to evaluate the soil and groundwater conditions at the site and laboratory test results.

If you have any questions, or would like to further discuss the report or the project, please contact us.

Respectfully,
AECOM

Joshua M. Bickett, EIT
Assistant Project Engineer

Jamie S. Matus, C.P.G.
Vice President

Contents

List of Appendices

List of Figures

1.0 Authorization and Purpose of Investigation

1. In September of 2010 the United States Army Corps of Engineers (USACE) Chicago District contracted with AECOM to complete a geotechnical investigation of subsurface conditions (subsurface investigation) for the Fort Sheridan Costal Habitat Restoration in the cities of Lake Forest and Highland Park, Illinois. The work was authorized on September 13, 2010 under contract W911XK-09-D-0015 delivery order CX 0013 purchase requisition number W81G66006894.

2. The objective of the project is to stabilize shoreline natural communities and restore historical native plant communities to Lake Michigan lakeshore at Fort Sheridan Forest Preserve and adjacent openlands holdings. The main stability concerns occur at the mouths of ravines that cut through the natural bluffs along the beach. The purpose of the subsurface investigation performed by AECOM was to identify the stratigraphy and soil properties of the areas where the aforementioned stability concerns are located. The information obtained through the subsurface investigation will be used by others to analyze the stability of the ravine mouths.

3. The subsurface investigation boreholes were drilled as close as possible to plan locations. Some locations were adjusted in the field due to observed site conditions. As-drilled locations are shown on the attached Figure 1: Boring Location Plan.

2.0 Project Location

4. The Fort Sheridan Costal Habitat Restoration Project is along about 1½ miles of Lake Michigan coastline, covering approximately 100 acres of beaches and bluffs. The area is east of McKinley Road, south of E Westleigh Road, and north of Walker Road in the cities of Lake Forest and Highland Park, Illinois. Specifically the subsurface investigation was completed at seven major ravine mouths on the site. Currently, the ravine mouths have man-made sheet pile structures that are to be removed as part of the project.

3.0 Scope of Work

5. The AECOM services were completed in general accordance with the Fort Sheridan Costal Habitat Restoration; Scope of Work (USACE Delivery Order No. CX 0013 Contract No. W911XK-09-D-0015). The Scope of Work included, but was not limited to, the following tasks:
   - Preparing a Quality Control Plan (QCP) and Accident Prevention Plan (APP).
   - Coordinating utility clearance and site access with USACE representatives.
   - Coordinate with USACE to avoid endangered plants in the vicinity of the boring locations.
   - Establishing soil boring locations (horizontally and vertically) as specified by USACE.
   - Mobilizing drilling equipment and personnel to complete seven soil borings to depths of approximately 20-feet below the existing sediment surface.
   - Split spoon sampling of overburden material at a maximum of 2½ foot intervals at each boring in general accordance with ASTM standards and collection of a representative soil sample(s) for that interval.
   - Observing soil conditions while drilling and sampling and prepare field logs documenting drilling methods, Standard Penetration Test (SPT) results, soil condition observations, and other pertinent geotechnical-related observations.
   - Performing laboratory analysis on samples selected jointly by AECOM and the USACE.
   - Preparing this geotechnical engineering report summarizing the field investigation, soil conditions, boring location plan, and final boring logs.

4.0 Subsurface Investigation

4.1 Drilling Activities

6. A total of seven (7) soil borings were completed by an AECOM drill crew. Multiple drilling rigs and methods were used to perform the borings in locations required by USACE. The rigs included a General 550 and a Mobile B-61. The General 550 is a light dolly-trailer mounted, small gasoline engine powered rig equipped with 140-lb Safety Hammer (30 inch fall) and cathead (Appendix C: Photo 1) that was utilized for drilling borings SB-01, SB-02, SB-03, SB-05, SB-06A and SB-07. The Mobile B-61 is a truck mounted drill rig equipped with an automatic hydraulic hammer that was utilized for drilling SB-04. Hand augering was performed at boring SB-06 and it should be noted that split spoon samples were obtained using an 89-lb hammer with 12 inch fall. The actual locations drilled were adjusted from USACE proposed locations based on access and observed site conditions. A map of the boring locations is shown on the attached Figure 1: Boring Location Plan.

7. The borings were generally advanced using continuous flight auger with the exception of boring B-4 where 3¼ inch hollow stem auger was used to advance the borehole. Due to site conditions, AECOM used a portable General 550 to advance the majority of the soil borings. As a result, it was not feasible to mix cement-bentonite grout for tremie placement in each borehole. In lieu of cement bentonite grout, the majority of the soil borings were backfilled with bentonite chips. The near surface of each borehole was then backfilled with beach sand. At some boring locations, collapsing saturated sand prevented placement of bentonite chips to the bottom of each boring.

8. Boreholes were advanced to plan depth where possible. At some locations, namely SB-03, SB-06 and SB-06A, borings were terminated prior to reaching plan depth. Specifically, borings SB-03 and SB-06A were terminated due to auger refusal on boulder sized (approximately 3 feet and larger in diameter) limestone riprap and armor stones (Appendix C: Photo 2), and SB-06 was terminated at a practical depth for hand augering. Mildly successful alternative locations were attempted on the site at boring locations where obstructions were encountered.

9. Representative soil samples were obtained using split-spoon sampling techniques in general accordance with American Society of Testing and Materials (ASTM) Standard D-1586 where possible. Soil samples were collected from each split-spoon sample obtained and transported back to AECOM's soils laboratory for further observation and testing. A copy of the AECOM Standard Boring Log Procedures is also included in Appendix A. The results of field observations are shown on the final boring logs that are included in Appendix B. General information describing each borehole is provided in Table 1: As-drilled Borehole Data.

10. An AECOM field engineer was present during the drilling activities to prepare field logs documenting drilling methods, soil sampling, soil conditions, water depth measurements, and other pertinent geotechnical-related observations. Copies of the field logs are provided in Appendix B. It is important to note that the information included on the field logs is based on the initial interpretations of the soil conditions and soil types by the AECOM field engineer. Two (2) selected photos documenting the drilling activities are included in Appendix C.

Table 1: As-drilled Borehole Data

Project: Fort Sheridan Costal Habitat Restoration				Drilling Firm: AECOM		
Boring	US State Plane 83, Illinois East 1201 Zone		Top of Hole Elevation (ft)	Hole Depth (ft)	Date Drilled	Borehole Backfill Material
	Northing	Easting				
SB-01	2025310.309	1126058.867	581.2	20	9/22/10	Bentonite
SB-02	2024001.053	1126851.598	580.5	15	9/17/10	Bentonite
SB-03	2023578.395	1127005.918	580.4	1.5	9/17/10	Bentonite
SB-04	2022213.518	1127452.516	587.9	22	9/22/10	Bentonite
SB-05	2020775.177	1127892.923	583.0	20	9/21/10	Bentonite
SB-06	2019949.602	1128124.045	581.6	5	9/22/10	Bentonite
SB-06A	2024632.215	1126494.219	580.1	1.5	9/22/10	Bentonite
SB-07	2018709.448	1128752.006	582.2	19.5	9/21/10	Bentonite

4.2 Laboratory Testing

11. Laboratory samples were classified according to Unified Soil Classification System (USCS) and tested to determine natural water content, index properties (cohesive samples) and grain size distribution (granular samples). Calibrated penetrometer strength testing was performed on cohesive samples. Table 2: Laboratory Testing Program outlines the laboratory tests that were completed and their corresponding ASTM designation:

Table 2: Laboratory Testing Program

Test Name	ASTM Designation	Proposed Number of Tests	Actual Number of Tests
Visual Classification	D 2487	56	46
Moisture Content	D 2216	56	46
Gradation Analysis	D 422	5	5
Atterberg Limits	D 4318	2	2
Calibrated Penetrometer	N/A	14	26

12. Deviations from the anticipated number of tests outlined in the Scope of Work were made by AECOM due to the soil conditions encountered during drilling.

13. The unconfined compressive strength of selected cohesive samples is estimated using the calibrated penetrometer. In conjunction with the laboratory testing program, all of the samples were classified in the field with AECOM Soil Classification System. These descriptions and estimated group symbols are in general conformance with the USCS classification system. The USCS serves as the basis for the AECOM Soil Classification System. AECOM/USCS soil descriptions and group symbols are included on the soil boring logs.

14. A brief explanation of the classification of soil samples is included in the Appendix A. The laboratory test results are included in Appendix B and the data is briefly summarized on Table 3: Laboratory Testing Summary.

Table 3: Laboratory Testing Summary

Soil Stratum	Ave. N-value	Ave. Qp (tsf)	Ave. w_o%	Ave. P200 %	Ave. LL	Ave. PL
Beach Sand and Boulders	10	-	11	2	-	-
Sands and Gravels	29	-	11	6	-	-
Silty Clay	29	2.95	18	-	29	13

4.3 Elevation and Location Survey

15. The location of each boring was determined using existing NGS primary benchmarks. The level of accuracy for borehole locations were established at +/-0.1 feet vertically and at +/-1.0 foot horizontally. Borehole locations were determined using GPS survey equipment and were checked into two NGS benchmarks. The horizontal coordinate system referenced is Illinois State Plane based on the North American Datum 1983 (NAD83). Elevations are referenced to North American Vertical Datum 1988 (NAVD88). The as-drilled boring locations are shown on the attached Boring Location Plan. A summary of the survey results is provided above in Table 1: As-drilled Borehole Data.

5.0 Subsurface Conditions

5.1 Soil Stratigraphy

16. Prior to subsurface investigation it was known that the existing surficial site conditions along Fort Sheridan area consisted of sandy beaches with low vegetation dispersed along the beach and boulder sized riprap (approximately 3 feet and larger in diameter) along the base of the bluff. Ravines exist on the bluff with man-made sheet pile structures across them to prevent erosion.

17. The general subsurface soil profile encountered at the site consists of a layer fine to coarse-grained sand and gravel (silty at some locations) typically ranging from approximately 2 to 7 feet in thickness underlain by a stiff to very stiff gray silty clay stratum (till). In general, the sand and gravel stratum is loose to medium dense near the surface (beach sand) and is medium dense to dense at depth (sands and gravels). Boulder sized limestone riprap is visible at the ground surface and was encountered within the first two (2) feet below the ground surface. Based on the observations during drilling, boulders can be completely buried beneath sand and not visible from the ground surface. While boulders were encountered at or near the ground surface during drilling, their depth may vary across the project site. More detailed descriptions of the soil conditions encountered at each boring are provided on the individual boring logs in Appendix B. The overall boring depths ranged from 1½ to 22 feet below the ground surface.

5.2 Groundwater

18. Groundwater was encountered in each borehole during the drilling process with the exception of one very shallow hole, boring SB-06A. Due to the close proximity to Lake Michigan, the long term groundwater can be assumed to be at or near the lake level. This assumption is confirmed with observations during the drilling operations. The approximate groundwater elevation can be taken at elevation 580 feet (NAVD88) for design purposes.

6.0 General Qualifications

19. The information presented in this report is based on data obtained from soil borings and laboratory testing completed. Variations can occur between borings; the nature and extent of which may not become evident until after construction. If variations are encountered, it may be necessary reevaluate the information contained in this report with respect to the design and construction.

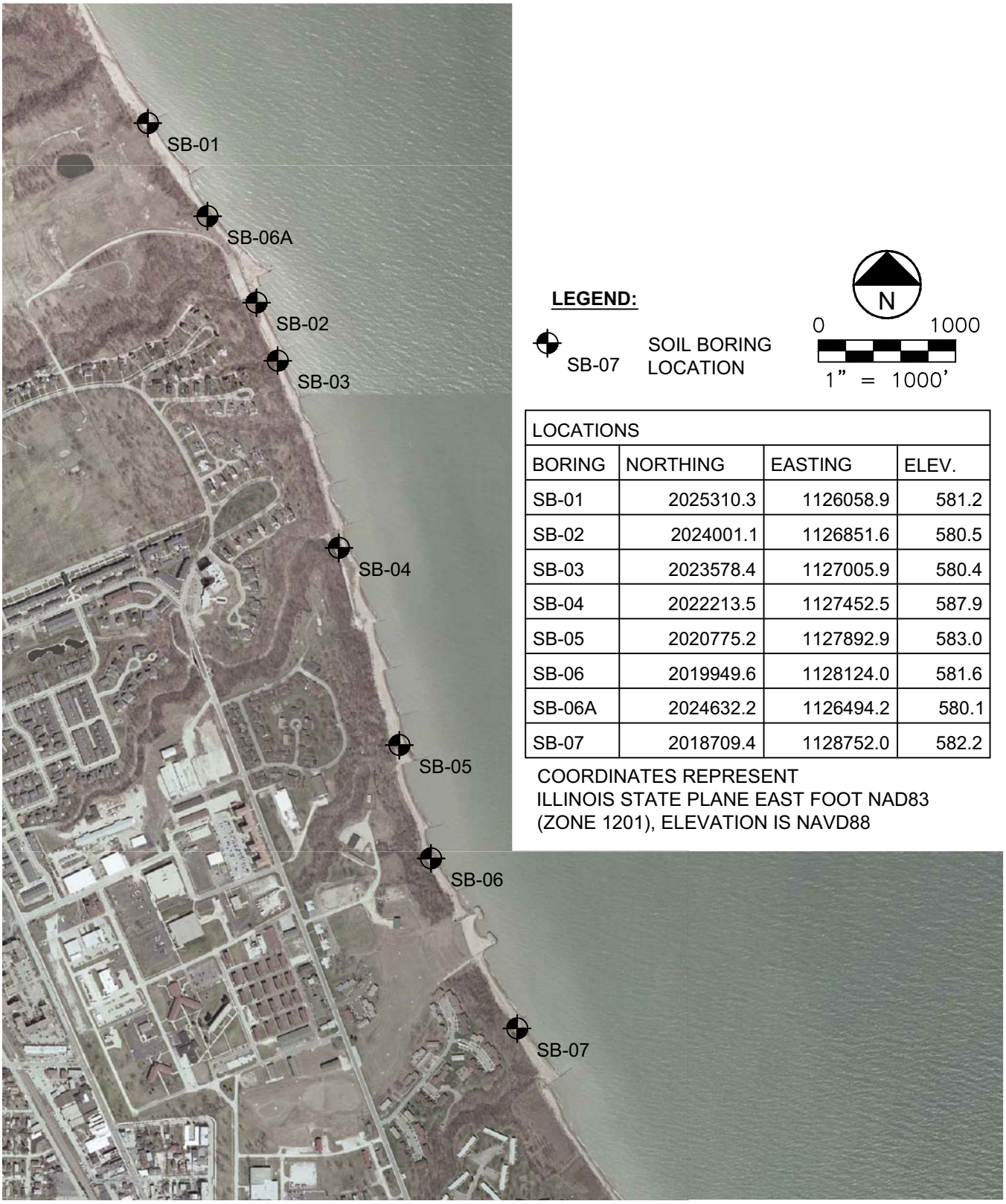
20. Water level readings have been made in the borings at the time and under the conditions stated on the boring logs. This data has been reviewed and an interpretation made in the text of this report. However, it must be noted that the period of observation was relatively short, and that seasonal and annual fluctuations in the level of the groundwater will likely occur.

21. This report has been prepared in accordance with generally accepted soil and foundation engineering practices to aid in the evaluation of this property, and to assist in the design of this project. No other warranty, expressed or implied, is made. The scope of this report is limited to the specific project and location described herein, and our description of the project represents our understanding of the significant aspects relevant to soil characteristics. In the event any changes in the design or location of the structures as outlined in this report are planned, we should be informed so the changes can be reviewed, and the conclusions of this report modified as required.

22. As a check, we recommend that AECOM be authorized to review project plans and specifications to confirm that the recommendations of this report have been interpreted in accordance with our intent. Without this review, AECOM will not be responsible for misinterpretation of our data, our analyses, and/or our recommendations or how these are incorporated into the final design.

Figure 1

Boring Location Plan



LEGEND:

SB-07 SOIL BORING LOCATION

N

0 1000

1" = 1000'

LOCATIONS			
BORING	NORTHING	EASTING	ELEV.
SB-01	2025310.3	1126058.9	581.2
SB-02	2024001.1	1126851.6	580.5
SB-03	2023578.4	1127005.9	580.4
SB-04	2022213.5	1127452.5	587.9
SB-05	2020775.2	1127892.9	583.0
SB-06	2019949.6	1128124.0	581.6
SB-06A	2024632.2	1126494.2	580.1
SB-07	2018709.4	1128752.0	582.2

COORDINATES REPRESENT
ILLINOIS STATE PLANE EAST FOOT NAD83
(ZONE 1201), ELEVATION IS NAVD88

AECOM

847.279.2500
www.aecom.com

SOIL BORING LOCATION PLAN
USACE - CHICAGO DISTRICT
FORT SHERIDAN COASTAL
HABITAT RESTORATION
FT SHERIDAN, IL.

Drawn :	DJD	10/22/2010
Checked:	JMB	10/27/2010
Approved:	RE	10/27/2010
PROJECT NUMBER	60163812	
FIGURE NUMBER	FIGURE 1	

Appendix A

General Notes

Soil Classification System

Field and Laboratory Procedures

Boring Log Procedures

AECOM General Notes

Drilling and Sampling Symbols:

SS : Split Spoon - 1-3/8" I.D. 2" O.D. (Unless otherwise noted)	HS : Hollow Stem Auger
ST : Shelby Tube-2" O.D. (Unless otherwise noted)	WS : Wash Sample
PA : Power Auger	FT : Fish Tail
DB : Diamond Bit-NX, BX, AX	RB : Rock Bit
AS : Auger Sample	BS : Bulk Sample
JS : Jar Sample	PM : Pressuremeter Test
VS : Vane Shear	GS : Giddings Sampler
OS : Osterberg Sampler	

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler, except where otherwise noted.

Water Level Measurement Symbols:

WL : Water Level	WCI : Wet Cave In
WS : While Sampling	DCI : Dry Cave In
WD : While Drilling	BCR : Before Casing Removal
AB : After Boring	ACR : After Casing Removal

Water levels indicated on the boring logs are the levels measured in the boring at the time indicated. In pervious soils, the indicated elevations are considered reliable groundwater levels. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations; additional evidence of groundwater elevations must be sought.

Gradation Description and Terminology:

Coarse grained or granular soils have more than 50% of their dry weight retained on a #200 sieve; they are described as boulders, cobbles, gravel or sand. Fine grained soils have less than 50% of their dry weight retained on a #200 sieve; they are described as clay or clayey silt if they are cohesive and silt if they are non-cohesive. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their strength or consistency and their plasticity.

Major Component of Sample	Size Range	Description of Other Components Present in Sample	Percent Dry Weight
Boulders	Over 8 in. (200 mm)	Trace	1-9
Cobbles	8 inches to 3 inches (200 mm to 75 mm)	Little	10-19
Gravel	3 inches to #4 sieve (75 mm to 4.76 mm)	Some	20-34
Sand	#4 to #200 sieve (4.76 mm to 0.074 mm)	And	35-50
Silt	Passing #200 sieve (0.074 mm to 0.005 mm)		
Clay	Smaller than 0.005 mm		

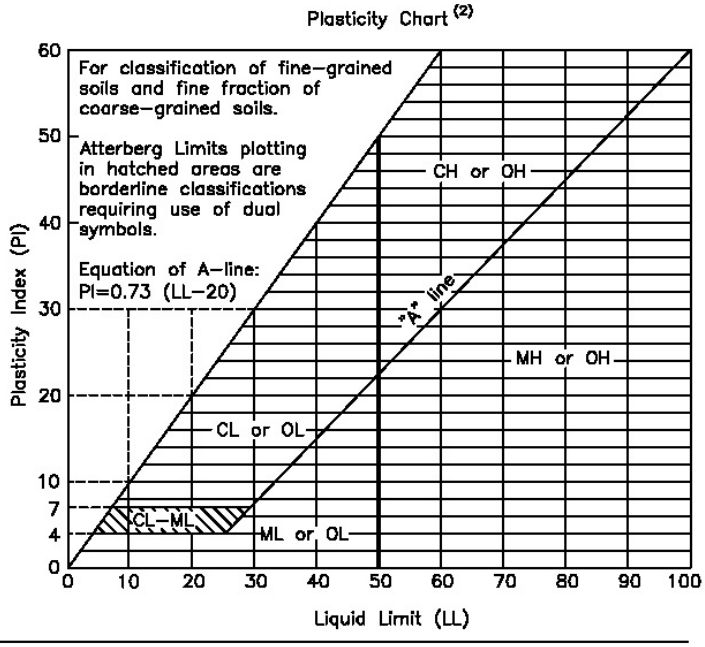
Consistency of Cohesive Soils:

Relative Density of Granular Soils:

Unconfined Compressive Strength, Qu, tsf	Consistency	N-Blows per foot	Relative Density
<0.25	Very Soft	0 - 3	Very Loose
0.25 - 0.49	Soft	4 - 9	Loose
0.50 - 0.99	Medium (firm)	10 - 29	Medium Dense
1.00 - 1.99	Stiff	30 - 49	Dense
2.00 - 3.99	Very Stiff	50 - 80	Very Dense
4.00 - 8.00	Hard	>80	Extremely Dense
>8.00	Very Hard		

AECOM Soil Classification System [1]

	Major Divisions		Group Symbols	Typical Names	Laboratory Classification Criteria
Coarse-grained soils (More than half of material is *larger* than No. 200 sieve size)	Gravel (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravel (Little or no fines)	GW	Well-graded, gravel, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent . . . . . GW, GP, SW, SP; More than 12 percent . . . . . GM, GC, SM, SC; 5 to 12 percent . . . . . Borderline cases *requiring* dual symbols [3]
			GP	Poorly graded gravel, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 & 3
		Gravel with fines (Appreciable amount of fines)	GM	Silty gravel, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC	Clayey gravel, gravel-sand-clay mixtures	Atterberg limits below "A" line or PI less than 4
					Atterberg limits above "A" line or PI greater than 7
					Above "A" line with PI between 4 and 7 are *borderline* cases requiring use of dual symbols
	Sand (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sand (Little or no fines)	SW	Well-graded sand, gravelly sand, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 & 3
			SP	Poorly graded sand, gravelly sand, little or no fines	Not meeting all gradation requirements for SW
		Sand with fines (Appreciable amount of fines)	SM	Silty sand, sand-silt mixtures	Atterberg limits below "A" line or PI less than 4
			SC	Clayey sand, sand-clay mixtures	Atterberg limits above "A" line or PI greater than 7
					Limits plotting in hatched zone with PI between 4 and 7 are *borderline* cases requiring use of dual symbols
Fine-grained soils (More than half of material is *smaller* than No. 200 sieve size)	Silt and clay (Liquid limit less than 50)		ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or clayey silt with slight plasticity	Plasticity Chart [2]
			CL	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay, silty clay, lean clay	
			OL	Organic silt and organic silty clay of low plasticity	
	Silt and clay (Liquid limit greater than 50)		MH	Inorganic silt, micaceous or diatomaceous fine sandy or silty soils, elastic silt	
			CH	Inorganic clay of high plasticity, fat clay	
			OH	Organic clay of medium to high plasticity, organic silt	
	Highly organic soils		PT	Peat and other highly organic soil	



1. See AECOM General Notes for component gradation terminology, consistency of cohesive soils and relative density of granular soils.
2. Reference: Unified Soil Classification Systems
3. Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

AECOM Field and Laboratory Procedures

Subsurface Exploration Procedures

Hand-Auger Drilling (HA)

In this procedure, a sampling device is driven into the soil by repeated blows of a sledge hammer or a drop hammer. When the sampler is driven to the desired sample depth, the soil sample is retrieved. The hole is then advanced by manually turning the hand auger until the next sampling depth increment is reached. The hand auger drilling between sampling intervals also helps to clean and enlarge the borehole in preparation for obtaining the next sample.

Power Auger Drilling (PA)

In this type of drilling procedure, continuous flight augers are used to advance the boreholes. They are turned and hydraulically advanced by a truck, trailer or track-mounted unit as site accessibility dictates. In auger drilling, casing and drilling mud are not required to maintain open boreholes.

Hollow Stem Auger Drilling (HS)

In this drilling procedure, continuous flight augers having open stems are used to advance the boreholes. The open stem allows the sampling tool to be used without removing the augers from the borehole. Hollow stem augers thus provide support to the sides of the borehole during the sampling operations.

Rotary Drilling (RB)

In employing rotary drilling methods, various cutting bits are used to advance the boreholes. In this process, surface casing and/or drilling fluids are used to maintain open boreholes.

Diamond Core Drilling (DB)

Diamond core drilling is used to sample cemented formations. In this procedure, a double tube (or triple tube) core barrel with a diamond bit cuts an annular space around a cylindrical prism of the material sampled. The sample is retrieved by a catcher just above the bit. Samples recovered by this procedure are placed in sturdy containers in sequential order.

AECOM Field and Laboratory Procedures

Field Sampling Procedures

Auger Sampling (AS)

In this procedure, soil samples are collected from cuttings off of the auger flights as they are removed from the ground. Such samples provide a general indication of subsurface conditions; however, they do not provide undisturbed samples, nor do they provide samples from discrete depths.

Split-Barrel Sampling (SS) - (ASTM Standard D-1586-99)

In the split-barrel sampling procedure, a 2-inch O.D. split barrel sampler is driven into the soil a distance of 18 inches by means of a 140-pound hammer falling 30 inches. The value of the Standard Penetration Resistance is obtained by counting the number of blows of the hammer over the final 12 inches of driving. This value provides a qualitative indication of the in-place relative density of cohesionless soils. The indication is qualitative only, however, since many factors can significantly affect the Standard Penetration Resistance Value, and direct correlation of results obtained by drill crews using different rigs, drilling procedures, and hammer-rod-spoon assemblies should not be made. A portion of the recovered sample is placed in a sample jar and returned to the laboratory for further analysis and testing.

Shelby Tube Sampling Procedure (ST) - ASTM Standard D-1587-94

In the Shelby tube sampling procedure, a thin-walled steel seamless tube with a sharp cutting edge is pushed hydraulically into the soil and a relatively undisturbed sample is obtained. This procedure is generally employed in cohesive soils. The tubes are identified, sealed and carefully handled in the field to avoid excessive disturbance and are returned to the laboratory for extrusion and further analysis and testing.

Giddings Sampler (GS)

This type of sampling device consists of 5-foot sections of thin-wall tubing which are capable of retrieving continuous columns of soil in 5-foot maximum increments. Because of a continuous slot in the sampling tubes, the sampler allows field determination of stratification boundaries and containerization of soil samples from any sampling depth within the 5-foot interval.

AECOM Laboratory Procedures

Water Content (Wc)

The water content of a soil is the ratio of the weight of water in a given soil mass to the weight of the dry soil. Water content is generally expressed as a percentage.

Hand Penetrometer (Qp)

In the hand penetrometer test, the unconfined compressive strength of a soil is determined, to a maximum value of 4.5 tons per square foot (tsf) or 7.0 tsf depending on the testing device utilized, by measuring the resistance of the soil sample to penetration by a small, spring-calibrated cylinder. The hand penetrometer test has been carefully correlated with unconfined compressive strength tests, and thereby provides a useful and a relatively simple testing procedure in which soil strength can be quickly and easily estimated.

Unconfined Compression Tests (Qu)

In the unconfined compression strength test, an undisturbed prism of soil is loaded axially until failure or until 20% strain has been reached, whichever occurs first.

Dry Density (γd)

The dry density is a measure of the amount of solids in a unit volume of soil. Use of this value is often made when measuring the degree of compaction of a soil.

Classification of Samples

In conjunction with the sample testing program, all soil samples are examined in our laboratory and visually classified on the basis of their texture and plasticity in accordance with the AECOM Soil Classification System which is described on a separate sheet. The soil descriptions on the boring logs are derived from this system as well as the component gradation terminology, consistency of cohesive soils and relative density of granular soils as described on a separate sheet entitled "AECOM General Notes". The estimated group symbols included in parentheses following the soil descriptions on the boring logs are in general conformance with the Unified Soil Classification System (USCS) which serves as the basis of the AECOM Soil Classification System.

AECOM Standard Boring Log Procedures

In the process of obtaining and testing samples and preparing this report, standard procedures are followed regarding field logs, laboratory data sheets and samples.

Field logs are prepared during performance of the drilling and sampling operations and are intended to essentially portray field occurrences, sampling locations and procedures.

Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory by experienced geotechnical engineers, and as such, differences between the field logs and the final logs may exist. The engineer preparing the report reviews the field logs, laboratory test data and classifications, and using judgment and experience in interpreting this data, may make further changes. It is common practice in the geotechnical engineering profession not to include field logs and laboratory data sheets in engineering reports, because they do not represent the engineer's final opinions as to appropriate descriptions for conditions encountered in the exploration and testing work. Results of laboratory tests are generally shown on the boring logs or are described in the text of the report, as appropriate.

Samples taken in the field, some of which are later subjected to laboratory tests, are retained in our laboratory for sixty days and are then discarded unless special disposition is requested by our client. Samples retained over a long period of time, even in sealed jars, are subject to moisture loss which changes the apparent strength of cohesive soil, generally increasing the strength from what was originally encountered in the field. Since they are then no longer representative of the moisture conditions initially encountered, observers of these samples should recognize this factor.

Appendix B

Boring Log Procedures

Field Logs

Laboratory Testing Results

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2025310.309 E 1126058.867
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-01
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	20.0 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	8 (DISTURBED 8, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	579.7 ft
16. DATE HOLE	STARTED 9/21/2010 COMPLETED 9/22/2010
17. ELEVATION TOP OF HOLE	581.2 ft
18. TOTAL CORE RECOVERY FOR BORING	65 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
579.2	2.0		Fine to coarse sand, trace gravel - brownish gray - loose to medium dense - moist (SP)	0.0 ft	1 0.0-2.0'	3-5-5-7, N=10, w=1.7%
577.2	4.0		Coarse sand and gravel - brown - medium dense - saturated (SP-GP)	0.9 ft	2 2.5-4.0'	10-12-16, N=28, w=10.2%
574.2	7.0		Fine to coarse sand, trace gravel - brown - medium dense - saturated (SP-GP)	1.2 ft	3 5.0-6.5'	13-15-20, N=35, w=19.1%, 10.5% Gravel, 83.1% Sand, 6.4% Fines
			Silty clay, trace sand, gravel and shale pebbles - gray - stiff to very stiff (CL)	1.3 ft	4 7.5-9.0'	11-10-11, N=21, w=18.3%, Qp=2.5 tsf
				1.0 ft	5 10.0-11.5'	10-10-10, N=20, w=16.1%, Qp=3.25 tsf, LL=29, PL=13
				1.3 ft	6 12.5-14.0'	12-15-21, N=36, w=18.4%, Qp=3.25 tsf
				1.3 ft	7 15.0-16.5'	13-16-20, N=36, w=17.7%, Qp=3.50 tsf
561.2	20.0			1.5 ft	8 18.0-20.0'	15-20-20-23, N = 40, w=18.5%, Qp=4.00 tsf
			End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon			

DRILLING LOG

DIVISION: Great Lakes - Chicago Dist.

INSTALLATION: AECOM

SHEET 1 OF 1 SHEETS

1. PROJECT: Ft Sheridan Coastal Habitat Restoration
JOB NUMBER: 60163812
2. LOCATION (Coordinates or Station): Ft. Sheridan, IL N 2024001.053 E 1126851.598
3. DRILLING AGENCY: AECOM
4. HOLE NO. (As shown on drawing title and file number): SB-02
5. NAME OF DRILLER: McCarthy
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: -
8. DEPTH DRILLED INTO ROCK: 0
9. TOTAL DEPTH OF HOLE: 15.0 ft
10. SIZE AND TYPE OF BIT: PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL: General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: 6 (DISTURBED: 6, UNDISTURBED: 0)
14. TOTAL NUMBER CORE BOXES: 0
15. ELEVATION GROUND WATER: 579.5 ft
16. DATE HOLE: STARTED 9/17/2010, COMPLETED 9/17/2010
17. ELEVATION TOP OF HOLE: 580.5 ft
18. TOTAL CORE RECOVERY FOR BORING: 61 %
19. SIGNATURE OF INSPECTOR: Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
			Fine to coarse sand, trace gravel - brown - very loose to loose - saturated (SP)			
578.5	2.0		Becomes medium to coarse grained below 1.5'	1.0 ft	1 0.0-2.0'	1-2-3-4, N=5, w=13.8%, 1.4% Gravel, 98.0% Sand, 0.6% Fines
			Medium to coarse sand, trace to little gravel - brownish gray - medium dense to dense - saturated (SP-GP)	1.4 ft	2 2.5-4.0'	13-19-19, N=38, w=9.2%
575.5	5.0				2A 4.0-4.5'	
			Clayey silt - gray - medium dense to dense - saturated (ML)			
573.0	7.5			1.0 ft	3 5.0-7.0'	7-17-15-23, N=32, w=17.7%, Qp=4.50 tsf
			Silty clay, trace sand, gravel and shale - gray - stiff to very stiff (CL)	0.8 ft	4 7.5-9.5'	7-15-18-29, N=33, w=15.1%, Qp=4.00 tsf
				1.2 ft	5 10.0-11.5'	6-7-9, N=16, w=21.1%, Qp=2.25 tsf
565.5	15.0			1.6 ft	6 12.5-14.5'	7-9-10-11, N=19, w=20.6%, Qp=2.75 tsf
			End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon			

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2023578.395 E 1127005.918
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-03
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	1.5 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	1 (DISTURBED: 1, UNDISTURBED: 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	580.1 ft
16. DATE HOLE	STARTED 9/17/2010 COMPLETED 9/17/2010
17. ELEVATION TOP OF HOLE	580.4 ft
18. TOTAL CORE RECOVERY FOR BORING	67 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
578.9	1.5		Silty fine sand, trace gravel - brown - medium dense - saturated (SM) Obstructed at 1.5' by boulder (riprap limestone) End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon	1.0 ft	1 0.0-1.5'	5-7-10, N=17, w=11.7%

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2022213.518 E 1127452.516
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-04
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	22.0 ft
10. SIZE AND TYPE OF BIT	HSA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	Mobile B-61
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	9 (DISTURBED 9, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	578.4 ft
16. DATE HOLE	STARTED 9/22/2010 COMPLETED 9/22/2010
17. ELEVATION TOP OF HOLE	587.9 ft
18. TOTAL CORE RECOVERY FOR BORING	83 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
			Fill: Silty clay, mixed with sand and gravel - dark brown - stiff	1.3 ft	1 0.0-2.0'	6-6-8-8, N=14, w=7.7%
585.4	2.5					
			Fill: Sandy silt, trace clay - brown - medium dense - moist	1.2 ft	2 2.5-4.0'	8-9-11, N=20, w=10.1%
582.9	5.0					
			Fill: Sand mixed with clay - brown - medium dense - moist	1.5 ft	3 5.0-7.0'	6-6-7-14, N=13, w=15.1%, Qp=2.50 tsf
580.4	7.5					
			Fine to medium sand, trace gravel - brown - medium dense - saturated (SP)	1.7 ft	4 7.5-9.5'	7-9-9-4, N=18, w=18.8%, 18.1% Gravel, 76.6% Sand, 5.3% Fines
577.9	10.0					
			Silty clay, trace sand, gravel and shale pebbles - gray - stiff to very stiff (CL)	1.7 ft	5 10.0-12.0'	7-8-8-10, N=16, w=18.9%, Qp=4.25 tsf
				1.2 ft	6 12.5-14.0'	10-12-16, N=28, w=16.1%, Qp=6.25 tsf
				1.5 ft	7 15.0-16.5'	8-8-10, N=18, w=18.8%, Qp=3.75 tsf
				1.5 ft	8 17.5-19.0'	9-10-12, N=22, w=18.8%, Qp=3.25 tsf
565.9	22.0			1.7 ft	9 20.0-22.0'	10-10-12-14, N=22, w=19.7%, Qp=3.25 tsf
			End of Boring Boring backfilled with bentonite chips upon completion 140 lb Automatic Hammer, 30" fall, 2" OD split spoon			

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2020775.177 E 1127892.923
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-05
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	20.0 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	8 (DISTURBED 8, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	580.5 ft
16. DATE HOLE	STARTED 9/20/2010 COMPLETED 9/21/2010
17. ELEVATION TOP OF HOLE	583.0 ft
18. TOTAL CORE RECOVERY FOR BORING	74 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
			Fine to medium sand, trace gravel - brownish gray - loose - moist (SP)	1.2 ft	1 0.0-2.0'	3-3-3-3, N=6, w=5.3%
580.5 ▼	2.5		Fine to medium sand, trace gravel - brownish gray - loose to medium dense - saturated (SP)	1.1 ft	2 2.5-4.5'	4-3-5-7, N=8, w=19.0%, 3.1% Gravel, 93.7% Sand, 3.2% Fines
				1.2 ft	3 5.0-6.5'	13-16-17, N=33, w=20.9%
575.5	7.5		Silty clay, trace sand, gravel and shale pebbles - gray - very stiff (CL)	1.1 ft	4 7.5-9.0'	11-13-17, N=30, w=19.0%, Qp=2.75 tsf
573.0	10.0		Silty sand, trace gravel - gray - medium dense - saturated (SM)	1.5 ft	5 10.0-11.5'	13-13-17, N=30, w=20.1%
570.5	12.5		Silty clay, trace sand, gravel and shale pebbles - gray - stiff to hard (CL)	1.2 ft	6 12.5-14.0'	9-13-16, N=29, w=20.4%, Qp=2.25 tsf
				1.2 ft	7 15.0-16.5'	10-12-16, N=28, w=20.2%, Qp=2.00 tsf
563.0	20.0		End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon	1.5 ft	8 18.0-20.0'	16-18-37-40, N=55, w=12.6%, Qp=3.75 tsf

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2019949.602 E 1128124.045
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-06
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	5.0 ft
10. SIZE AND TYPE OF BIT	HA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	Hand Auger
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	3 (DISTURBED 3, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	580.1 ft
16. DATE HOLE	STARTED 9/22/2010 COMPLETED 9/22/2010
17. ELEVATION TOP OF HOLE	581.6 ft
18. TOTAL CORE RECOVERY FOR BORING	70 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
580.1	1.5		Fine to medium sand, trace gravel - brownish gray - medium dense - moist (SP)	1.0 ft	1 0.0-1.5'	10-15-22, N=37, w=3.3%
			Fine to coarse gravel with sand - brown - dense to very dense - saturated (GP-SP)	1.2 ft	2 1.5-3.0'	30-40-45, N=85, w=8.2%
576.6	5.0			1.3 ft	3 3.0-5.0'	30-38-40-50, N=78, w=8.9%
			End of Boring Boring backfilled with bentonite chips upon completion 89 lb Donut Hammer, 12" fall, 2" OD split spoon Note: N-value shown corresponds to number of blows required to drive split spoon sampler 1 foot after the initial 6 inch increment with 89 lb hammer			

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2024632.215 E 1126494.219
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-06A
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	1.5 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	1 (DISTURBED: 1, UNDISTURBED: 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	NE ft
16. DATE HOLE	STARTED 9/22/2010, COMPLETED 9/22/2010
17. ELEVATION TOP OF HOLE	580.1 ft
18. TOTAL CORE RECOVERY FOR BORING	45 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
578.6	1.5		Fine to medium sand, trace gravel - brownish gray - medium dnese - moist (SP) Obstructed at 1.5 ft by boulder (riprap limestone) End of Boring Boring backfilled with bentonite chips upon completion	0.7 ft	1 0.0-1.5'	4-9-15, N=24, w=6.4%

DRILLING LOG

DIVISION	Great Lakes - Chicago Dist.
INSTALLATION	AECOM
SHEET	1 OF 1 SHEETS
1. PROJECT	Ft Sheridan Coastal Habitat Restoration
JOB NUMBER	60163812
2. LOCATION (Coordinates or Station)	Ft. Sheridan, IL N 2018709.448 E 1128752.006
3. DRILLING AGENCY	AECOM
4. HOLE NO. (As shown on drawing title and file number)	SB-07
5. NAME OF DRILLER	McCarthy
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	-
8. DEPTH DRILLED INTO ROCK	0
9. TOTAL DEPTH OF HOLE	19.5 ft
10. SIZE AND TYPE OF BIT	PA
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	NAVD88
12. MANUFACTURER'S DESIGNATION OF DRILL	General 550
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	8 (DISTURBED 8, UNDISTURBED 0)
14. TOTAL NUMBER CORE BOXES	0
15. ELEVATION GROUND WATER	579.7 ft
16. DATE HOLE	STARTED 9/21/2010 COMPLETED 9/21/2010
17. ELEVATION TOP OF HOLE	582.2 ft
18. TOTAL CORE RECOVERY FOR BORING	76 %
19. SIGNATURE OF INSPECTOR	Joshua M. Bickett

ELEVATION (ft) a	DEPTH (ft) b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV-ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
			Fine to coarse sand, trace gravel - brown - medium dense - saturated (SP)	1.0 ft	1 0.0-2.0'	3-8-9-9, N=17, w=9.3%
578.9	3.3		Silty clay, trace sand, gravel and shale pebbles - gray - stiff to hard (CL)	0.7 ft	2 2.5-3.75'	4-5-9-9, N=14, w=17.7%, 45.5% Gravel, 52.5% Sand, 2.0% Fines
				1.0 ft	2A 3.25-4.5'	w=20.6%, Qp=1.50 tsf
				1.5 ft	3 5.0-7.0'	5-8-12-12, N=20, w=22.2%, Qp=1.25 tsf
				0.6 ft	4 7.5-9.5'	8-11-12-14, N=23, w=21.4%, Qp=0.50 tsf
				1.2 ft	5 10.0-11.5'	14-16-16, N=32, w=17.6%, Qp=3.25 tsf
				1.4 ft	6 12.5-14.0'	11-17-24, N=41, w=17.1%, Qp=3.25 tsf
				1.5 ft	7 15.0-16.5'	20-16-25, N=43, w=18.0%, Qp=1.25 tsf, LL=29, PL=13
562.7	19.5		End of Boring Boring backfilled with bentonite chips upon completion 140 lb Safety Hammer, 30" fall, 2" OD split spoon	1.7 ft	8 18.0-19.5'	18-20-20, N=40, w=17.3%, Qp=1.75 tsf

approx elev. 580.

AECOM

FIELD BORING LOG

{ End of Boring
{ 140 lb. Hammer, 30" Fall, 2" OD split spoon

1 of 2

TECHNICIAN _____ SURFACE ELEV. _____ 140 LB. HAMMER TYPE:

DRILLER Billy BORING STARTED 9-21-10 ☐ DONUT

HELPER Chris BORING COMPLETED 9-22-10 ☑ SAFETY

RIG MFG/MODEL Geoprobe STATION _____ ☐ AUTOMATIC

OFFSET _____ CASING USED _____ SIZE _____

WATER LEVEL OBSERVATIONS

WL: 1.5 WS OR WD

WL: _____ BCR _____ ACR

WL: _____ AB _____ HR. AB

WL: _____ 24 HR. AB

JOB NO. 60163812 BORING NO. B-1 CLIENT FT. SHERIDAN Coastal Habitat Restoration WEATHER _____

USACE Chicago Dist.

SAMPLE NO.	DEPTH OR ELEVATION FROM	DEPTH OR ELEVATION TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	R LENGTH RECOVERED IN FEET	QP PENETROMETER TEST IN TSF	HNU PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
1	0	2.0	NS	3	5	5	7	1'				F-C Sand & Gravel
	0	2.5	PA									
2	2.5	4.0	SS	10	12	14		11"				Sat Sand & Gravel M-C
												CONTINUED ON
												PG. 2

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST

TOPSOIL THICKNESS _____

FILL THICKNESS _____

CAVE-IN LEVEL:

WHILE DRILLING AND SAMPLING _____

AFTER BORING COMPLETION _____

WATER LOSS:

AT _____ TO _____

PERCENT LOSS

AT _____ TO _____

PERCENT LOSS _____

BOULDERS OR OBSTRUCTIONS:

AT _____ TO _____

AT _____ TO _____

ARTESIAN PRESSURE:

DEPTH _____

HEIGHT OF SOIL RISE IN CASING _____

PIEZOMETER PVC OR SS

DIAMETER _____ IN.

SCREEN DEPTH _____ FT. TO _____ FT

RISER PIPE _____ FT. TO _____ FT

AECOM

FIELD BORING LOG

2

TECHNICIAN _____ SURFACE ELEV. _____ 140 LB. HAMMER TYPE:

DRILLER Billy BORING STARTED 9/21/10 ☐ DONUT

HELPER Chris BORING COMPLETED 9/22/10 ☑ SAFETY

RIG MFG/MODEL Geoprobe STATION _____ ☐ AUTOMATIC

OFFSET _____ CASING USED _____ SIZE _____

WATER LEVEL OBSERVATIONS

WL: _____ WS OR WD

WL: _____ BCR _____ ACR

WL: 1.5 AB _____ HR. AB

WL: _____ 24 HR. AB

JOB NO. _____ BORING NO. 1 CLIENT USACOE WEATHER _____

SAMPLE NO.	DEPTH OR ELEVATION FROM	TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	R LENGTH RECOVERED IN FEET	QP PENETROMETER *TEST IN TSF	HNU PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
3	5.0	6.5	SS	13	15	20		14"	-			F/c Sand
	5.0	7.5	PA								7.0	
4	7.5	9.0	SS	11	10	11		16"	2.5			Grey Silty clay
	7.5	10.0	PA									
5	10.0	11.5	SS	10	10	10		12"	2.5			Same
	10.0	12.5	PA									
6	12.5	14.0	SS	12	15	21		18"	2.5			Same
	12.5	14.0	PA									
7	14.0	15.5	SS	13	16	20		15"	2.75			Same
	14.0	15.5	PA									
8	15.5	17.0	SS	15	20	26	23	15"	4.25			Same

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST

TOPSOIL THICKNESS _____

FILL THICKNESS _____

CAVE-IN LEVEL:

WHILE DRILLING AND SAMPLING _____

AFTER BORING COMPLETION _____

WATER LOSS:

AT _____ TO _____

PERCENT LOSS

AT _____ TO _____

PERCENT LOSS _____

BOULDERS OR OBSTRUCTIONS:

AT _____ TO _____

AT _____ TO _____

ARTESIAN PRESSURE:

DEPTH _____

HEIGHT OF SOIL RISE IN CASING _____

PIEZOMETER PVC OR SS

DIAMETER _____ IN.

SCREEN DEPTH _____ FT. TO _____ FT

RISER PIPE _____ FT. TO _____ FT

SARA

AECOM

FIELD BORING LOG

TECHNICIAN _____ SURFACE ELEV. _____ 140 LB. HAMMER TYPE:

DRILLER Dan & Billy BORING STARTED Sept 17 2010 ☐ DONUT

HELPER _____ BORING COMPLETED Sept 17 2010 ☑ SAFETY

RIG MFG/MODEL General STATION _____ ☐ AUTOMATIC

OFFSET _____ CASING USED _____ SIZE _____

WATER LEVEL OBSERVATIONS

WL: 11 WS OR WD

WL: _____ BCR _____ ACR

WL: _____ AB _____ HR. AB

WL: _____ 24 HR. AB

JOB NO. _____ BORING NO. B-2 CLIENT Ft Sheridan WEATHER _____

SAMPLE NO.	DEPTH OR ELEVATION FROM	DEPTH OR ELEVATION TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	R LENGTH RECOVERED IN FEET	QP PENETROMETER TEST IN TSF	HNU PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
1	0'	2'	SS	1	2	3	4	12"				- Silty fine sand - brown -
												wet to saturated
												- became medium to coarse
	2	2.5'	PA									grained below 1.5'
2	2.5'	4'	SS	13	19	15		17"				- medium to coarse sand
2A	4'	5'	PA									- limestone gravel at tip
3	5'	7'	SS	7	17	15	23	1'				- grav clayey silt - saturated
	7'	7.4'	PA									
4	7.5	9.5'	SS	7	15	18	29	9"	3.0			silt clay - gray - trace
	7.5	10.0	PA									Sand and shale - very stiff
5	10.0	11.5	SS	6	7	9		14"	1.5			Gray Silty Clay Tr
	10.0	12.5	PA									sand GR
6	12.5	14.5	SS	7	9	10	11	19"	2.25			SAND
	12.5	15.0	PA									

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST

TOPSOIL THICKNESS _____

FILL THICKNESS _____

CAVE-IN LEVEL:

WHILE DRILLING AND SAMPLING _____

AFTER BORING COMPLETION _____

WATER LOSS:

AT _____ TO _____

PERCENT LOSS

AT _____ TO _____

PERCENT LOSS _____

BOULDERS OR OBSTRUCTIONS:

AT _____ TO _____

AT _____ TO _____

ARTESIAN PRESSURE:

DEPTH _____

HEIGHT OF SOIL RISE IN CASING _____

PIEZOMETER DIAMETER _____ PVC OR SS IN.

SCREEN DEPTH _____ FT. TO _____ FT

RISER PIPE _____ FT. TO _____ FT

EGD

AECOM

FIELD BORING LOG

TECHNICIAN _____ SURFACE ELEV. _____ 140 LB. HAMMER TYPE:

DRILLER Dan & Billy BORING STARTED Sept 17, 2010 ☐ DONUT

HELPER _____ BORING COMPLETED Sept 17, 2010 ☒ SAFETY

RIG MFG/MODEL General STATION _____ ☐ AUTOMATIC

OFFSET _____ CASING USED _____ SIZE _____

WATER LEVEL OBSERVATIONS

WL: 3' WS OR (WD)

WL: _____ BCR _____ ACR

WL: _____ AB _____ HR. AB

WL: _____ 24 HR. AB

JOB NO. _____ BORING NO. B-3 CLIENT Ft. Sheridan WEATHER _____

SAMPLE NO.	DEPTH OR ELEVATION FROM	DEPTH OR ELEVATION TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	R LENGTH RECOVERED IN FEET	QP PENETROMETER TEST IN TSF	HNU PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
1	0	1.5	SS	5	7	10					—	Sand + gravel, Silty - brown -
												Saturated (SM - GP)
	1.5	-										obstructed at 1.5 ft by
												the rip-rap limestone block

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST

TOPSOIL THICKNESS _____

FILL THICKNESS _____

CAVE-IN LEVEL:

WHILE DRILLING AND SAMPLING _____

AFTER BORING COMPLETION _____

WATER LOSS:

AT _____ TO _____

PERCENT LOSS

AT _____ TO _____

PERCENT LOSS _____

BOULDERS OR OBSTRUCTIONS:

AT _____ TO _____

AT _____ TO _____

ARTESIAN PRESSURE:

DEPTH _____

HEIGHT OF SOIL RISE IN CASING _____

PIEZOMETER PVC OR SS

DIAMETER _____ IN.

SCREEN DEPTH _____ FT. TO _____ FT

RISER PIPE _____ FT. TO _____ FT

AECOM

FIELD BORING LOG

1 of 2

TECHNICIAN _____ SURFACE ELEV. _____ 140 LB. HAMMER TYPE:

DRILLER Billy BORING STARTED 9/22/16 ☐ DONUT

HELPER Chris BORING COMPLETED 9/22/16 ☐ SAFETY

RIG MFG/MODEL 66 STATION _____ ☑ AUTOMATIC

OFFSET _____ CASING USED _____ SIZE _____

WATER LEVEL OBSERVATIONS

WL: 9.5 (WS) OR WD

WL: _____ BCR _____ ACR

WL: _____ AB _____ HR. AB

WL: _____ 24 HR. AB

JOB NO. _____ BORING NO. 4 CLIENT US ACE WEATHER _____

SAMPLE NO.	DEPTH OR ELEVATION FROM	TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	R LENGTH RECOVERED IN FEET	QP PENETROMETER TEST IN TSF	HNU PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
1	0	2.0	SS	6	6	8	8	14"				Clayfill w/ gr. @ typ
	0	2.5	HSA									
2	2.5	4.0	SS	8	9	11		14"				Sandyfill w/ silt
	2.5	5.0	HSA									
3	5.0	7.0	SS	6	6	7	14	18"				Sandyfill w/ Clayfill
	5.0	7.5	HSA									
4	7.5	9.5	SS	7	9	9	9	20"			7.5	F/c Sand & gr.
	7.5	10.0	HSA									
5	10.0	12.0	SS	7	8	8	10	20"	4.0		10.0	Grey Silty Clay
	10.0	12.5	HSA									
6	12.5	14.0	SS	10	12	16		14"	4.5+			Same
	12.5	15.0	HSA									
7	15.0	16.5	SS	8	8	10		18"	3.0			Same
	15.0	17.5	HSA									
8	17.5	19.0	SS	9	10	12		18"	3.0			Same
	17.5	20.0	HSA									
9	20.0	22.0	SS	10	10	12	14	20"	3.5			Same

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST

TOPSOIL THICKNESS _____

FILL THICKNESS 7.5

CAVE-IN LEVEL:

WHILE DRILLING AND SAMPLING _____

AFTER BORING COMPLETION _____

WATER LOSS:

AT _____ TO _____

PERCENT LOSS

AT _____ TO _____

PERCENT LOSS _____

BOULDERS OR OBSTRUCTIONS:

AT _____ TO _____

AT _____ TO _____

ARTESIAN PRESSURE:

DEPTH _____

HEIGHT OF SOIL RISE IN CASING _____

PIEZOMETER PVC OR SS

DIAMETER _____ IN.

SCREEN DEPTH _____ FT. TO _____ FT

RISER PIPE _____ FT. TO _____ FT

AECOM

FIELD BORING LOG

1 of 1

TECHNICIAN _____ SURFACE ELEV. _____ 140 LB. HAMMER TYPE:

DRILLER Billy BORING STARTED 9/20/10 ☐ DONUT

HELPER Chris BORING COMPLETED 9/21/10 ☑ SAFETY

RIG MFG/MODEL Geoprobe STATION _____ ☐ AUTOMATIC

OFFSET _____ CASING USED _____ SIZE _____

WATER LEVEL OBSERVATIONS

WL: 2.5 (WS) OR WD

WL: _____ BCR _____ ACR

WL: 2.5 AB _____ HR. AB

WL: _____ 24 HR. AB

JOB NO. _____ BORING NO. B-5 CLIENT U.S.A.C.E WEATHER _____

SAMPLE NO.	DEPTH OR ELEVATION FROM	TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	R LENGTH RECOVERED IN FEET	QP PENETROMETER TEST IN TSF	HNU PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
												UNSURE ON SAMPLE INTEGRITY POSSIBLE CAVE IN OF SAMPLE #5
1	0	2.0	SS	3	3	3	3	14"				FC Sand & Gravel
	0	2.5	PA									
2	2.5	4.5	SS	4	3	5	7	13"				F-C Sand & Grey Silt
	2.5	5.0	PA									
3	5.0	6.5	SS	13	16	17		14"				Sand
	5.0	7.5	PA									
4	7.5	9.0	SS	11	13	17		13"	3.5		7.5	Grey Silty Clay and Sand
	7.5	10.0	PA									
5	10.0	11.5	SS	13	13	17		18"			10.0	Sand
	10.0	12.5										
6	12.5	14.0	SS	9	13	16		14"	2.0		2.0	Grey Silty Clay
	12.5	14.0	PA									
7	15.0	16.5	SS	10	12	14		14"	2.0			Sand
	15.0	18.0	PA									
8	18.0	20.0	SS	16	18	37	40	18"	4.5+		18.0	Sand

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST

TOPSOIL THICKNESS _____

FILL THICKNESS _____

CAVE-IN LEVEL:

WHILE DRILLING AND SAMPLING _____

AFTER BORING COMPLETION _____

WATER LOSS:

AT _____ TO _____

PERCENT LOSS

AT _____ TO _____

PERCENT LOSS _____

BOULDERS OR OBSTRUCTIONS:

AT _____ TO _____

AT _____ TO _____

ARTESIAN PRESSURE:

DEPTH _____

HEIGHT OF SOIL RISE IN CASING _____

PIEZOMETER PVC OR SS

DIAMETER _____ IN.

SCREEN DEPTH _____ FT. TO _____ FT

RISER PIPE _____ FT. TO _____ FT

Bob Backfilled

AECOM

FIELD BORING LOG

1 of 1

TECHNICIAN _____ SURFACE ELEV. _____ 140 LB. HAMMER TYPE:

DRILLER Billy BORING STARTED 9/22/10 ☒ DONUT

HELPER Chris BORING COMPLETED 9/22/10 ☐ SAFETY

RIG MFG/MODEL HA STATION _____ ☐ AUTOMATIC

OFFSET _____ CASING USED _____ SIZE _____

WATER LEVEL OBSERVATIONS

WL: 1.5 WS OR WD

WL: _____ BCR _____ ACR

WL: _____ AB _____ HR. AB

WL: _____ 24 HR. AB

JOB NO. _____ BORING NO. 16 CLIENT US ACE WEATHER _____

SAMPLE NO.	DEPTH OR ELEVATION FROM	DEPTH OR ELEVATION TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	R LENGTH RECOVERED IN FEET	QP PENETROMETER TEST IN TSF	HNU PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
1	0	1.5	SS	10	15	22		12"				F/c Sand
	0	1.5	HA									
2	1.5	3.0	SS	30	40	45		14"				F/c Sand w/ lg gr.
	1.5	3.0	HA									
3	3.0	5.0	SS	30	38	40	50	16"				Same
												BOB Backfilled

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST

TOPSOIL THICKNESS _____

FILL THICKNESS _____

CAVE-IN LEVEL:

WHILE DRILLING AND SAMPLING _____

AFTER BORING COMPLETION _____

WATER LOSS:

AT _____ TO _____

PERCENT LOSS

AT _____ TO _____

PERCENT LOSS _____

BOULDERS OR OBSTRUCTIONS:

AT _____ TO _____

AT _____ TO _____

ARTESIAN PRESSURE:

DEPTH _____

HEIGHT OF SOIL RISE IN CASING _____

PIEZOMETER PVC OR SS

DIAMETER _____ IN.

SCREEN DEPTH _____ FT. TO _____ FT

RISER PIPE _____ FT. TO _____ FT

AECOM

FIELD BORING LOG

TECHNICIAN Nick Pl
DRILLER Billy McCarthy
HELPER Curtis Franks
RIG MFG/MODEL ATV

SURFACE ELEV.
BORING STARTED 9/22/10
BORING COMPLETED 9/22/10
STATION
OFFSET

140 LB. HAMMER TYPE:
☐ DONUT
☒ SAFETY
☐ AUTOMATIC
CASING USED N SIZE

WATER LEVEL OBSERVATIONS
WL: WS OR WD
WL: BCR ACR
WL: AB HR. AB
WL: 24 HR. AB

JOB NO. Stratton
BORING NO. B-6A ALTERNATE
CLIENT
WEATHER Windy 60°

SAMPLE NO.	DEPTH OR ELEVATION FROM	DEPTH OR ELEVATION TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	R LENGTH RECOVERED IN FEET	QP PENETROMETER TEST IN TSF	HNU PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
1	0.0	1.5	SS	4	9	15		8"				Coarse sand & gravel
	1.5	3	PA									Augered to 3'
												No rec
												for

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST
TOPSOIL THICKNESS
FILL THICKNESS

CAVE-IN LEVEL:
WHILE DRILLING AND SAMPLING
AFTER BORING COMPLETION

WATER LOSS:
AT TO
PERCENT LOSS
AT TO
PERCENT LOSS

BOULDERS OR OBSTRUCTIONS:
AT TO
AT TO

ARTESIAN PRESSURE:
DEPTH
HEIGHT OF SOIL RISE IN CASING
PIEZOMETER PVC OR SS
DIAMETER IN.
SCREEN DEPTH FT. TO FT
RISER PIPE FT. TO FT

FIELD BORING LOG

1 of 1

AECOM

TECHNICIAN _____ SURFACE ELEV. _____ 140 LB. HAMMER TYPE:

DRILLER Billy BORING STARTED 9/21/10 ☐ DONUT

HELPER Chris BORING COMPLETED 9/21/10 ☒ SAFETY

RIG MFG/MODEL Geneaa STATION _____ ☐ AUTOMATIC

OFFSET _____ CASING USED _____ SIZE _____

WATER LEVEL OBSERVATIONS

WL: 2.5 WS OR WD

WL: ' BCR _____ ACR

WL: 2.5 AB _____ HR. AB

WL: _____ 24 HR. AB

JOB NO. _____ BORING NO. B-7 CLIENT FT. SHERIDAN WEATHER _____

SAMPLE NO.	DEPTH OR ELEVATION FROM	TO	SAMPLE METHOD	PENETRATION RECORD SPLIT SPOON BLOWS 6"	6"	6"	6"	LENGTH RECOVERED IN FEET	PENETROMETER TEST IN TSF	PHOTO-IONIZATION DETECTION	STRATA CHANGE	SAMPLE DESCRIPTION
1	0	2.0	SS	3	8	9	7	12"				Dark Sand & Gravel F.C
	0	2.5	PA									
2	2.5	3.25	SS	4	5	9	9	8"				Sand
2-A	3.25	4.5	SS				4	12"	2.5		3.25	Gray Silty Clay
	2.5	5.0	PA									
3	5.0	7.0	SS	5	8	12	12	18"	2.5			Dark Silty Clay Sand & GRAVEL F.C
4	5.0	7.5	PA									
4	7.5	9.5	SS	8	11	12	14	11"				Same Sample Disturbed by Cobbles
	7.5	10.0	PA									
5	10.0	11.5	SS	14	14	14		14"	4.0			Same
	10.0	12.5	PA									
6	12.5	14.0	SS	11	17	24		17"	4.0			Same
	12.5	15.0	PA									Same
7	15.0	16.5		20	18	25		18"	2.75			Same
	15.5	18.0	PA									
	18.0	19.5	SS	18	20	20	24	20"	3.0			SAME

ABBREVIATIONS

FT	FISH TAIL
WO	WASH OUT
ST	SHELBY TUBE
SS	SPLIT SPOON
DB	DIAMOND BIT
PA	POWER AUGER
HSA	HOLLOW STEM AUGER
HA	HAND AUGER
RB	ROCK BIT
WS	WHILE SAMPLING
WD	WHILE DRILLING
BCR	BEFORE CASING REMOVAL
ACR	AFTER CASING REMOVAL
AB	AFTER BORING

DRILL CREW CHECKLIST

TOPSOIL THICKNESS _____

FILL THICKNESS _____

CAVE-IN LEVEL:

WHILE DRILLING AND SAMPLING _____

AFTER BORING COMPLETION _____

WATER LOSS:

AT _____ TO _____

PERCENT LOSS

AT _____ TO _____

PERCENT LOSS _____

BOULDERS OR OBSTRUCTIONS:

AT _____ TO _____

AT _____ TO _____

ARTESIAN PRESSURE:

DEPTH _____

HEIGHT OF SOIL RISE IN CASING _____

PIEZOMETER PVC OR SS

DIAMETER _____ IN.

SCREEN DEPTH _____ FT. TO _____ FT

RISER PIPE _____ FT. TO _____ FT

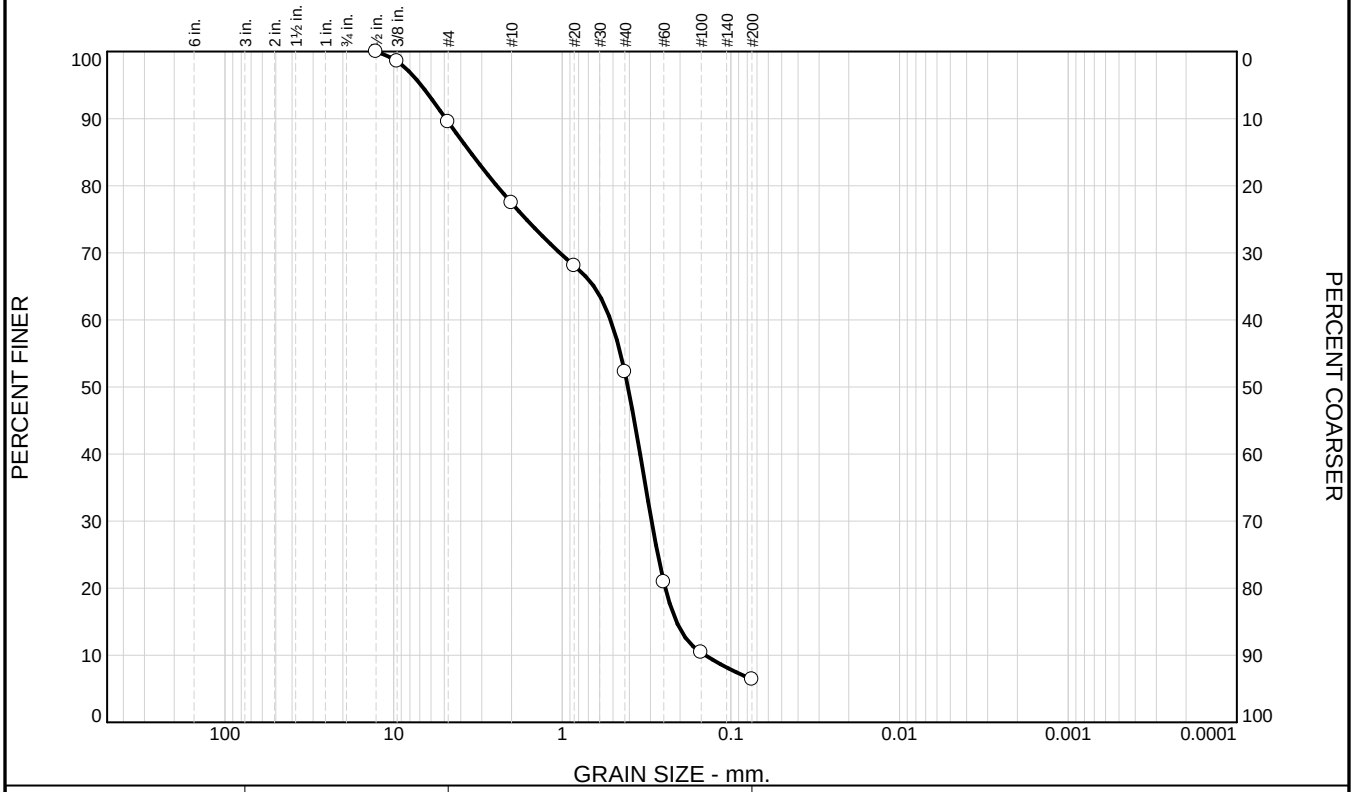
E.O.B. - BACK FILLED.

SUMMARY OF LABORATORY TESTS

Project No.: 60163812 **Project:** USACE - Fort Sheridan **Client** : US Army Corps of Engineers

Boring No.	Sample No.	Depth (ft.)	Description	USCS	Nat. WC%	Qp (tsf)	LL	PL	PI	% Gravel	% Sand	% Fines (silt and clay)
Boring 1												
	1	0.0-2.0	F-C SAND TRACE CLAY TRACE SILT TRACE F GRAVEL - GRAY	SP	1.7							
	2	2.5-4.0	F GRAVEL LITTLE F-C SAND TRACE SILT - GRAY	GP	10.2							
	3	5.0-6.5	F-C SAND LITTLE F GRAVEL TRACE FINES - GRAY	SP-SM	19.1					10.5	83.1	6.4
	4	7.5-9.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	18.3	2.50						
	5	10.0-11.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	16.1	3.25	29	13	16			
	6	12.5-14.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	18.4	3.25						
	7	15.0-16.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	17.7	3.50						
	8	18.0-20.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	18.5	4.00						
Boring 2												
	1	0.0'-2.0'	F-C SAND TRACE F GRAVEL - GRAY	SP	13.8					1.4	98.0	0.6
	2	2.5-4.0	F-C GRAVEL LITTLE F-C SAND TRACE SILT - GRAY	GP	9.2							
	3	5.0-7.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	17.7	4.50						
	4	7.5-9.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	15.1	4.00						
	5	10.0-11.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	21.1	2.25						
	6	12.5-14.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	20.6	2.75						
Boring 3												
	1	0.0-1.5	F-C GRAVEL LITTLE F-C SAND TRACE SILT - GRAY	GP	11.7							
Boring 4												
	1	0.0-2.0	F-C SAND TRACE CLAY TRACE F GRAVEL TRACE TOPSOIL - GRAY TO DK GRAY	SP	7.7							
	2	2.5-4.0	SILT TRACE CLAY TRACE F-C SAND TRACE F GRAVEL - BROWN	ML	10.1							
	3	5.0-7.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	15.1	2.50						
	4	7.5'-9.5'	F-C SAND LITTLE F-C GRAVEL TRACE FINES - GRAY	SP-SM	18.8					18.1	76.6	5.3
	5	10.0-12.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	18.9	4.25						
	6	12.5-14.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	16.1	6.25						
	7	15.0-16.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	18.8	3.75						
	8	17.5-19.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	18.8	3.25						
	9	20.0-22.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	19.7	3.25						
	4	73.5-9.5	F-C SAND TRACE SILT TRACE F GRAVEL - GRAY	SP	18.8							
Boring 5												
	1	0.0-2.0	F-C SAND TRACE SILT TRACE F GRAVEL - GRAY	SP	5.3							
	2	2.5'-4.5'	F-C SAND TRACE F GRAVEL TRACE FINES - GRAY	SP	19.0					3.1	93.7	3.2
	3	5.0-6.5	F-C SAND TRACE SILT TRACE F GRAVEL - GRAY	SP	20.9							
	4	7.5-9.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	19.0	2.75						
	5	10.0-11.5	F-C SAND LITTLE SILT TRACE F GRAVEL - GRAY	SP-SM	20.1							
	6	12.5-11.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	20.4	2.25						
	7	15.0-16.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	20.2	2.00						
	8	18.0-20.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	12.6	3.75						
Boring 6												
	1	0.0-1.5	F-C SAND TRACE SILT TRACE F GRAVEL - GRAY	SP	3.3							
	2	1.5-3.0	F-C GRAVEL LITTLE F-C SAND TRACE SILT - GRAY	GP	8.2							
	3	3.0-5.0	SANDY F-C GRAVEL TRACE SILT - GRAY	GP	8.9							
Boring 6A												
	1	0.0-1.5	F-C SAND LITTLE F-C GRAVEL - GRAY	SP	6.4							
Boring 7												
	1	0.0-2.0	F-C SAND LITTLE F-C GRAVEL TRACE SILT - GRAY	SP	9.3							
	2	2.5'-3.25'	F-C SAND AND F-C GRAVEL TRACE FINES - GRAY	SP	17.7					45.5	52.5	2.0
	2A	3.25-4.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	20.6	1.50						
	3	5.0-7.0	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	22.2	1.25						
	4	7.5-9.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	21.4	0.50						
	5	10.0-11.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	17.6	3.25						
	6	12.5-14.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	17.1	3.25						
	7	15.0-16.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	18.0	1.25	29	13	16			
	8	18.0-19.5	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	CL	17.3	1.75						

Partical Size Analysis of Soils ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.5	12.1	25.2	45.8	6.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.50	100.0		
.375	98.5		
#4	89.5		
#10	77.4		
#20	68.1		
#40	52.2		
#60	20.9		
#100	10.4		
#200	6.4		

* (no specification provided)

Material Description

F-C SAND LITTLE F GRAVEL TRACE FINES - GRAY

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 4.9030 D_{85}= 3.5065 D_{60}= 0.5171
D_{50}= 0.4073 D_{30}= 0.2955 D_{15}= 0.2102
D_{10}= 0.1418 C_u= 3.65 C_c= 1.19

Classification

USCS= SP-SM AASHTO=

Remarks

F.M.=2.56

Source of Sample: Boring 1 **Depth:** 5.0-6.5
Sample Number: 3 **Date:** 10/4/2010

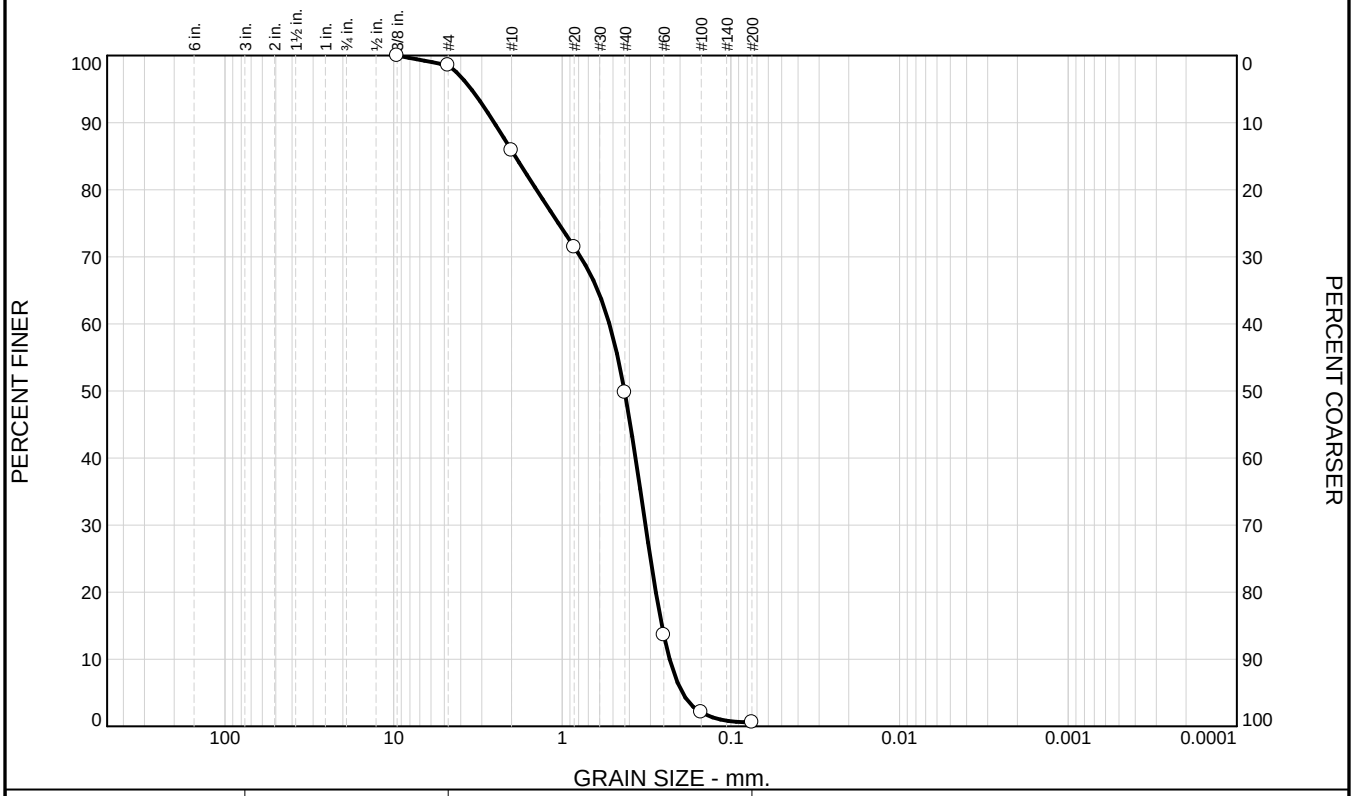
AECOM

Client: US Army Corps of Engineers
Project: USACE - Fort Sheridan

Project No: 60163812

Tested By: EMR **Checked By:** WPQ

Partical Size Analysis of Soils ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	12.7	36.1	49.2	0.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	98.6		
#10	85.9		
#20	71.4		
#40	49.8		
#60	13.6		
#100	2.1		
#200	0.6		

* (no specification provided)

Material Description

F-C SAND TRACE F GRAVEL - GRAY

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.5307 D_{85}= 1.9024 D_{60}= 0.5252
D_{50}= 0.4266 D_{30}= 0.3212 D_{15}= 0.2566
D_{10}= 0.2307 C_u= 2.28 C_c= 0.85

Classification

USCS= SP AASHTO=

Remarks

F.M.=2.44

Source of Sample: Boring 2 **Depth:** 0.0'-2.0'
Sample Number: 1 **Date:** 10/4/2010

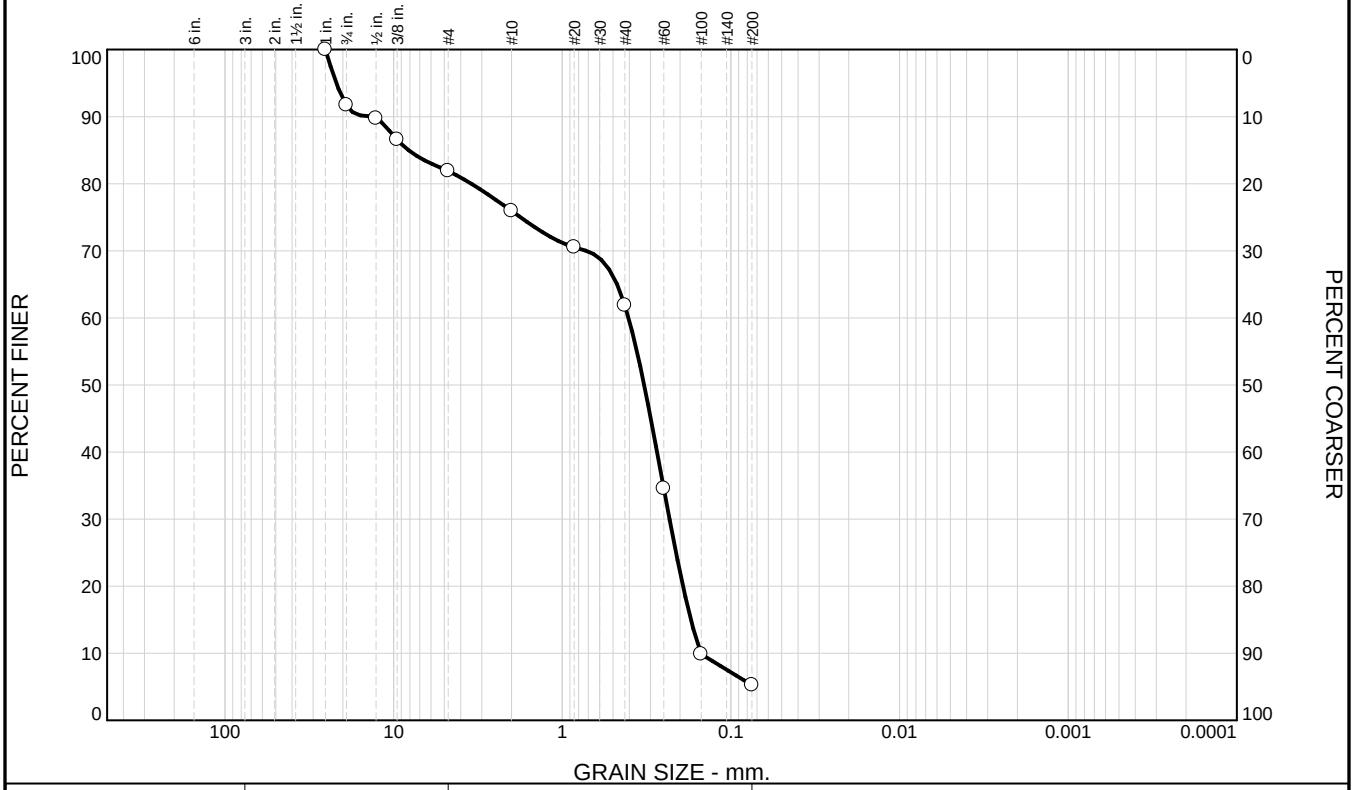
AECOM

Client: US Army Corps of Engineers
Project: USACE - Fort Sheridan

Project No: 60163812

Tested By: EMR **Checked By:** WPQ

Partical Size Analysis of Soils ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.3	9.8	5.9	14.1	56.6	5.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	100.0		
.75	91.7		
.50	89.7		
.375	86.6		
#4	81.9		
#10	76.0		
#20	70.5		
#40	61.9		
#60	34.6		
#100	9.8		
#200	5.3		

* (no specification provided)

Material Description

F-C SAND LITTLE F-C GRAVEL TRACE FINES - GRAY

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 13.5652 D_{85}= 8.1578 D_{60}= 0.4040
D_{50}= 0.3270 D_{30}= 0.2311 D_{15}= 0.1726
D_{10}= 0.1507 C_u= 2.68 C_c= 0.88

Classification

USCS= SP-SM AASHTO=

Remarks

F.M.=2.67

Source of Sample: Boring 4 **Depth:** 7.5'-9.5'
Sample Number: 4 **Date:** 10/4/2010

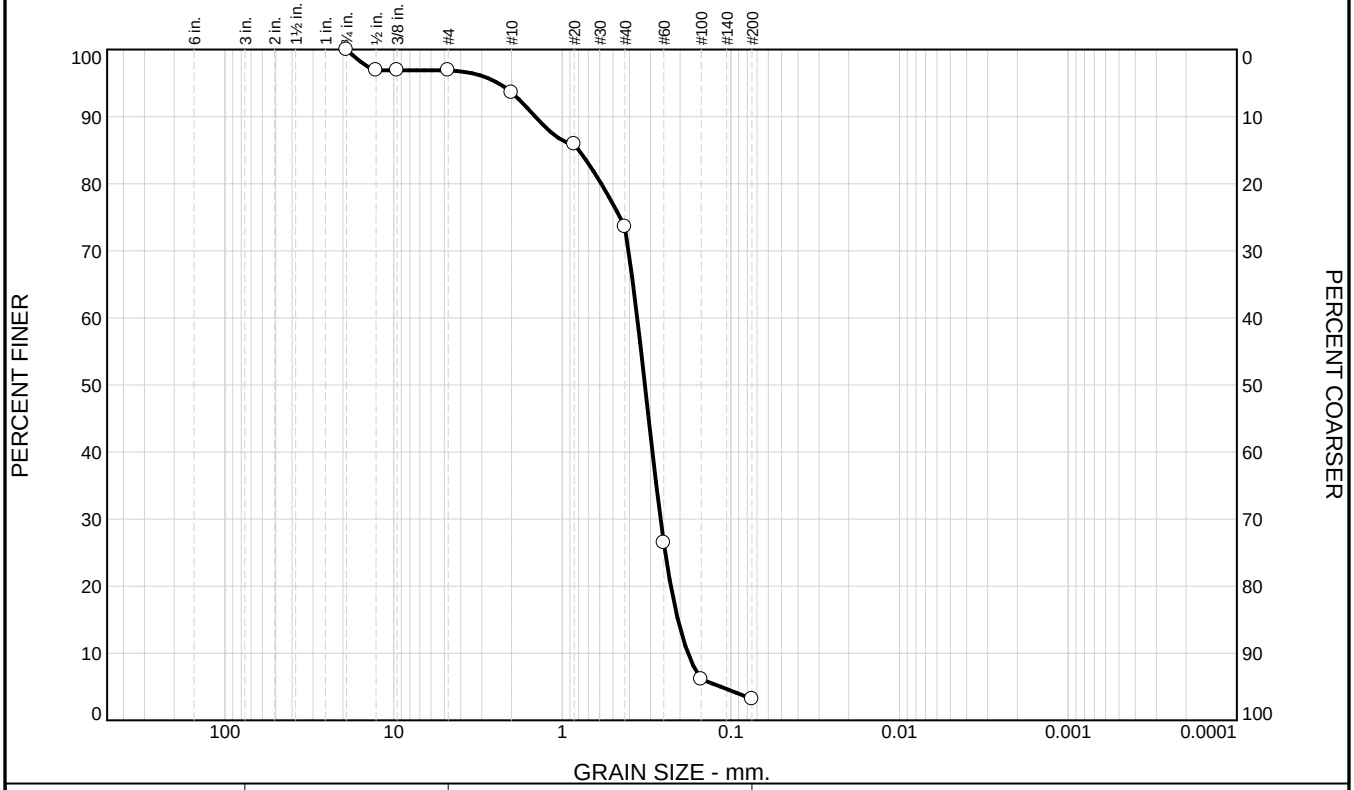
AECOM

Client: US Army Corps of Engineers
Project: USACE - Fort Sheridan

Project No: 60163812

Tested By: EMR **Checked By:** WPQ

Partical Size Analysis of Soils ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	3.3	20.0	70.4	3.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.50	96.9		
.375	96.9		
#4	96.9		
#10	93.6		
#20	85.9		
#40	73.6		
#60	26.5		
#100	6.1		
#200	3.2		

* (no specification provided)

Material Description

F-C SAND TRACE F GRAVEL TRACE FINES - GRAY

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.4441 D_{85}= 0.7970 D_{60}= 0.3592
D_{50}= 0.3236 D_{30}= 0.2614 D_{15}= 0.2061
D_{10}= 0.1796 C_u= 2.00 C_c= 1.06

Classification

USCS= SP AASHTO=

Remarks

F.M.=1.94

Source of Sample: Boring 5 **Depth:** 2.5'-4.5'
Sample Number: 2 **Date:** 10/4/2010

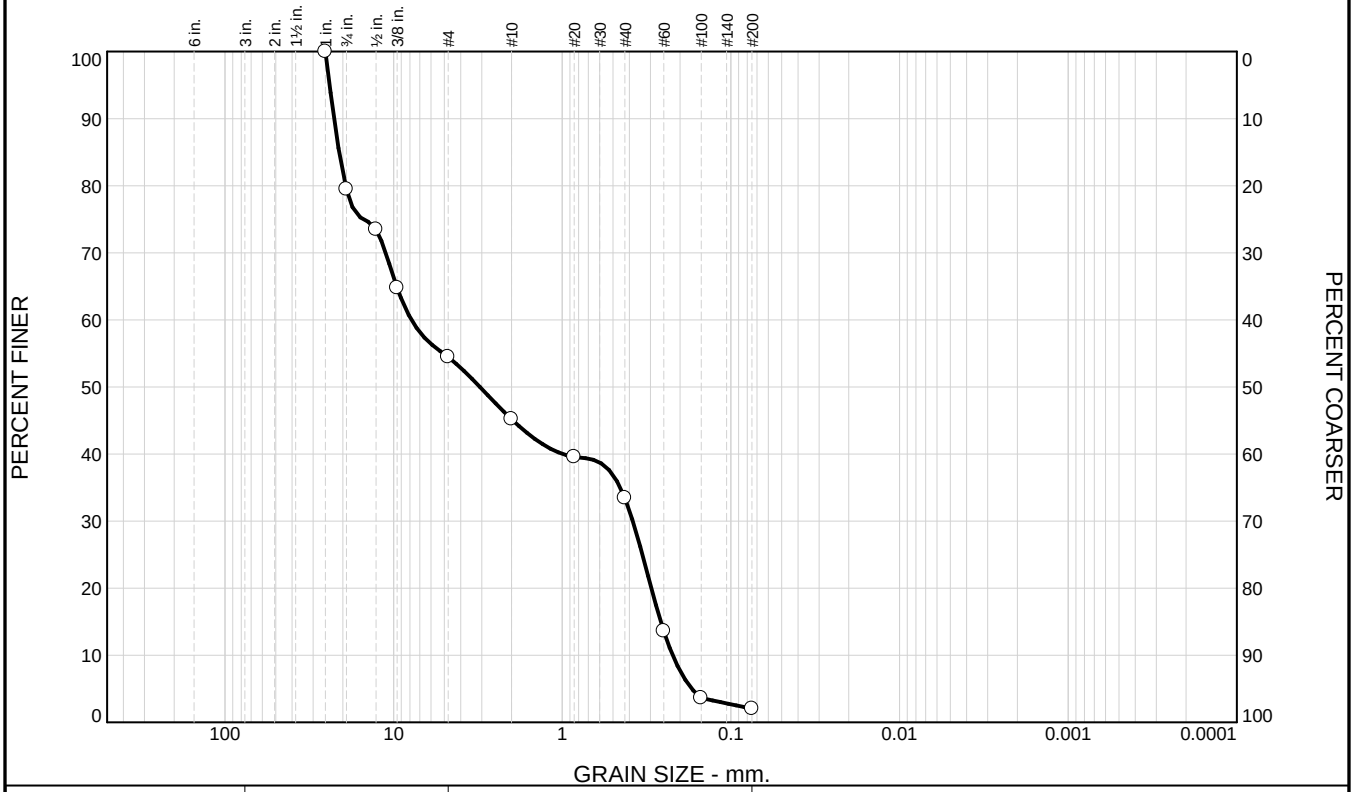
AECOM

Client: US Army Corps of Engineers
Project: USACE - Fort Sheridan

Project No: 60163812

Tested By: EMR **Checked By:** WPQ

Partical Size Analysis of Soils ASTM D 422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.5	25.0	9.3	11.8	31.4	2.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.0	100.0		
.75	79.5		
.50	73.5		
.375	64.8		
#4	54.5		
#10	45.2		
#20	39.6		
#40	33.4		
#60	13.6		
#100	3.6		
#200	2.0		

* (no specification provided)

Material Description

F-C SAND AND F-C GRAVEL TRACE FINES - GRAY

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 22.5145 D_{85}= 21.0233 D_{60}= 7.8402
D_{50}= 3.0776 D_{30}= 0.3815 D_{15}= 0.2605
D_{10}= 0.2214 C_u= 35.41 C_c= 0.08

Classification

USCS= SP AASHTO=

Remarks

F.M.=4.51

Source of Sample: Boring 7 **Depth:** 2.5'-3.25'
Sample Number: 2 **Date:** 10/4/2010

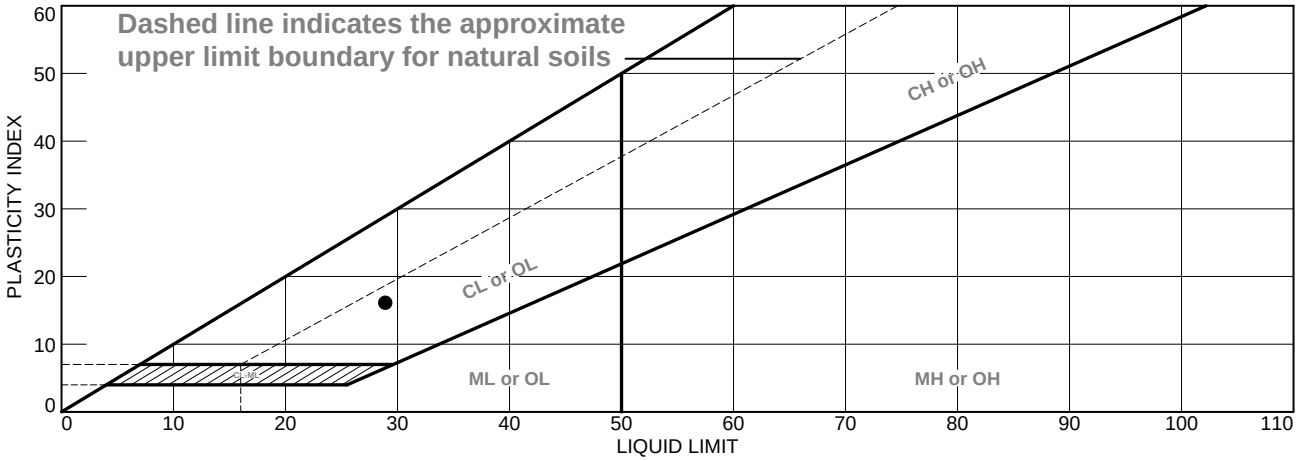
AECOM

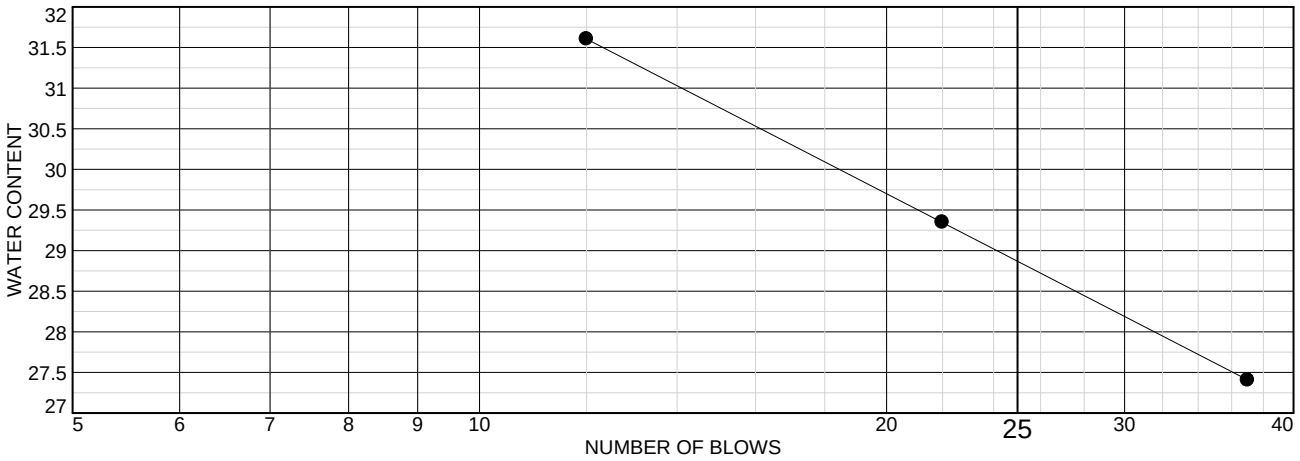
Client: US Army Corps of Engineers
Project: USACE - Fort Sheridan

Project No: 60163812

Tested By: EMR **Checked By:** WPQ

LIQUID AND PLASTIC LIMITS ASTM D 4318





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	29	13	16			CL

Project No. 60163812 **Client:** US Army Corps of Engineers

Project: USACE - Fort Sheridan

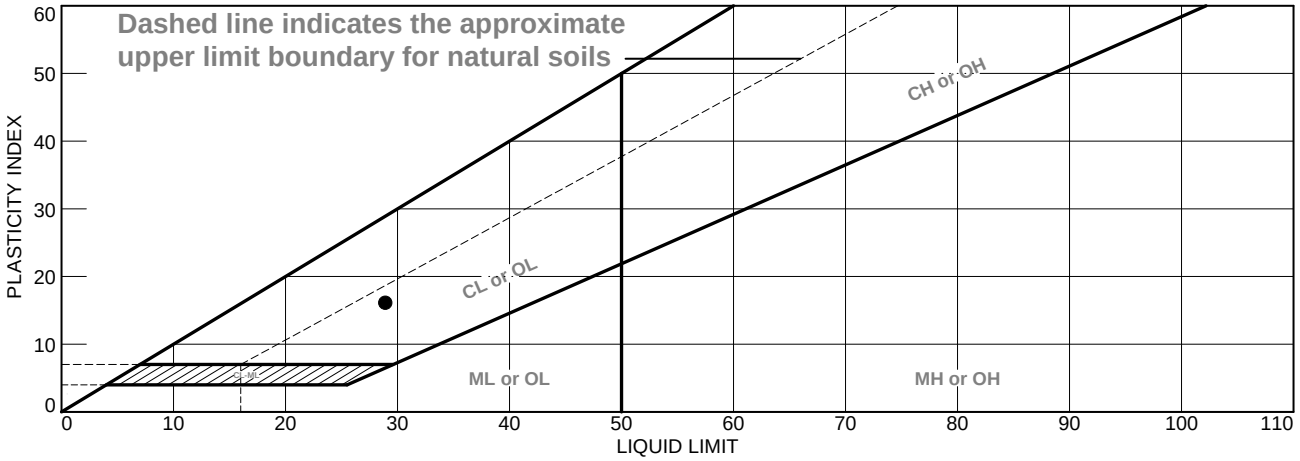
●**Source of Sample:** Boring 1 **Depth:** 10.0-11.5 **Sample Number:** 5

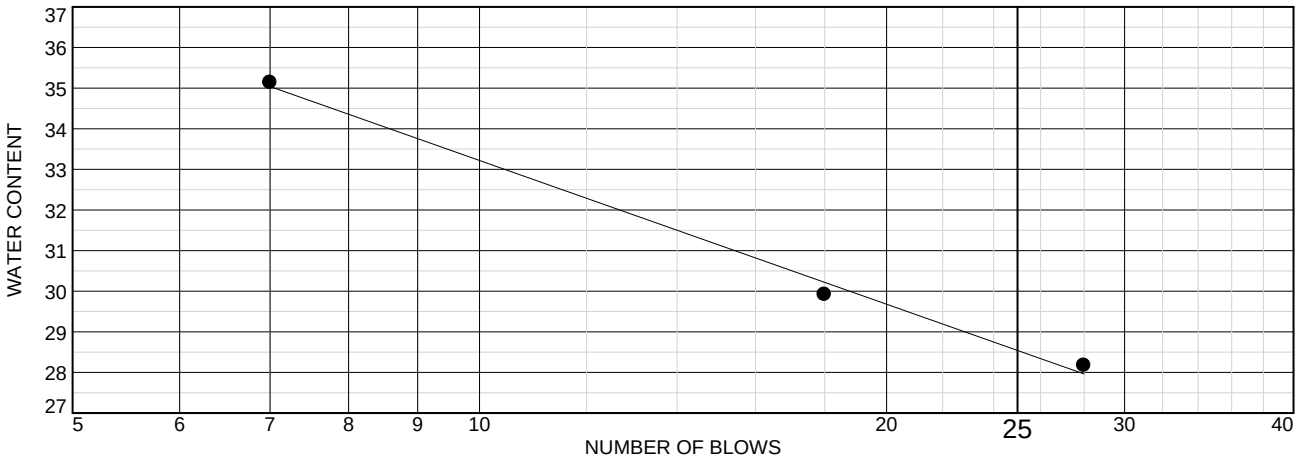
Remarks:

AECOM

Tested By: DS **Checked By:** WPQ

LIQUID AND PLASTIC LIMITS ASTM D 4318





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILTY CLAY TRACE F-C SAND TRACE F GRAVEL - GRAY	29	13	16			CL

Project No. 60163812 **Client:** US Army Corps of Engineers

Project: USACE - Fort Sheridan

●**Source of Sample:** Boring 7 **Depth:** 15.0-16.5 **Sample Number:** 7

Remarks:

AECOM

Tested By: DS **Checked By:** WPQ

Appendix C

Drilling Photos

Photo 1 – General 550 Drill Rig

Photo 2 – Typical Buried Boulder

APPENDIX D – GEOTECHNICAL ANALYSIS

Attachment 4: Ft. Sheridan CTL Geotechnical Engineering Report

Geotechnical Engineering Report

Proposed "Openlands Lakeshore Preserve" Project
Highland Park/Fort Sheridan, Illinois.

Chicago Testing Laboratory, Inc.
Project No. 10EG204
05/06/2010

Prepared for:

Mr. James A. Stevenson
Clauss Brothers, Inc.
360 West Schaumburg Road
Streamwood, Illinois 60107

Prepared by:

Founded1912

Chicago Testing Laboratory, Inc.
Warrenville, Illinois

Chicago Testing Laboratory, Inc.
30W114 Butterfield Road, Warrenville, IL 60555 p 630.393.CTL1 f 630.393.CTL7
18000 South Williams Street, Thornton, IL 60476 p 708.877.1801 f 708.877.6926
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P.O. Box 3395, Joliet, IL 60434 p 815.385.8351 f 815.385.8456
www.chicagotestinglab.com
info@chicagotestinglab.com
Testing • Inspection • Training • Consulting • Research • Geotechnical
Founded 1912

May 7, 2010

Mr. James A. Stevenson
Clauss Brothers, Inc.
360 West Schaumburg Road
Streamwood, Illinois 60107

Re: Report of Subsurface Exploration and Engineering Services
Proposed "Openlands Lakeshore Preserve" project
Highland Park/Fort Sheridan, Illinois.
CTL Project No. 10EG204

Dear Mr. Stevenson:

This report presents the results of geotechnical subsurface exploration, lab testing and engineering analysis conducted for the above referenced project in Highland Park and Fort Sheridan, Illinois. This exploration was performed in accordance with our Proposal No. EG10029 dated March 4, 2010, and your subsequent authorization.

INTRODUCTION

General

The recommendations submitted herein are based on the available soil information and preliminary design details outlined in this report. Any revision in the plans for the proposed structures from those enumerated in this report should be brought to the attention of the Geotechnical Engineer so that he may determine if changes in the recommendations are required. If deviations from the noted subsurface conditions are encountered during construction, they should also be brought to the attention of the Geotechnical Engineer.

Purpose and Scope of Work

The purpose of this exploration was to evaluate the subsurface conditions at the site and to formulate conclusions and recommendations pertaining to the influence of those conditions upon the proposed construction of three (3) parking lots, a pathway or bike trail, overlook areas and a pedestrian bridge over the Schenck Ravine. The scope of work included subsurface exploration by soil

borings, engineering analysis of the pertinent geotechnical data, and preparation of this report. Samples obtained during this exploration will be retained in our facility for a period of 90 days, after which time they will be discarded unless other arrangements are made.

SITE LOCATION & PROJECT DESCRIPTION

General

The proposed 26 acre property site located along the Lake Michigan and Bartlett Ravine bluffs is located in Highland Park and Fort Sheridan, Illinois. The explored area, mostly covered with grass was relatively flat with the exception of the area of boring B-15, which was covered with old asphalt pavement. The project starts with a parking lot located north of the intersection of Walker Avenue and Oak Street in Highland Park. The pathway system starts from the parking lot and moves along the Lake Michigan bluff over the Schenck and Van Horn Ravines to the Bartlett Ravine. The pathway then moves west along the Bartlett Ravine and ends at the second parking lot located west of Patton Road in Highland Park. The third parking lot was located in Fort Sheridan east of Lyster Road. Site and Boring Location Plan is included in Appendix A.

FIELD EXPLORATION

General

The soil and groundwater conditions were investigated by drilling and sampling of the subsurface materials at the site. Boreholes were extended to a depth of 7 ½ feet below the existing ground surface (bgs) at each location with the exception of deeper boring B-16, which was drilled to a depth of 50 feet for the bridge at Schenck Ravine. The drilling and sampling methods used are described herein.

Scope

A total of sixteen soil borings, identified as B-1 through B-16 were drilled during the present subsurface exploration. The boring locations were selected and marked in the field by Clauss Brothers representatives. The approximate locations of the borings are illustrated in the Site and Boring Location Plan included in the Appendix A.

Soil Drilling & Sampling Procedures

The borings were drilled with a conventional truck mounted drill rig equipped with a rotary head. Continuous Flight augers (CFA) were used to advance the boreholes. Soils were sampled at 2½ foot intervals through the borings termination depths.

At sampling elevations, advancement of the borehole was stopped and representative soil samples were obtained with a sampling device known as a split-spoon or split-barrel sampler. The sampler was attached to the drill rods and lowered into the borehole. The advancement of the sampler into the soil was conducted in general accordance with the Standard Penetration Test (SPT) (ASTM D1586). The sampling spoon was advanced, by driving, using a drop hammer. The number of blows required driving the sampler 12 inches with a hammer weighing 140 lbs and dropping over a distance of 30 inches is known as the standard penetration resistance (N).

The results of the standard penetration tests indicate the relative density of granular soils and comparative consistency of cohesive soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components. The results of standard penetration tests can be found on the log of borings included in the Appendix B.

Field Logs

The results of Standard Penetration Testing (SPT) and field descriptions of the soils encountered, approximate measurements of strata thicknesses, groundwater observations, as well as other pertinent remarks were recorded on the field logs. The field logs were maintained by the drilling crew. The soil samples and field logs were submitted for lab testing upon completion of the field exploration.

Water Level Measurements

Groundwater level measurements were made in the soil borings during and immediately following the drilling operations. Groundwater information is indicated on the log of borings, located in the Appendix B. In relatively pervious soils, such as sandy soils, the indicated elevations are considered reliable short-term groundwater levels. In relatively impervious soils, the accurate determination of the groundwater elevation may not be possible, even after several days of observation. Additionally, seasonal variations, temperature, recent rainfall conditions, permeability of the soil and other factors can influence the groundwater level.

LABORATORY TESTING

General

Upon completion of the field exploration, the soil samples and field logs were brought to our laboratory for further testing. The sampled soils were tested by our laboratory staff. Detailed soil descriptions were prepared by a Geotechnical Engineer. Estimations of grain sizes and physical properties of the sampled soils

were used to prepare soil descriptions based on the Visual/Manual Classification System (ASTM D2488).

Scope

The laboratory testing program included supplementary visual description, and water content determinations (Wc) on all relatively cohesive samples. In addition, reasonably intact samples of fine-grain cohesive soils were subjected to unconfined compressive strength testing using a calibrated hand-held penetrometer. Consideration must be given to the manner in which the values of the unconfined compressive strengths (Qp) were obtained. It should be noted that ASTM D2166 Split-spoon sampling techniques provide a representative, though somewhat disturbed, soil sample. The values presented must be considered approximate unconfined compressive strength values. In order to provide USDA Soil Classification, Hydrometer (ASTM T422) and Atterberg Limits (ASTM D4318) tests were performed on select representative soil samples.

The results of the standard penetration tests (N), water content tests (Wc), unconfined compressive strength estimates (Qp) and other specialized test along with the visual descriptions are presented on the log of Borings included in the Appendix B and C of this report.

SUBSURFACE CONDITIONS

General

The stratification of the soils, as presented on the Boring Logs, was prepared using the field logs. Variations in the subsurface conditions may occur between the boring locations and lines of demarcation represent the approximate vertical boundaries between the soil types, but the transition may be more gradual. The subsurface conditions described are representative of those conditions encountered at each specific boring location or other point of exploration.

Subsurface Soils Description

Proposed Parking Lots: Borings B-1, B-14, were drilled at the proposed Parking lots in Highland Park and boring B-15 was drilled at the proposed parking lot in Fort Sheridan. Approximately 2 inches of black Clayey Topsoil was encountered at the surface of boring B-1, which was followed by brown with grey streaks Silty Clay through the boring termination depth of 7 ½ feet below the existing grade (bgs). Approximately 8 inches of Topsoil, over 6 inches of black Silty Clay (FILL) was noted at the surface of boring B-14. Below Topsoil and Clayey Fill, brown Silty Clay was encountered through the boring termination depth of 7 ½ feet bgs. Boring B-15 was drilled for the proposed parking lot in Fort Sheridan. Approximately 3 ¾ inch of existing asphalt pavement was noted at the surface, which was followed by Fill material comprising of brown to grey and dark grey

Silty Clay to a depth of 4.5 feet bgs. Following the Clayey Fill, Very Stiff brown and grey Silty Clay was found through the boring termination depth of 7 ½ feet bgs. The Very Stiff to Hard consistency of Clay was shown by Qp values ranging from 2.0 tsf to greater than 4.5 tsf. The natural moisture in Silty Clay/Clay Loam ranged from 15% to 23%.

Proposed Pathway and Overlook Structures: Borings B-2 through B-13 were drilled to evaluate the subsurface soils for the proposed pathway/bike trail and overlook structures. In general, approximately 2 to 6 inches of dark brown to black Clayey Topsoil and/or Fill was noted at the surface with the exception of the area of Boring B-13. In Boring B-13, 12 inches of black Clayey Topsoil was noted at the surface which was followed by 14 inches of black Sand, Cinders and Gravel Fill. Underlying the surficial Topsoil and Fill, Stiff to Very Stiff and Hard brown to brown and grey Silty Clay and Silty Clay Loam was encountered through the borings termination depth of 7 ½ feet bgs. Inter-bedded in Silty Clay a stratum of brown Clayey Silt was noted 3 ½ feet to 6 feet depth in Boring B-5. The Stiff to Hard consistency of Clay was shown by Qp values ranging from 1.5 tsf to greater than 4.0 tsf. The natural moisture in Silty Clay/Clay Loam and Loam ranged from 12% to 26%.

Proposed Pedestrian Bridge: Boring B-16 was drilled at the location of North Abutment. Stiff brown Silty Clay was noted from surface to a depth of 2.5 feet bgs. Below 2 ½ feet depth, Very Stiff to Hard brown and gray Silty Clay was encountered to a depth of 13 feet bgs, which was followed by Very Stiff to Hard grey Silty Clay Loam through the boring termination depth of 50 feet. The Stiff to Hard consistency of Clay was shown by Qp values ranging from 1.25 tsf to greater than 4.0 tsf. The natural moisture in Silty Clay and Silty Clay Loam ranged from 14% to 22%.

Groundwater Observations

Groundwater level observations were made by the drilling personnel. With the exception of Borings B-5 and B-16, groundwater was not encountered during the present subsurface exploration. In Boring B-5, groundwater was noted in silt layer at a depth of 4 feet while drilling. In deeper boring B-16, groundwater was encountered at a depth of 23.5 feet during drilling. It should be noted that groundwater levels are subject to seasonal and long term variations in response to climate conditions and man made influences.

DISCUSSIONS AND RECOMMENDATIONS

Project Description

The planned project consist of the construction of three (3) parking lots, asphalt pavement pathway/bike trail, overlooks areas and a pedestrian bridge over Schenck Ravine along the Lake Michigan shore bluffs in Highland Park and Fort Sheridan, Illinois.

Site Preparation:

Prior to any construction, the proposed parking lots, pathway and overlook areas should be carefully observed and stripped to remove surface vegetation, topsoil and/or any other unsuitable surface materials such as asphalt (Boring B-15).

Upon removing the Topsoil and/or any other unsuitable surface materials, the subgrade soil is expected to be stiff to Very stiff and Hard brown Silty Clay for most of the construction areas. However, relatively low bearing medium stiff Clay was noted below the Topsoil in the area of boring B-11 and black Sand, Cinders and gravel fill was encountered below the Topsoil in the area of boring B-13. The areas in the vicinity of these borings should be carefully observed and any low bearing and/or unsuitable materials encountered during the construction should be undercut and replaced with an engineered fill.

It is recommended that upon removing the surfical vegetation/topsoil and grading the site, the entire parking lots, pathway and overlook areas should be proof-rolled using a tandem wheeled dump truck. Proof rolling should be observed by a geotechnical engineer to delineate any softer/unstable areas or areas requiring additional undercutting. The over-excavated or undercut areas should then be backfilled with an engineered fill.

Pavement Section for Parking lots:

Based on our observation of the on-site soil the typical section which should be constructed in the car parking lots in 1-inch of asphaltic surface course and 2-inches of asphaltic bonder over 10 inches of compacted crushed stone. These typical thicknesses assume that the soil subgrade is stable and any fill placed for grading is compacted to a minimum of 95 percent of the maximum dry density as determined by Modified proctor test, ASTM D1557.

Pavement Section for Pathways:

Initially a porous asphalt pavement was proposed. However, due to the presence of impermeable Clay, conventional hot mix asphalt is being considered for the pathways. Project specifications regarding the thickness of asphalt pavement and crushed stone base should be followed. In general, upon following the recommendations provided in the “Site Preparation” section of this report, the clayey subgrade soil should be considered suitable to support the asphalt pavement.

A clay subgrade, in general is considered a poor subgrade for pavements if it becomes wet. The site grading and drainage should be designed to prevent accumulation of rain water. If pavements are not constructed immediately after grading, the subgrade should be shaped to prevent water ponding. Minor ponding, of even short duration, can cause softening of a soil subgrade to a

significant depth. If there is a substantial lapse of time between grading and paving, or if the subgrade is disturbed by construction activities, the subgrade should be proof-rolled with a loaded, tandem-wheeled dump truck. Unstable areas observed during construction or proof-rolling should be removed and replaced with soil or crushed stone. A stone base course is recommended below the asphalt pavement.

Foundation Design for overlook structures:

It is anticipated that footings will be required for the five (5) overlook structures. The loadings of these structures are not known to us at this time. However, as per Mr. Jim Stevenson these structures will be of light load. Borings B-2, B-5, B-6, B-7, B-8 and B-11 were drilled close to the vicinity of proposed overlook structures. For a shallow based foundation system the bearing materials below a frost depth of 3.5 feet would mostly consist of stiff to very stiff Clay which is considered suitable to support the footings. Recommended Net allowable bearing pressure for the soil at each overlook structure is presented in the following table.

Overlook Structure No.	Corresponding Boring No.	Net Allowable Bearing Pressure (psf)
Structure No.1	B-2	2,500
Structure No.2	B-5	3,500
Structure No.3	B-6	2,500
Structure No.4	B-7 & B-8	4,000
Structure No.5	B-11	4,000

The footing subgrade at each location should be carefully observed and tested by a Geotechnical Engineer or experienced Soils Technician. The subgrade soil should be evaluated using a hand auger probe to at least 2 to 3 feet below the bottom of proposed footings. The settlement of footings, designed in accordance with our recommendations is anticipated to be in the range of 1 inch or less, with the maximum differential settlement expected to be half of the total settlement.

Foundation Subgrade Evaluation and Construction:

Care should be exercised as not to disturb the clayey bearing materials, encountered at the bottom of footing excavation. The bearing soils should be carefully evaluated after foundation excavation, and any soft, or otherwise unsuitable material if encountered should be undercut down to competent soil. The required excavation to remove unstable or low bearing materials if encountered should be carried out covering a zone within a 1 horizontal to 1 vertical plane extended downward and outward from the outer limits of the proposed footings. The over excavated areas should then be replaced with a compacted load bearing engineered fill.

All footing excavations should be protected from freezing conditions and maintained free of ponded water before concrete placement. The footings should be cast as soon as possible after excavation is prepared, and backfilled after the concrete has attained its strength.

Engineered Fill:

Engineered fill should be comprised of well-graded, crushed limestone, free of organic or other objectionable materials, with a maximum particle size of 1½ inch, grading down to fines but not having more than 10 percent of particles finer than the No. 200 sieve, such an IDOT CA-6 size crushed stone. Engineered fill should be placed in essentially horizontal lifts not exceeding 9 inches in loose thickness. Each lift should be compacted to at least 95 percent of the maximum dry density as determined in the laboratory by the "Modified Proctor" compaction test, ASTM D1557.

Proposed Pedestrian Bridge:

A 5 ton timber pile supported pedestrian bridge is proposed over the Schenck Ravine. As per the data provided by Mr. Jim Stevenson, the bridge will be supported on 9" butt pilings with 3 pilings per bents. The bridge will be 12 feet wide, 230 feet long and 43 feet high. Boring B-16 was drilled at the location of North Abutment. Very Stiff to Hard brown to gray Silty Clay/Silty Clay Loam was noted from ground surface through the boring termination depth of 50 feet at this location. Very Stiff to Hard Clay is considered suitable material to support the proposed bridge abutment. Allowable pile capacity in kips for various pile lengths is shown in the following table. The pile capacity was calculated using a procedure developed by FHWA (FHWA-HI-97-013) with a factor safety value of 3.0.

Estimated Pile Length (ft)	Allowable Pile Capacity (Kips)
7.5	21
10	32
12.5	45
15.0	59
17.5	79
20	100

CONSTRUCTION CONSIDERATIONS

OSHA regulations regarding soil excavation should be followed and is the responsibility of the contractor. Excavations exceeding a depth of 5 feet will need to be appropriately sloped or benched. Groundwater is not considered a significant concern during construction.

Construction Observation

It is recommended that full time construction observation be provided during earthworks construction by a Geotechnical Engineering firm which is familiar with the subsurface conditions and design criteria. Since the intent of the design recommendations is best understood by CTL, it is imperative to involve CTL in the construction process. The construction observation services which could be provided at an additional cost should include the observation and documentation of all phases of construction, evaluation of bearing materials, subgrade preparation, proof-rolling, placement and compaction of engineered fill and density tests on asphalt pavement. CTL will be pleased to provide these services, if requested.

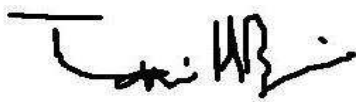
CLOSURE

The conclusions and recommendations presented in this report are based upon the assumption that the subsurface conditions do not deviate appreciably from those disclosed by the soil borings, and are also based upon the premise of competent field engineering, monitoring and testing during construction.

The professional services provided in connection with this project were performed in a manner consistent with the level of care and skill ordinarily exercised by an engineering firm. The opinions and conclusions presented in this report are based upon visual observations, limited testing and engineering judgement. No other representation, warranty, or guarantee is intended.

We appreciate the opportunity to be of service to you. If you have any questions regarding this report or if we may be of additional service, please do not hesitate to call our office.

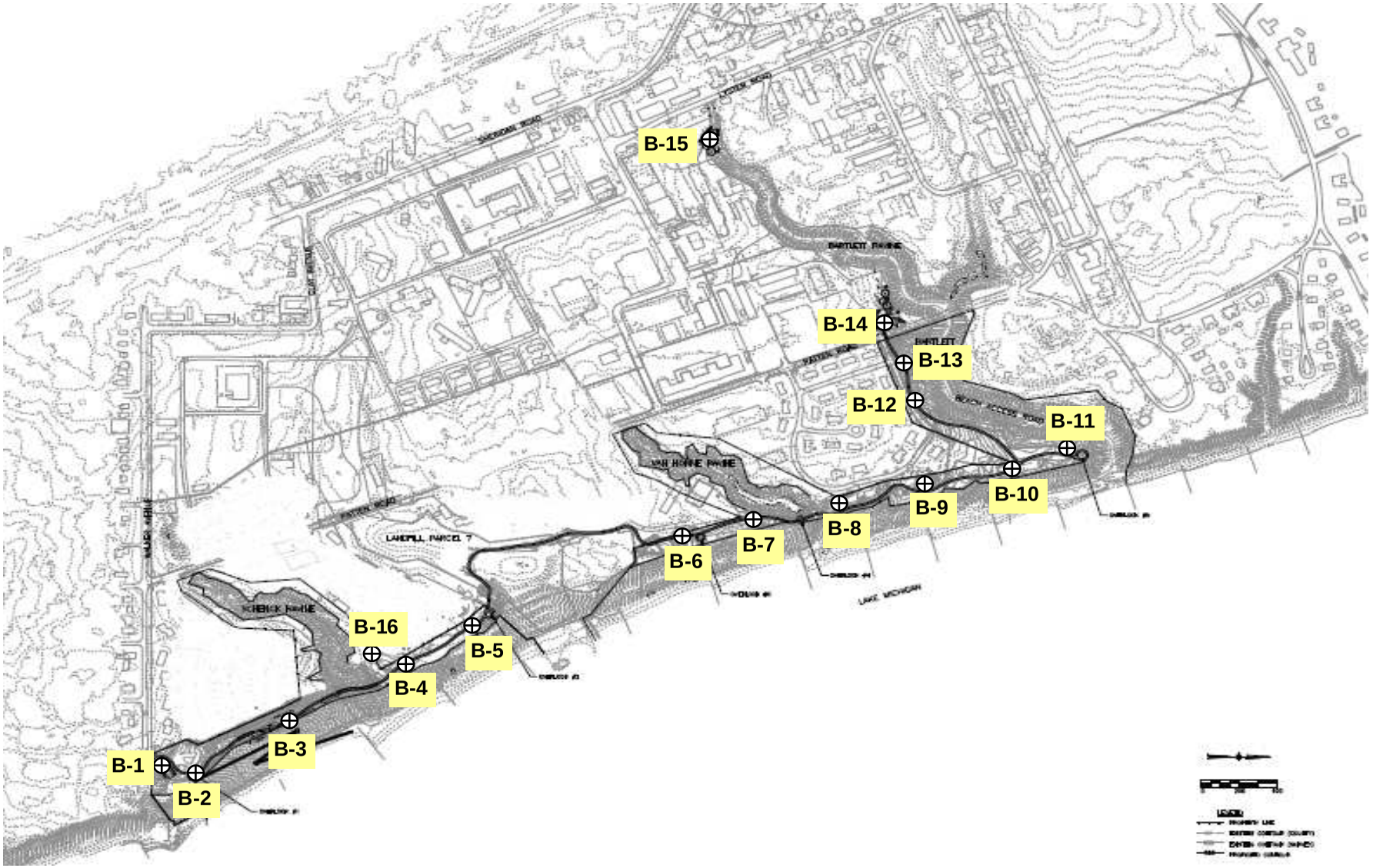
Sincerely,
CHICAGO TESTING LABORATORY, INC.



Tahir Munawar
Geotechnical Engineer

Christopher Chan, P.E.
Senior Geotechnical Engineer

Appendix - A
Site and Boring Location Plan



CHICAGO TESTING LABORATORY, INC.	**SITE AND BORING LOCATION PLAN**	**EXHIBIT:** A	**DRAFTER:** TM	**PROJECT NO.** 10EG204
	Openlands Lakeshore Preserve **Highland park/Fort Sheridan, IL.**	**LEGEND:** ⊕ Approximate Boring Location	**ENGINEER:** CC	**SCALE:** NTS
			REVISION:	**DATE:** 5/6/2010

Appendix - B

Log of Borings

(Borings B-1 through B-16)

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-1

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						2" Black Clayey Topsoil					
							Brown with streaks of grey Silty CLAY, trace gravel					
			SS-1	9	18			21	3.25	48	18	
			SS-2	14	18			16	4.0			
	5		SS-3	20	18			15	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-1

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-2

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						3" Black Clayey Topsoil					
							Brown Silty CLAY, very stiff, trace gravel					
			SS-1	7	16			17	3.0			
			SS-2	14	18		Brown and grey Silty CLAY, trace to little gravel	19	1.5			
	5		SS-3	16	18		Brown Silty Clay LOAM, trace fine gravel, hard	15	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-2

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Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-3

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						3" Dark Brown Silty Clayey Topsoil					
							Brown with streaks of grey Silty CLAY, very stiff to medium stiff, trace fine gravel					
			SS-1	7	18			17	3.25			
			SS-2	5	14			20	0.75			
	5						Grey Silty Clay LOAM, trace gravel, very stiff					
			SS-3	13	18			15	2.5			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-3

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-4

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						2" Black Clayey Topsoil over 6" Brown Silty CLAY, FILL					
			SS-1	9	16		Brown and grey Clay LOAM, very stiff, trace fine gravel	20	2.75	27	14	
			SS-2	14	18		Brown Silty Clay LOAM, trace gravel, hard	15	4.5+			
	5		SS-3	12	18			17	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-4

P:\Elk Grove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-5

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: 4 feet ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						5" Dark Brown to Black Clayey Topsoil (possible FILL)					
							Brown (with streaks of white) Silty CLAY, hard					
			SS-1	15	18			15	4.5+			
			SS-2	10	18		Brown Clayey SILT, damp, very stiff (ATD)	18	2.25			
	5		SS-3	20	18		Brown Silty Clay LOAM, trace fine gravel	16	4.0			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-5

P:\IElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-6

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						Brown Clay LOAM, stiff (possible FILL)					No Topsoil observed
			SS-1	5	16			17	1.25			
			SS-2	9	18		Brown and grey Silty CLAY, trace gravel, very stiff	22	1.25			
	5		SS-3	9	18			12	2.75			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-6

P:\Elk Grove\Geo\200 Series\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-7

Sheet 1 of 1

Date(s) Drilled: April 20, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						Brown to dark brown and black Silty CLAY, stiff, FILL					
			SS-1	9	18		Brown to dark brown Silty Clay LOAM, very stiff	26	1.25			
							Brown with streaks of grey Silty CLAY, trace gravel					
	5		SS-2	13	18			19	3.75			
			SS-3	21	18			15	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-7

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-8

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						9" Dark Brown Silty CLAY mixed with Pea Gravel, FILL					
			SS-1	9	18		Brown Clay LOAM, hard, trace gravel, FILL	16	4.5+			
			SS-2	11	18		Grey to Dark Grey Silty and Sandy CLAY, trace black cinders and brick fragments, hard, FILL	17	4.5+			
	5		SS-3	10	18		Brown with grey Silty CLAY, trace gravel, hard	18	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-8

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-9

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						6" Dark Brown Silty CLAY mixed with Pea Gravel, FILL					
							Brown Silty CLAY, very stiff, trace fine gravel, FILL					
			SS-1	6	18			17	3.5			
							Brown to dark brown with traces of black Silty CLAY, trace fine sand, stiff					
	5		SS-2	7	18			29	1.5			
							Brown and grey Silty Clay LOAM, trace gravel, hard					
			SS-3	20	18			15	4.25			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

P:\IElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Figure B-9

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-10

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						6" Black Silty CLAY Topsoil, FILL					
			SS-1	10	16		Brown to dark brown LOAM, trace gravel, hard, FILL	17	4.5+	28	15	
	5		SS-2	6	18		Brown Silty CLAY, hard, trace gravel	17	4.5+			
			SS-3	12	18			15	4.5+			
	10						Bottom of Boring at 7.5 feet bgs					
	15											
	20											
	25											

P:\Elk Grove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Figure B-10

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-11

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						5" Dark Brown Silty CLAY Topsoil					
							Brown Sandy Clay LOAM, medium stiff to stiff					
			SS-1	4	18			22	0.75			
							Brown Silty CLAY, very stiff to hard, trace fine gravel					
	5		SS-2	7	18			18	3.0			
			SS-3	10	18			16	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-11

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-12

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						6" Black Silty CLAY Topsoil					
							Brown with streaks of grey Silty CLAY, very stiff to hard, trace fine gravel					
			SS-1	8	18			23	2.0			
			SS-2	13	16			15	4.5+			
	5		SS-3	21	18			15	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-12

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-13

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						12" Black Silty CLAY Topsoil, FILL					
			SS-1	11	18		Black SAND, Cinders and GRAVEL, FILL	27				
							Brown with streaks of grey Silty CLAY, very stiff to hard, trace gravel					
	5		SS-2	15	18			17	3.75			
			SS-3	20	18			16	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-13

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-14

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						8" Black Silty CLAY Topsoil, FILL					
							Black Silty CLAY mixed with gravel, FILL					
			SS-1	9	18		Brown Silty CLAY, very stiff, trace sand, trace gravel	20	3.5			
			SS-2	16	18		Brown with streaks of grey Silty CLAY, hard	16	4.5+			
	5		SS-3	20	18			16	4.5+			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-14

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-15

Sheet 1 of 1

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 7.5 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: Not Encountered ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						3-3/4" Asphalt					
							Grey Crushed Stone mixed with some CLAY, FILL					
			SS-1	9	0		Brown Silty CLAY, Stiff, FILL	19				No recovery in sampler, auger sample.
							Grey to dark grey Silty CLAY, very stiff, FILL					
			SS-2	8	18			23	2.0			
	5						Brown and grey Silty CLAY, trace gravel, very stiff	17	2.75			
			SS-3	9	18			22	2.0			
							Bottom of Boring at 7.5 feet bgs					
	10											
	15											
	20											
	25											

Figure B-15

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.lpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-16

Sheet 1 of 2

Date(s) Drilled: April 21, 2010	Logged By: S.E.	Checked By: Tahir Munawar
Drilling Method: Continuous Flight Auger	Drill Bit Size/Type: 3-1/4 inch soil bit	Total Depth of Borehole: 50 feet bgs
Drill Rig Type: CME 45	Drilling Contractor: i. e. xploration, llc	Approximate Surface Elevation:
Groundwater Level and Date Measured: 23.5 feet ATD	Sampling Method(s): SPT	Hammer Data: 140 lb, 30 in drop, auto trip
Borehole Backfill: Cuttings	Location: See Boring Location Plan	

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	0						Brown Silty CLAY, stiff					No Topsoil observed
			SS-1	5	16			22	1.25			
							Brown and Grey Silty CLAY, trace sand, trace fine gravel, very stiff to hard					
	5		SS-2	8	18			15	4.5+			
			SS-3	15	18			16	4.5+			
			SS-4	19	18			15	4.5+			
	10		SS-5	25	18			16	4.5+			
							Grey Silty Clay LOAM, trace gravel, trace shale, very stiff to hard					
			SS-6	14	18			15	3.5			
	15		SS-7	13	18			15	3.0			
			SS-8	15	18			15	3.75	31	14	
	20		SS-9	11	18			15	3.5			
							(ATD)					
			SS-10	15	14			15	3.25			
	25											

Figure B-16

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.lpj]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Log of Boring B-16

Sheet 2 of 2

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
	25						Grey Silty Clay LOAM, trace gravel, trace shale, very stiff to hard (cont.)					
			SS-11	19	14			14	3.5			
			SS-12	18	18			15	2.5			
	30											
			SS-13	20	18			14	4.0			
	35											
			SS-14	15	18			15	3.5			
	40											
			SS-15	18	18			16	2.0			
	45											
			SS-16	25	18			14	4.5+			
	50						Bottom of Boring at 50 feet bgs					

Figure B-16

P:\ElkGrove\Geo (200 Series)\2010 Soils Reports\10EG204 Lakeshore Preserve Project\Boring Logs.bgs [Boring Log - 3 Lab Modified.tpl]

Project: Lake Shore Preserve
Project Location: Highland Park, IL
Project Number: 10EG204

Chicago Testing Laboratory, Inc.

Key to Log of Boring

Sheet 1 of 1

Elevation, feet	Depth, feet	Sample Type	Sample Number	N-Value (blows per foot)	Recovery (inches)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Qp (tsf)	LL, %	PI, %	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9	10	11	12	13

COLUMN DESCRIPTIONS

1. **Elevation, feet:** Elevation (MSL, feet)
2. **Depth, feet:** Depth in feet below the ground surface.
3. **Sample Type:** Type of soil sample collected.
4. **Sample Number:** Sample identification number.
5. **N-Value (blows per foot):** Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the indicated hammer.
6. **Recovery (inches):** Length of representative soil sample recovered in sampler
7. **Graphic Log:** Graphic depiction of material encountered.
8. **MATERIAL DESCRIPTION:** Description of material encountered. May include consistency, moisture, color and other descriptive text.
9. **Water Content, %:** Water content of the soil sample, expressed as percentage of dry weight of sample.
10. **Qp (tsf):** Pocket penetrometer value (tsf)
11. **LL, %:** Liquid Limit, expressed as a water content
12. **PI, %:** Plasticity Index, expressed as a water content
13. **REMARKS AND OTHER TESTS:** Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

bgs: Below Ground Surface
SPT: Standard Penetration Test (in general accordance with ASTM D1586)
LL-PL(PL): Liquid Limit- Plastic Limit (Plasticity Index) (in general accordance with ASTM D 4318)
Color: Color(s) are generally representative of samples in moist condition.
Qp: Relative strength measured with a pocket penetrometer on reasonably intact samples of cohesive materials

RIMAC: Unconfined Compressive Strength estimate as determined by the Rimac spring tester as modified by IDOT (Reference IDOT Geotechnical Manual)
Qu: Unconfined Compressive Strength as determined by AASHTO T 208/ASTM D 2166

TYPICAL MATERIAL GRAPHIC SYMBOLS

- Well graded GRAVEL (GW)
- Well graded GRAVEL with Clay (GW-GC)
- Well graded SAND (SW)
- Well graded SAND with Clay (SW-SC)
- Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)
- Lean-Fat CLAY, CLAY w/SAND, SANDY CLAY (CL-CH)
- SILTY CLAY (CL-ML)
- Clayey SAND to Sandy CLAY (SC-CL)
- Silty to Clayey SAND (SM-SC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- 2-inch-OD unlined split spoon (SPT)
- Shelby Tube (Thin-walled, fixed head)
- Grab Sample

OTHER GRAPHIC SYMBOLS

- Water level (at time of drilling, ATD)
- Water level (after waiting a given time)
- Minor change in material properties within a stratum
- Inferred or gradational contact between strata
- ? Queried contact between strata

GENERAL NOTES

1. Material descriptions were prepared based, in part, upon the USDA Textural Classification Chart. Descriptions are interpretive by nature and therefore somewhat subjective based upon the experience of the personnel making the observations. Descriptions of the same sample may vary slightly from person to person. Field descriptions and samples obtained are reviewed by experienced geotechnical engineers or geologists in the laboratory prior to incorporation into a formal report. Descriptions are also influenced by the results of lab testing. Questions regarding material descriptions are welcomed.
2. Changes in lithology (or layering), as shown on the log are influenced by factors such as texture, relative density, strength, color, plasticity and moisture condition. Other factors may also influence the presentation as well. Changes are often inferred or estimated based upon the judgement of experienced personnel. Changes may be gradual or gradational.
3. The final boring log is representative of a thorough effort to communicate accurately the observations made by the field and lab personnel.
4. Test data and observations apply only to the specific boring location at the time the boring was completed. They may not be representative of subsurface conditions at other locations.

Appendix - C

Reports of Combined Sieve &Hydrometer Analysis

Chicago Testing Laboratory, Inc.
30W114 Butterfield Road, Warrenville, IL 60555 p 630.393.CTL1 f 630.393.CTL7
18000 South Williams Street, Thornton, IL 60476 p 708.877.1801 f 708.877.6326
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LAB REPORT

ID # 1004037 (1&2)
CTL PROJECT # 10EG204

PROJECT NAME Lake Shore Preserve
CLIENT Clauss Brothers, Inc.
LOCATION Highland Park, IL
MATERIAL Soil

Report of Combined Sieve and Hydrometer Analysis

Date: 5/6/2010 Sample Type: Split Spoon
Boring: B-1 Sample #: SS-1 Depth: 1-2.5 ft. bgs
Total Sample Weight (g): 316.3

	Sieve Size:	Cum. Weight Retained	% Retained	% Passing	Total Passing (%)	Diameter (mm)
+ #10 sieve portion	1"	0.00	0.0	100.0	100.0	25.0000
	3/4"	0.00	0.0	100.0	100.0	19.0000
	1/2"	0.00	0.0	100.0	100.0	12.5000
	3/8"	0.00	0.0	100.0	100.0	9.5000
	No. 4	0.30	0.1	99.9	99.9	4.7500
	No. 10	1.50	0.5	99.5	99.5	2.0000
	No. 20	0.40	0.8	99.2	98.7	0.8500
- #10 sieve portion	No. 40	1.00	2.0	98.0	97.5	0.4200
	No. 100	3.70	7.5	92.5	92.0	0.1500
	No. 200	6.00	12.2	87.8	87.4	0.0750

Sample Weight at Start of Hydrometer (g): 49.20
Temperature: 24 °C
Blank Hydrometer Reading: 4.5
Specific Gravity: 2.70 est.

	Elapse Time (min.)	Uncorrected Hydrometer Reading	Corrected Hydrometer Reading	% Passing	Total Passing (%)	Diameter (mm)
Hydrometer Portion	1	46.0	42.5	85.4	85.0	0.0379
	2	45.0	41.5	83.4	83.0	0.0271
	5	42.0	38.5	77.4	77.0	0.0176
	15	38.0	34.5	69.3	69.0	0.0105
	30	35.0	31.5	63.3	63.0	0.0076
	60	32.0	28.5	57.3	57.0	0.0055
	120	29.5	26.0	52.3	52.0	0.0040
	250	26.0	23.0	46.2	46.0	0.0028
	1440	23.0	19.5	39.2	39.0	0.0012

Liquid Limit: 48 **Plastic Limit:** 18 **Plasticity Index:** 30

% Gravel : 1 **% Sand :** 13 **% Silt :** 43 **% Clay :** 43

USDA Textural Soil Classification: **silty clay**

Delivered By: DKS
Date Received: 4/22/10

Tested By: DKS/DP
Date Complete: 5/5/10

Reviewed By: DKS
Date: 5/6/10

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LAB REPORT

ID #	1004037 (1&2)
CTL PROJECT #	10EG204

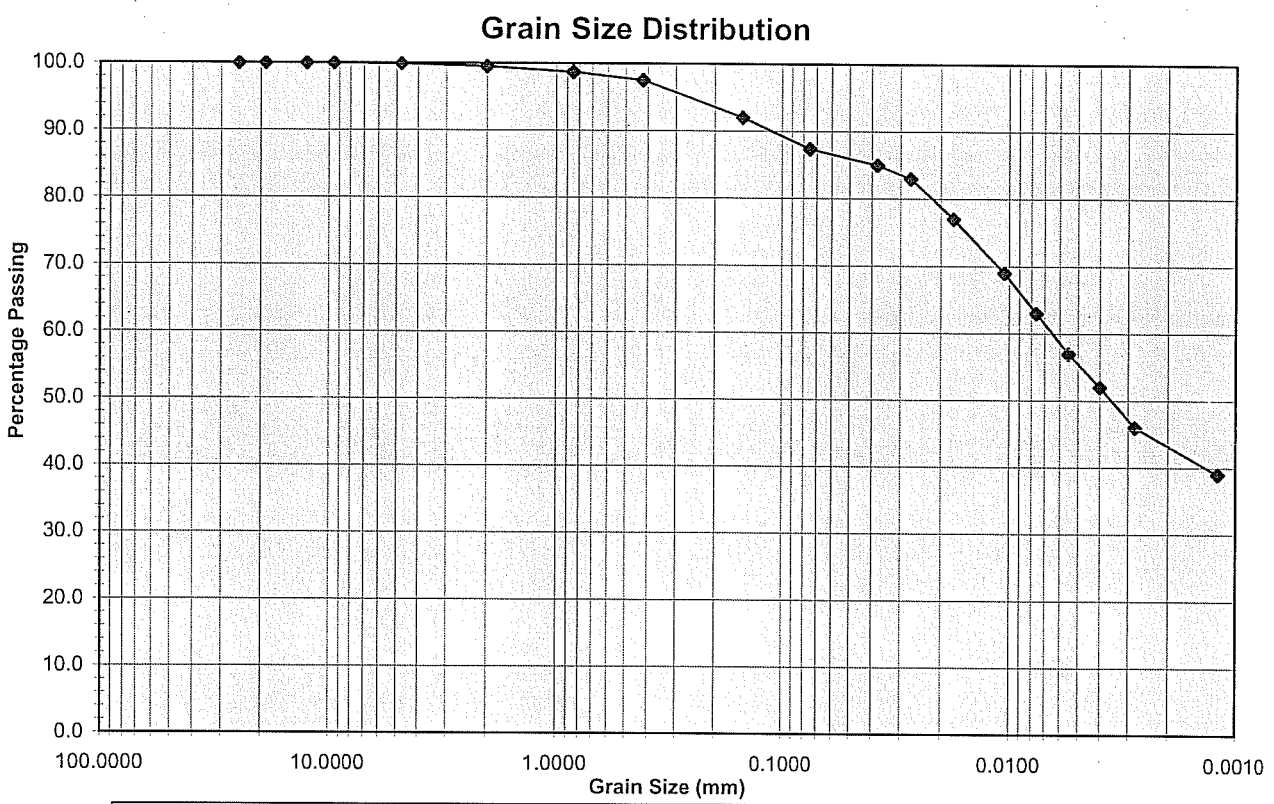
PROJECT NAME Lake Shore Preserve CLIENT Clauss Brothers, Inc.

LOCATION Highland Park, IL MATERIAL Soil

Report of Combined Sieve and Hydrometer Analysis

Date: 5/6/2010 Sample Type: Split Spoon

Boring: B-1 Sample #: SS-1 Depth: 1-2.5 ft. bgs



Gravel	Sand	Silt	Clay

Liquid Limit: 48 **Plastic Limit:** 18 **Plasticity Index:** 30 **Group Index:**

% Gravel : 1 **% Sand :** 13 **% Silt :** 43 **% Clay :** 43

USDA Textural Soil Classification: **silty clay**

Delivered By: DKS Tested By: DKS/DP Reviewed By: DKS

Date Received: 4/22/10 Date Complete: 5/5/10 Date: 5/6/10

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LAB REPORT

ID # 1004037 (13&14)
CTL PROJECT # 10EG204

PROJECT NAME Lake Shore Preserve CLIENT Clauss Brothers, Inc.
LOCATION Highland Park, IL MATERIAL Soil

Report of Combined Sieve and Hydrometer Analysis

Date: 5/6/2010 Sample Type: Split Spoon
Boring: B-4 Sample #: SS-1 Depth: 1-2.5 ft. bgs
Total Sample Weight (g): 320.2

	Sieve Size:	Cum. Weight Retained	% Retained	% Passing	Total Passing (%)	Diameter (mm)
+ #10 sieve portion	1"	0.00	0.0	100.0	100.0	25.0000
	3/4"	0.00	0.0	100.0	100.0	19.0000
	1/2"	5.60	1.7	98.3	98.3	12.5000
	3/8"	5.60	1.7	98.3	98.3	9.5000
	No. 4	12.60	3.9	96.1	96.1	4.7500
	No. 10	19.80	6.2	93.8	93.8	2.0000
	No. 20	1.50	3.0	97.0	91.0	0.8500
- #10 sieve portion	No. 40	3.90	7.7	92.3	86.6	0.4200
	No. 100	13.00	25.7	74.3	69.7	0.1500
	No. 200	17.60	34.8	65.2	61.2	0.0750

Sample Weight at Start of Hydrometer (g): 50.60
Temperature: 24 °C
Blank Hydrometer Reading: 4.5
Specific Gravity: 2.70 est.

	Elapse Time (min.)	Uncorrected Hydrometer Reading	Corrected Hydrometer Reading	% Passing	Total Passing (%)	Diameter (mm)
Hydrometer Portion	1	34.5	31.0	60.6	56.8	0.0418
	2	32.0	28.5	55.7	52.3	0.0301
	5	29.5	26.0	50.8	47.7	0.0194
	15	25.5	22.0	43.0	40.3	0.0115
	30	23.0	19.5	38.1	35.8	0.0083
	60	20.0	16.5	32.2	30.3	0.0060
	120	18.0	14.5	28.3	26.6	0.0043
	250	16.0	12.5	24.4	22.9	0.0030
	1440	14.0	10.5	20.5	19.3	0.0013

Liquid Limit: 27 **Plastic Limit:** 14 **Plasticity Index:** 13

% Gravel : 6 **% Sand :** 36 **% Silt :** 37 **% Clay :** 21

USDA Textural Soil Classification: **clay loam**

Delivered By: DKS
Date Received: 4/22/10
Tested By: DKS/DP
Date Complete: 5/5/10
Reviewed By: DKS
Date: 5/6/10

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LAB REPORT

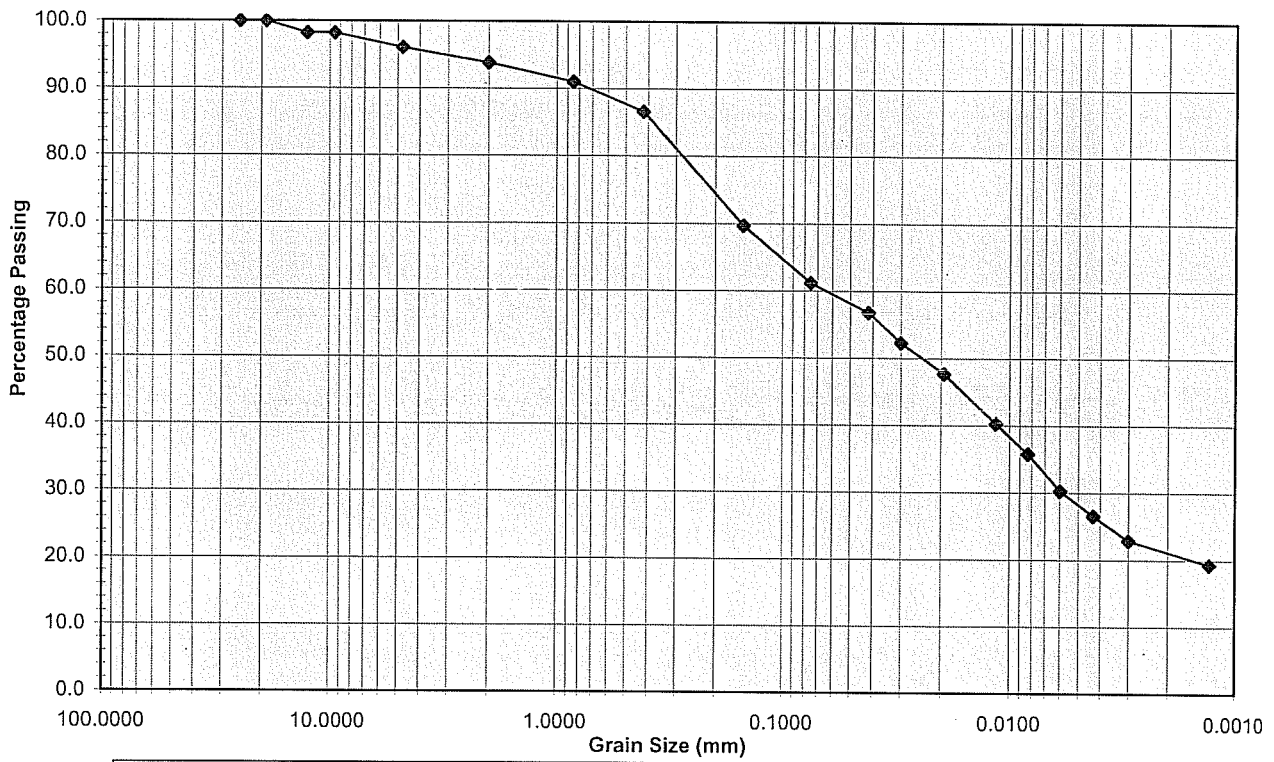
ID #	1004037 (13&14)
CTL PROJECT #	10EG204

PROJECT NAME Lake Shore Preserve CLIENT Clauss Brothers, Inc.
LOCATION Highland Park, IL MATERIAL Soil

Report of Combined Sieve and Hydrometer Analysis

Date: 5/6/2010 Sample Type: Split Spoon
Boring: B-4 Sample #: SS-1 Depth: 1-2.5 ft. bgs

Grain Size Distribution



Gravel	Sand	Silt	Clay

Liquid Limit: 27 **Plastic Limit:** 14 **Plasticity Index:** 13 **Group Index:**

% Gravel : 6 **% Sand :** 36 **% Silt :** 37 **% Clay :** 21

USDA Textural Soil Classification: **clay loam**

Delivered By: DKS
Date Received: 4/22/10

Tested By: DKS/DP
Date Complete: 5/5/10

Reviewed By: DKS
Date: 5/6/10

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LAB REPORT

ID # 1004037 (37&38)
CTL PROJECT # 10EG204

PROJECT NAME Lake Shore Preserve
CLIENT Clauss Brothers, Inc.
LOCATION Highland Park, IL
MATERIAL Soil

Report of Combined Sieve and Hydrometer Analysis

Date: 5/6/2010 Sample Type: Split Spoon
Boring: B-10 Sample #: SS-1 Depth: 1-2.5 ft. bgs
Total Sample Weight (g): 295.1

	Sieve Size:	Cum. Weight Retained	% Retained	% Passing	Total Passing (%)	Diameter (mm)
+ #10 sieve portion	1"	0.00	0.0	100.0	100.0	25.0000
	3/4"	10.20	3.5	96.5	96.5	19.0000
	1/2"	19.50	6.6	93.4	93.4	12.5000
	3/8"	23.70	8.0	92.0	92.0	9.5000
	No. 4	34.20	11.6	88.4	88.4	4.7500
	No. 10	45.60	15.5	84.5	84.5	2.0000
	No. 20	3.30	6.5	93.5	79.0	0.8500
- #10 sieve portion	No. 40	6.50	12.9	87.1	73.6	0.4200
	No. 100	12.20	24.2	75.8	64.1	0.1500
	No. 200	17.90	35.5	64.5	54.5	0.0750

Sample Weight at Start of Hydrometer (g): 50.40
Temperature: 24 °C
Blank Hydrometer Reading: 4.5
Specific Gravity: 2.70 est.

	Elapse Time (min.)	Uncorrected Hydrometer Reading	Corrected Hydrometer Reading	% Passing	Total Passing (%)	Diameter (mm)
Hydrometer Portion	1	32.0	28.5	55.9	47.3	0.0426
	2	31.5	28.0	54.9	46.4	0.0302
	5	27.0	23.5	46.1	39.0	0.0198
	15	24.0	20.5	40.2	34.0	0.0116
	30	21.0	17.5	34.3	29.0	0.0084
	60	18.0	14.5	28.5	24.1	0.0060
	120	16.0	12.5	24.5	20.7	0.0043
	250	13.5	10.0	19.6	16.6	0.0030
	1440	11.5	8.0	15.7	13.3	0.0013

Liquid Limit: 28 **Plastic Limit:** 15 **Plasticity Index:** 13

% Gravel : 15 **% Sand :** 37 **% Silt :** 33 **% Clay :** 15

USDA Textural Soil Classification: **loam**

Delivered By: DKS
Date Received: 4/22/10
Tested By: DKS/DP
Date Complete: 5/5/10
Reviewed By: DKS
Date: 5/6/10

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LAB REPORT

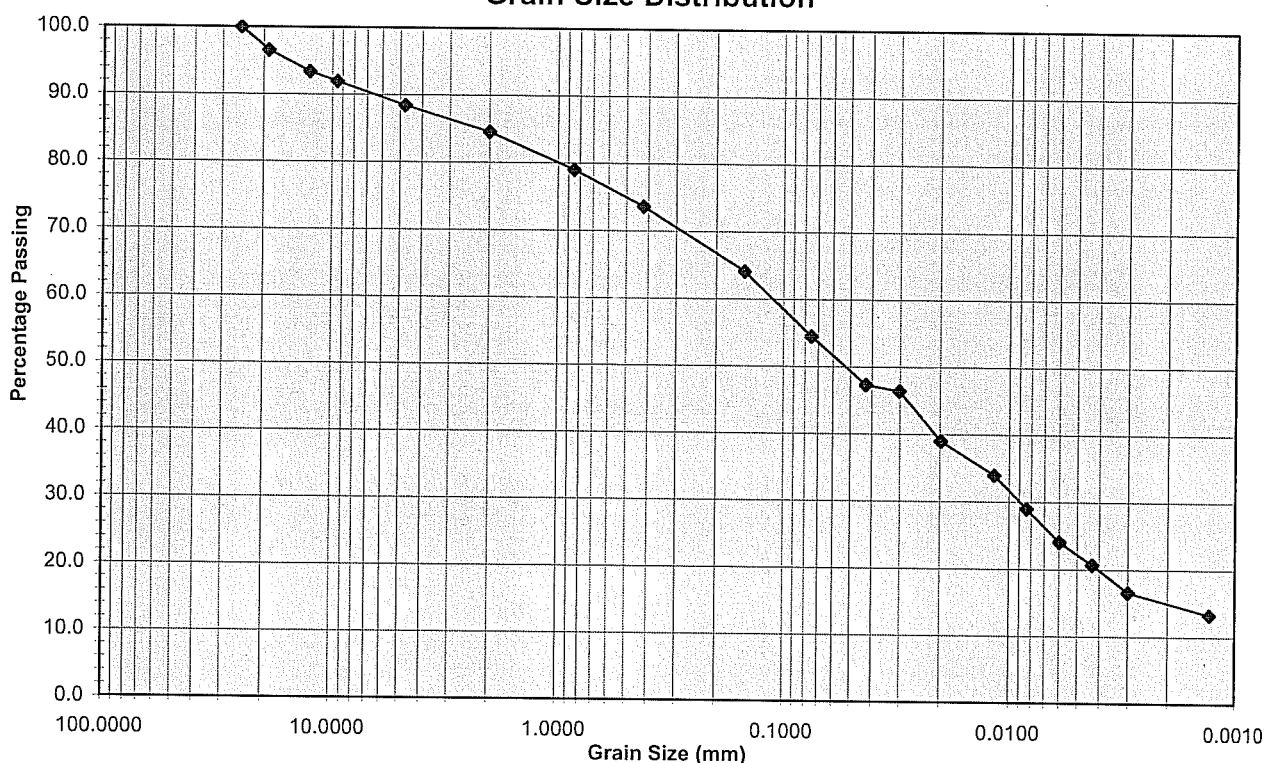
ID #	1004037 (37&38)
CTL PROJECT #	10EG204

PROJECT NAME Lake Shore Preserve
LOCATION Highland Park, IL
CLIENT Clauss Brothers, Inc.
MATERIAL Soil

Report of Combined Sieve and Hydrometer Analysis

Date: 5/6/2010 Sample Type: Split Spoon
Boring: B-10 Sample #: SS-1 Depth: 1-2.5 ft. bgs

Grain Size Distribution



Gravel	Sand	Silt	Clay

Liquid Limit: 28 **Plastic Limit:** 15 **Plasticity Index:** 13 **Group Index:**

% Gravel : 15 **% Sand :** 37 **% Silt :** 33 **% Clay :** 15

USDA Textural Soil Classification: **loam**

Delivered By: DKS
Date Received: 4/22/10
Tested By: DKS/DP
Date Complete: 5/5/10
Reviewed By: DKS
Date: 5/6/10

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LAB REPORT

ID # 1004037 (69)
CTL PROJECT # 10EG204

PROJECT NAME Lake Shore Preserve
CLIENT Clauss Brothers, Inc.
LOCATION Highland Park, IL
MATERIAL Soil

Report of Combined Sieve and Hydrometer Analysis

Date: 5/6/2010 Sample Type: Split Spoon
Boring: B-16 Sample #: SS-8 Depth: 18.5-20 ft. bgs
Total Sample Weight (g): 180.1

	Sieve Size:	Cum. Weight Retained	% Retained	% Passing	Total Passing (%)	Diameter (mm)
+ #10 sieve portion	1"	0.00	0.0	100.0	100.0	25.0000
	3/4"	0.00	0.0	100.0	100.0	19.0000
	1/2"	0.00	0.0	100.0	100.0	12.5000
	3/8"	0.00	0.0	100.0	100.0	9.5000
	No. 4	1.20	0.7	99.3	99.3	4.7500
	No. 10	4.10	2.3	97.7	97.7	2.0000
	No. 20	0.70	1.4	98.6	96.4	0.8500
- #10 sieve portion	No. 40	1.20	2.4	97.6	95.4	0.4200
	No. 100	2.70	5.4	94.6	92.5	0.1500
	No. 200	5.10	10.2	89.8	87.8	0.0750

Sample Weight at Start of Hydrometer (g): 50.10
Temperature: 24 °C
Blank Hydrometer Reading: 4.5
Specific Gravity: 2.70 est.

	Elapse Time (min.)	Uncorrected Hydrometer Reading	Corrected Hydrometer Reading	% Passing	Total Passing (%)	Diameter (mm)
Hydrometer Portion	1	47.0	43.5	85.9	83.9	0.0376
	2	44.0	40.5	79.9	78.1	0.0273
	5	33.0	35.5	70.1	68.5	0.0180
	15	34.0	30.5	60.2	58.8	0.0108
	30	30.5	27.0	53.3	52.1	0.0079
	60	27.5	24.0	47.4	46.3	0.0057
	120	24.0	20.5	40.5	39.5	0.0041
	250	22.0	18.5	36.5	35.7	0.0029
	1440	18.5	15.0	29.6	28.9	0.0012

Liquid Limit: 31 **Plastic Limit: 14** **Plasticity Index: 17**

% Gravel : 2 **% Sand : 12** **% Silt : 53** **% Clay : 33**

USDA Textural Soil Classification: **silty clay loam**

Delivered By: DKS
Date Received: 4/22/10
Tested By: DKS/DP
Date Complete: 5/5/10
Reviewed By: DKS
Date: 5/6/10

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LAB REPORT

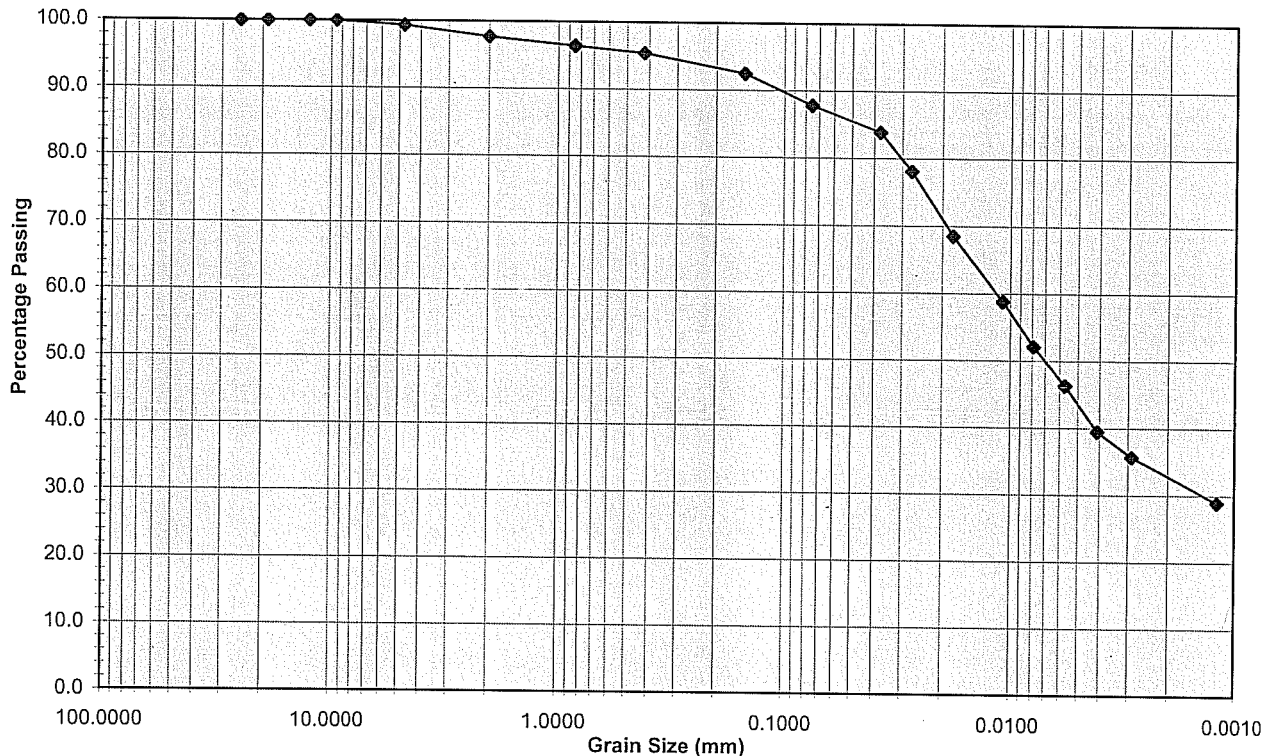
ID #	1004037 (69)
CTL PROJECT #	10EG204

PROJECT NAME Lake Shore Preserve
CLIENT Clauss Brothers, Inc.
LOCATION Highland Park, IL
MATERIAL Soil

Report of Combined Sieve and Hydrometer Analysis

Date: 5/6/2010 Sample Type: Split Spoon
Boring: B-16 Sample #: SS-8 Depth: 18.5-20 ft. bgs

Grain Size Distribution



Gravel	Sand	Silt	Clay

Liquid Limit: 31 **Plastic Limit:** 14 **Plasticity Index:** 17 **Group Index:**

% Gravel : 2 **% Sand :** 12 **% Silt :** 53 **% Clay :** 33

USDA Textural Soil Classification: **silty clay loam**

Delivered By: DKS
Date Received: 4/22/10

Tested By: DKS/DP
Date Complete: 5/5/10

Reviewed By: DKS
Date: 5/6/10

APPENDIX D – GEOTECHNICAL ANALYSIS

Attachment 5: Rosewood Park SMC Geotechnical Engineering Report

SOIL AND MATERIAL CONSULTANTS, INC.

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May 6, 2010
File No 19918

Mr. Rick Stumpf
Park District of Highland Park
636 Ridge Road
Highland Park, IL 60035

Re: Geotechnical Investigation
Rosewood Beach
Highland Park, Illinois

Dear Mr. Stumpf:

The following is our report of findings for the geotechnical investigation completed along portions of the existing paths, the top of the bluff near the new beach house and north parking lot at Rosewood Beach located in the City of Highland Park, Illinois

The investigation was requested to determine current subsurface soil and water conditions at select boring locations. The findings of the field investigation and the results of laboratory testing are intended to assist in the planning, design and construction of proposed site improvements.

PROPOSED IMPROVEMENTS

We understand that it is proposed to construct a 1-story beach house supported on a shallow depth foundation. The interior is expected to have the floor slabs supported on prepared subgrade soils. Additional improvements are expected to include new bike paths, pavement areas, sidewalks and related underground improvements.

SCOPE OF THE INVESTIGATION

The field investigation included obtaining 10 borings at the approximate locations requested and as indicated on the enclosed sketch. The boring locations were established using field taping methods. The surface elevations were determined using data presented on the topographic survey.

We auger drilled 8 borings to depths of 5.0 feet to 50.0 feet below existing surface elevations. Soil samples were obtained using a split barrel sampler advanced utilizing an automatic SPT hammer. Borings 8 and 9 were completed by hand auger methods due to limited equipment access. Soil profiles were determined in the field and soil samples returned to our laboratory for additional testing including determination of moisture content. Cohesive soils obtained by split barrel sampling were tested further to determine dry unit weight and unconfined compressive strength. The results of all field determinations and laboratory testing are included in summary with this report.

RESULTS OF THE INVESTIGATION

Enclosed are boring logs indicating the soil conditions encountered at each location. The site surface conditions include bituminous concrete pavement, crushed gravel, vegetation, topsoil and fill soil conditions. The topsoil is classified as a dark brown silt/sand/clay mixture with traces of roots present.

The fill soil conditions were encountered at borings 3, 4, 6, 7, 8 and 10. The composition of the fill includes the presence of silt/clay, clay/silt, silt/sand/limestone/asphalt, sand/gravel/cinders and sand/gravel mixtures extending to depths of 1.5 feet to 3.5 feet at these boring locations. The limits of fill placement were not determined within the scope of this investigation.

The underlying soil conditions include the presence of non-cohesive soils. These include very loose to medium dense silt/clay, sand and sand/gravel mixtures. The non-cohesive granular soils are often in a damp to very damp. Cobbles and boulders may be present within the site soils at any elevation, although none were encountered while drilling.

Cohesive soils were also encountered as indicated on the logs. These are classified as stiff to very hard clay/silt mixtures with lesser portions of sand and gravel. The upper portions of these soils are sometimes high in moisture content with values in excess of 20.0 % determined.

Low-strength soil conditions were indicated at borings 1 and 3. These conditions are likely present in other areas of the site but were not discovered within the scope of this investigation.

The following table summarizes depth ranges below existing grade, the magnitude of soil strength within these ranges and other information:

Boring	Surface Elevation (feet)	Depth Range Below Existing Surface (feet)	Soil Strength (lbs./sq.ft.)	Recorded Water Levels, W.D./A.D. (feet)
1	588.0	0.0 to 4.5	*500	10.0/10.0
		4.5 to 10.5	3,000	
		10.5 to 12.0	4,000	
2	631.5	1.0 to 3.5	2,000	22.0/28.0
		3.5 to 5.5	4,000	
		5.5 to 16.0	6,000	
		16.0 to 29.0	4,000	
		29.0 to 32.5	3,000	
		32.5 to 47.0	4,000	

* Not recommended for support of foundations. Deeper foundation depths will be needed to reduce the magnitude of long-term total and differential settlement.

SUBSURFACE WATER

The boring logs and the above table indicate the depth at which subsurface water was encountered in the bore holes at the time of the drilling operations and during the period of these readings. It is expected that fluctuations from the water levels recorded will occur over a period of time due to variations in rainfall, temperature, subsurface soil conditions, soil permeability and other factors not evident at the time of the water level measurements.

FOUNDATIONS – BEACH HOUSE

Based on the results of this investigation it is our opinion that continuous and isolated footing foundations may be considered for support of building loads. Weak soil conditions should be anticipated at design foundation elevations requiring extending the foundation to a deeper elevation (approximate elevation 583.5 feet). These foundations can be supported on undisturbed natural soils located below all topsoil, low strength soils and other unsuitable conditions which may be encountered. Soil strength values and the depths at which they are expected to be encountered at these boring locations are indicated in the above table. An allowable bearing value of 2,000 lbs./sq.ft. is available for foundation design. Increased bearing values may be available at some locations and elevations.

All exterior building foundations should extend at least 42.0 inches below exposed surface elevations to provide adequate protection against uplift due to freezing of the supporting soils. Foundations for unprotected improvements should extend at least 48.0 inches below exposed surface elevations. We recommend providing adequate reinforcing steel in foundation walls and piers to minimize the effects of long-term differential settlement.

The proposed floor slab for the new beach house planned for support on the existing soil conditions should be expected to undergo some degree of long-term settlement as the soils consolidate under loading and as they shrink due to desiccation. We would recommend that the subgrade preparation for the floor slab include the removal of any unsuitable surface conditions including vegetation, topsoil, unsuitable fill soils, significant debris, weak or unstable soils, and other deleterious conditions which may be encountered. The above grade areas should then be cut to the design subgrade elevation for the floor slab subbase. The exposed subgrade soils should then be leveled and compacted to a minimum of 95% compaction based on the modified Proctor test, ASTM D-1557. We would recommend that there be a minimum of 5.0 inches of a crushed granular subbase placed for the floor slab.

NEW BIKE PATHS & PAVEMENT AREAS

Normal subgrade preparation is anticipated for the new paths and pavement areas. The procedure should include the removal of any unsuitable surface conditions including vegetation, topsoil, unsuitable fill soils, significant debris, weak or unstable soils, and other deleterious conditions which may be encountered. Above grade areas should be cut to design subgrade elevations. Exposed subgrade soils should be leveled, compacted and proof-rolled in the presence of the Soil Engineer.

Proof-rolling may reveal areas of unstable soil conditions Discing and aeration of high moisture content soils can be effective to depths of up to 1.0 foot, depending upon the equipment utilized. Removal of unstable soils may be necessary if high moisture content conditions extend to depths greater than the effective depth of discing.

Soft or unstable soil conditions in pavement areas can often be bridged by use of an effective depth of crushed granular material. The placement of the crushed granular bridging material, possibly in conjunction with the use of an appropriate geotextile fabric, should only proceed after review of the proof-roll conditions by the Soil Engineer. Long-term settlement of pavement surfaces may occur locally as the bridged soils desiccate.

Structural fill can be placed on soils prepared to the satisfaction of the Soil Engineer. The fill should be placed in lifts not to exceed 8.0 inches when uncompacted. Each lift should exceed minimum compaction requirements prior to placement of the next lift. We recommend a minimum of 90% compaction should be achieved beneath exterior improvements such as pavements and sidewalks. Compaction requirements also apply to backfill placement within trench excavations located below subgrade supported improvements.

The following pavement sections can be considered by the design firm when the subgrade soils have been prepared in accordance with our subgrade soil preparation procedures:

Pavement Type	Bituminous Concrete Surface N/50 Mix C	Bituminous Concrete Binder N/50	Aggregate Base
Parking Lot & Drives	2.0 in.	2.25 in.	10.0 in.
Bike Paths	1.5 in.		6.0 in.

Final pavement design should address traffic load requirements and meet or exceed minimum pavement material thicknesses required by the local building code.

DEWATERING

Excavations may require dewatering due to subsurface water seepage and/or surface precipitation. This water can be removed by standard sump and pump operations. Soils exposed at foundation, slab or undercut elevations should not be permitted to become saturated Loss of bearing strength and stability may occur thus requiring additional soil excavation.

Aggressive dewatering efforts may be necessary for deep excavations extending to sand and sand/gravel soils. Well-points or deep sumps can be utilized to collect the water for pumping in an effort to lower the water level below the bottom elevation of proposed excavations. The dewatering should be accomplished prior to soil excavation when possible

Organic soils, non-cohesive soils and others can be unstable when saturated. These soils tend to cave or run when submerged or disturbed The stability of exposed embankments is minimal to non-existent as confining soil pressures are removed. Proper drainage within excavations is necessary at all times, particularly when excavations extend below anticipated water levels and below saturated soils

FILL SOURCES

The onsite non-organic soils are generally suitable for reuse as fill. Offsite sources may also be used provided they are approved in advance by the Soil Engineer Aeration may be necessary to reduce soil moisture content prior to compaction. Soil borrowed from near the surface where seasonal fluctuations in soil moisture content occur may require particular attention. The moisture content of fill soils should be within approximately 3.0% of optimum moisture content as determined by the modified Proctor test for the soils to meet or exceed minimum compaction requirements.

DESIGN

Where applicable, the following values can be utilized for design of the proposed improvements in the area of borings 1 and 2:

Boring	Surface Elevation (feet)	Depth Below Existing Surface (feet)	Cohesion (psf)	Φ (deg)	Soil Unit Weight (Wet) (pcf)	Earth Pressure Coefficients	
						K_a	K_p
1	588.0	0.0 – 4.5	0	32	90	.39	2.56
		4.5 – 6.5	1,000	28	132	.36	2.76
		6.5 – 10.5	0	34	130	.28	3.53
		10.5 – 15.0	2,000	28	146	.36	2.76
2	631.5	0.5 – 3.5	500	26	120	.39	2.56
		3.5 – 5.5	2,000	28	133	.36	2.76
		5.5 – 18.0	3,000	28	137	.36	2.76
		18.0 – 29.5	0	34	130	.28	3.53
		29.5 – 33.0	1,000	28	143	.36	2.76
		33.0 – 50.0	2,000	28	140	.36	2.76

Note: The coefficient of friction for concrete against the soils would be 0.33. The Phi values given for the cohesive soils are for the long term conditions, they should be assumed to be zero for the short term, undrained condition.

Passive pressure values are not available for the design within 4.0 feet of the exposed surfaces due to the seasonal considerations.

CONCLUSION

The information within this report is intended to provide initial information concerning subsurface soil and water conditions on the site. Variations in subsurface conditions are expected to be present between boring locations due to naturally changing and filled soil conditions.

Our understanding of the proposed improvements is based on limited information available to us at the writing of this report. The findings of the investigation and the recommendations presented are not considered applicable to significant changes in the scope of the improvements or applicable to alternate site uses. We recommend that proposed foundation, pavement and grading plans be reviewed by our office to determine if additional considerations are necessary to address anticipated subsurface conditions.

The soils exposed in soil undercut areas should be evaluated for suitability prior to placement of structural fill, as previously indicated in this report. Soils and aggregates placed as structural fill should be tested as the work progresses to verify that minimum compaction requirements have been met. We recommend that soil conditions encountered at foundation elevations be tested to verify the presence of design soil strength prior to concrete placement.

If you have any questions concerning the findings or recommendations presented in this report, please let me know.

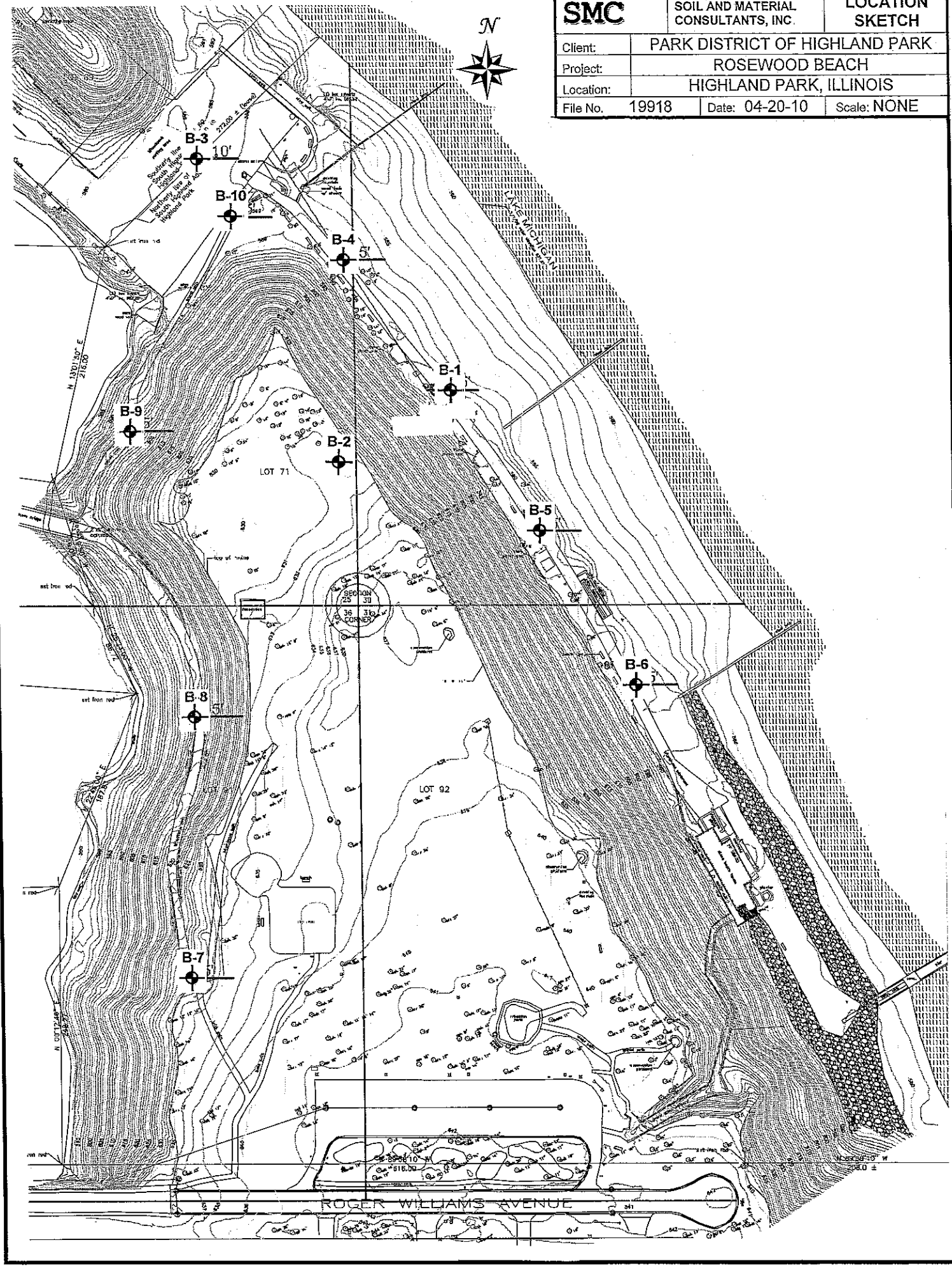
Very truly yours,

SOIL AND MATERIAL CONSULTANTS, INC

Joseph A. Klawitter, P.E.
Project Engineer

JAK:ek
Enc.

SMC	SOIL AND MATERIAL CONSULTANTS, INC.	LOCATION SKETCH
Client:	PARK DISTRICT OF HIGHLAND PARK	
Project:	ROSEWOOD BEACH	
Location:	HIGHLAND PARK, ILLINOIS	
File No. 19918	Date: 04-20-10	Scale: NONE



SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 1

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park **File No.** 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

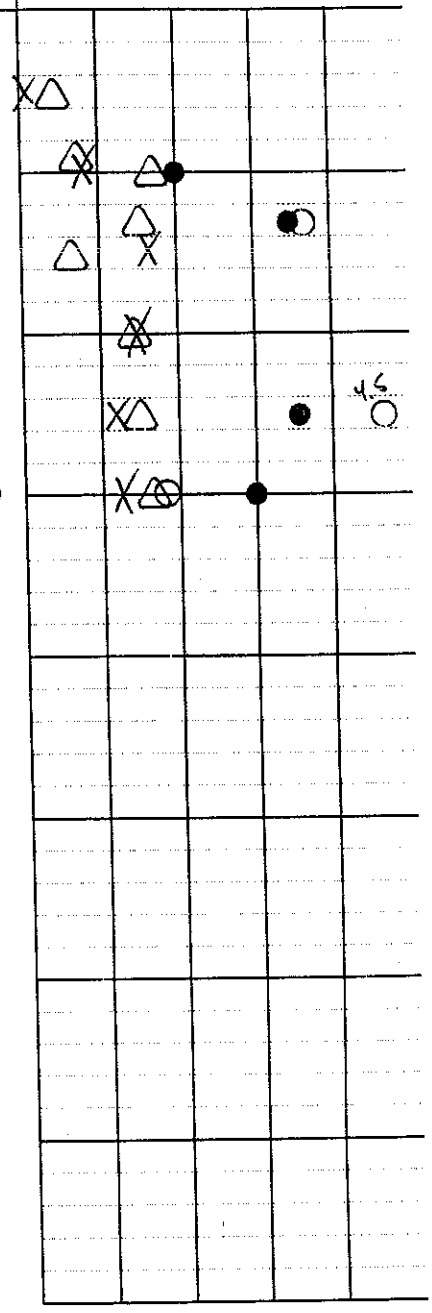
Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

Elevation 588.0' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
	Brown fine sand, trace roots, damp, very loose	1	3.6		
			8.2		
5	Brown clay, some silt, trace sand & gravel, damp, very tough	7	15.9		
			14.9	115.6	3.6
	Brown fine sand, damp-very damp, saturated, medium dense	16	6.5		
10	▽	15	14.4		
	Gray clay, some silt, trace sand & gravel, damp, hard to tough	12	14.7	128.4	4.5
15		13	16.1	124.8	1.9
	End of Boring				
20					
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40



Water encountered at 10.0 feet during drilling operations (W D)
Water recorded at 10.0 feet on completion of drilling operations (A D)
Water recorded at feet hours after completion of drilling operations (A D)

G-303

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Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 2

Logged By: DA **Page:** 1 of 2

Client: Park District of Highland Park **File No.** 19918 **Date Drilled:** 4/19/10

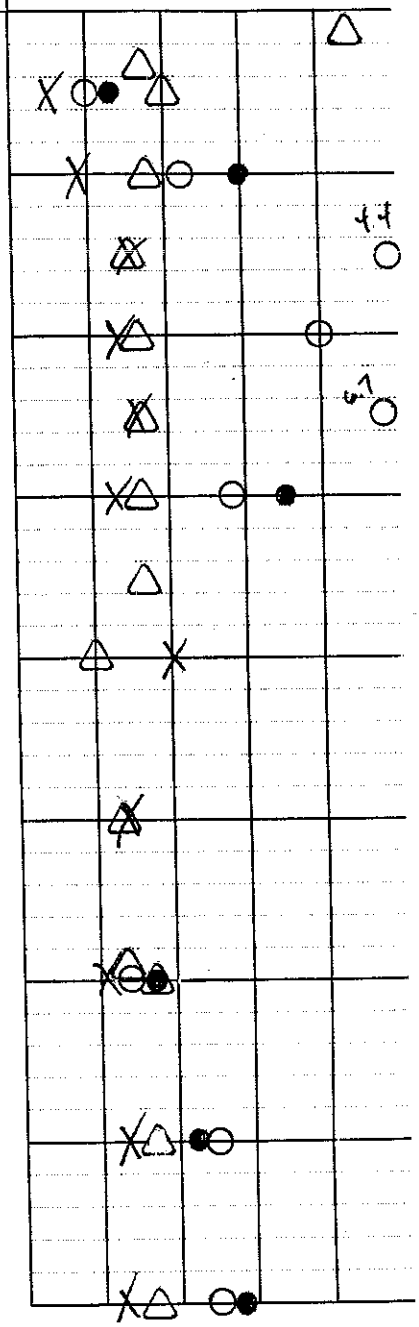
Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 631.5' Existing Surface	standard penetration ×	moisture content Δ	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	(a) see page 2 of 2 (b) see page 2 of 2		42.7 17.7		
	Brown clay & silt,trace sand & gravel, damp-very damp,tough	5	20.2	103.9	1.0
5	Brown-gray clay,some silt,trace sand & gravel,damp,very tough	9	19.3	111.1	2.2
	Brown clay,some silt,trace sand & gravel, damp,hard	15	15.4	118.6	4.4
10		14	16.4	119.1	4.0
		16	15.9	119.9	6.7
15	Brown-gray clay,some silt,trace sand & gravel,damp,very tough	14	16.2	119.4	2.9
	Gray clay,some silt,trace sand & gravel, damp		17.3		
20	Gray fine sand,trace medium-coarse sand & silt,damp,medium dense	21	10.1		
	Gray fine sand,trace medium-coarse sand & gravel,very damp-saturated,medium dense				
25		15	12.8		
	Gray fine-medium sand,some coarse sand & gravel,very damp-saturated,medium dense				
30		11	14.4 17.5	121.3	1.4
	Gray clay,some silt,trace sand & gravel, damp,tough to very tough				
35		14	17.6	120.6	2.5
40		13	16.7	119.4	2.5

○ unconfined compressive strength, tons/sq.ft.
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0
× standard penetration "N", blows/ft
Δ moisture content, %
10 20 30 40



Water encountered at 22.0 feet during drilling operations (W D)
Water recorded at 28.0 feet on completion of drilling operations (A D)
Water recorded at feet hours after completion of drilling operations (A D)

SOIL AND MATERIAL CONSULTANTS, INC.

Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 2

Logged By: DA **Page:** 2 of 2

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/19/10

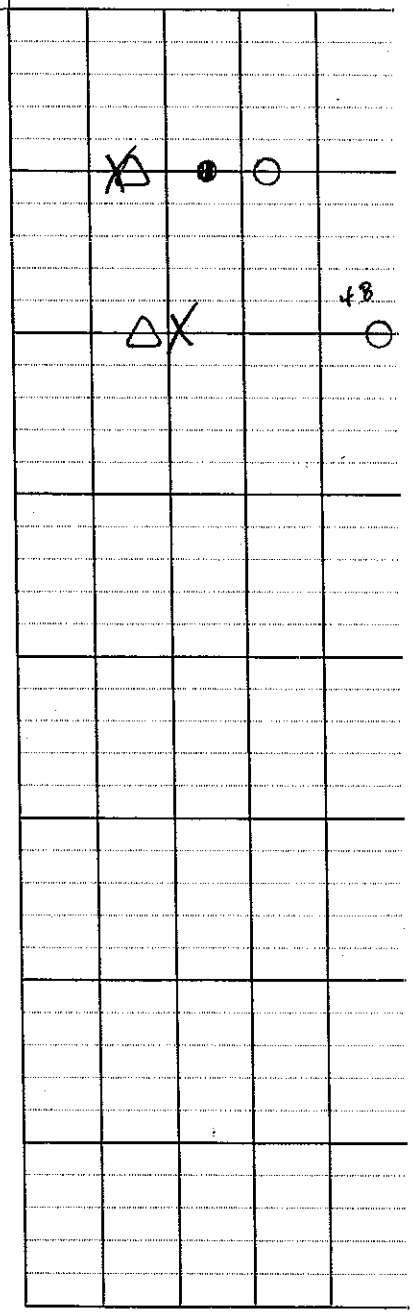
Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation	standard penetration ×	moisture content △	dry unit weight, lbs./cu.ft. ɣ	unconfined comp. strength ○
45	Gray clay,some silt,trace sand & gravel, damp,very tough to hard	14	15.4	119.1	3.3
50	End of Boring	22	16.1	123.3	4.8
55	(a) Dark brown silt,some fine sand, trace clay & roots,damp (topsoil) - 6.0" (b) Brown silt,some clay,trace sand, damp-very damp,loose				
60					
65					
70					
75					
80					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0
× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40



Water encountered at 22.0 feet during drilling operations (W D).
Water recorded at 28.0 feet on completion of drilling operations (A D)
Water recorded at feet hours after completion of drilling operations (A D)

SOIL AND MATERIAL CONSULTANTS, INC.

Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 3

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

Elevation 589.8' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	Bituminous concrete - 5.0"				
	Limestone - 7.0"				
1	Black-dark gray silt,some clay,trace sand & gravel,damp,medium dense - Fill		12.8		
2	Gray fine sand,trace gravel,damp,medium dense	13	5.6		
3					
4			6.1		
	Gray silt,some fine sand,damp-very damp, very loose				
5		3	19.9		
	Gray fine sand,trace medium-coarse sand & silt,damp				
6			9.5		
	Gray silt,some clay,trace sand,damp-very damp,very loose				
7			24.3		
	Gray clay & silt,trace sand,very damp, stiff ▼	2	23.5	107.3	0.7
8	▽				
	Gray silt,some clay,trace fine sand & organic matter,very damp,very loose				
9					
10		1	40.9		

End of Boring

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at 8.5 feet during drilling operations (W D)
Water recorded at 7.5 feet on completion of drilling operations (A D)
Water recorded at feet hours after completion of drilling operations (A D)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 4

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 588.4' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
	Bituminous concrete - 7.0" Dark brown-black sand & gravel,damp - 2.5"				
1	Brown-dark brown clay & silt,some sand, trace gravel,damp,medium dense - Fill		6.9		
2	Brown clay,some silt,trace sand & gravel, damp,very hard	14	12.2	124.6	8.3
3	Brown fine sand,damp,medium dense				
4					
5	End of Boring	10	4.7		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 5

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

Elevation 590.0' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration (×)	moisture content (△)	dry unit weight lbs./cu.ft. (ɣ)	unconfined compressive strength (○)
	Bituminous concrete - 4.5"				
	Dark brown-black silt & gravel,damp - 3.5"				
1	Brown clay & silt,trace sand,damp				
	Brown fine sand,damp,medium dense		10.8		
2		10	3.3		
3					
4	Brown fine sand,damp,loose				
5	End of Boring	9	4.4		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 6

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park **File No.** 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

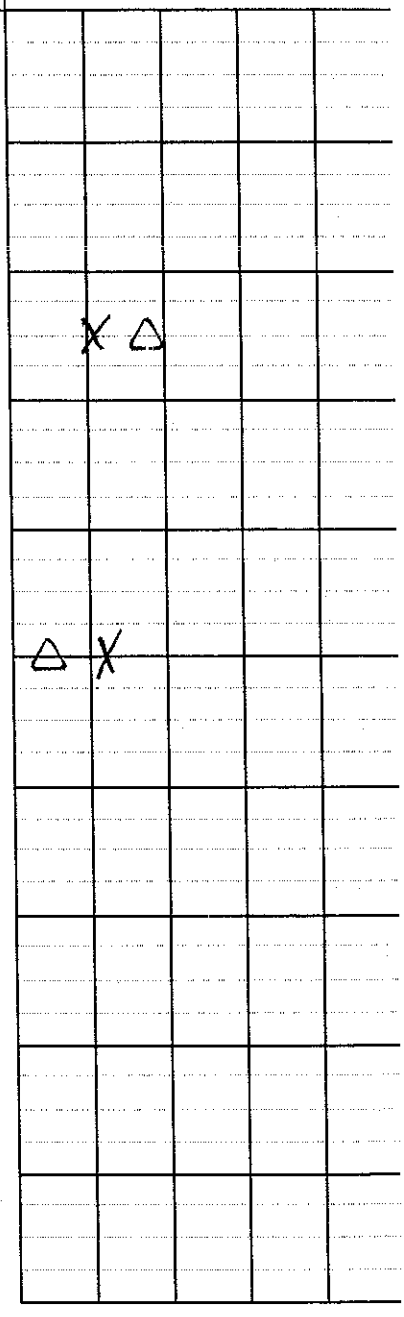
Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 589.2' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ⊗	unconfined compressive strength ○
1	Bituminous concrete - 4.5" Limestone,damp - 7.5"				
2	Brown-dark brown-black clay & silt,some sand & gravel,damp,medium dense - Fill	11	19.4		
3					
4	Brown fine sand,damp,medium dense				
5	End of Boring	13	4.3		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq.ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 7

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/19/10

Reference: Rosewood Beach
Highland Park, IL

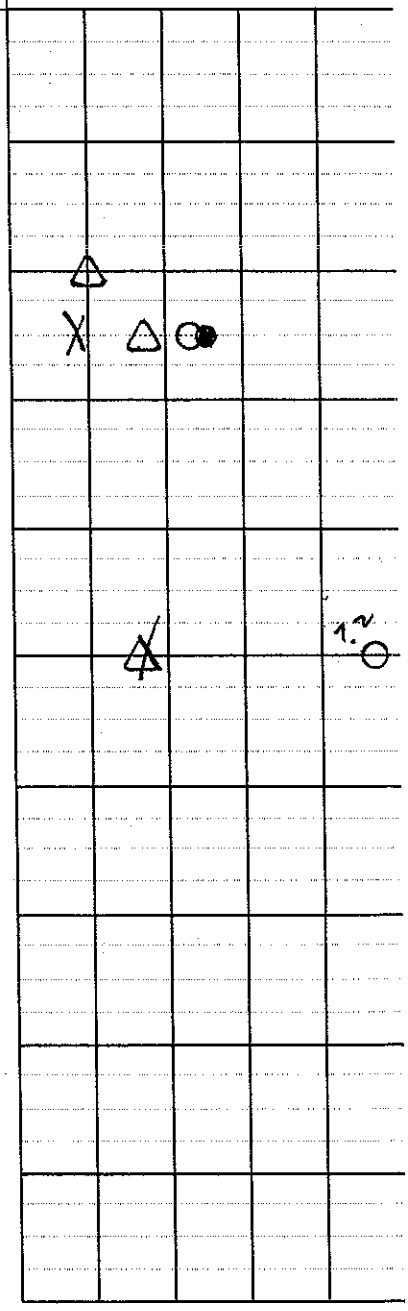
Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	Elevation 630.7' **Existing Surface** (a) see below				
1	Dark brown sand, some gravel, cinders & large limestone, damp - Fill				
2			10.3		
3	Brown clay, some silt, trace sand & gravel, damp, very tough to hard	8	17.5	109.7	2.4
4					
5		17	15.6	111.0	7.2
	End of Boring				
	(a) Bituminous concrete - 1.0"				
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq.ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 8

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☐ CME 45B ☐ CME 55 ☒ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 610.1' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
1	Dark brown silt,some sand,gravel,large limestone & asphalt,damp - Fill		13.0		
2	Brown clay,some silt,trace sand & gravel, damp,very tough				
3			20.8		
4					
5	End of Boring		23.3		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq.ft.
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 9

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☐ CME 45B ☐ CME 55 ☒ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 598.5' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
	Crushed gravel,damp - 4.0"				
1	Brown clay,some silt,trace sand & gravel, damp,very tough		19.0		
2					
3			17.4		
4					
5	End of Boring		15.8		
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W D)
Water recorded at dry feet on completion of drilling operations (A.D)
Water recorded at feet hours after completion of drilling operations (A.D)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.
Arlington Heights, Illinois (847) 870-0544

SOIL BORING LOG 10

Logged By: DA **Page:** 1 of 1

Client: Park District of Highland Park

File No. 19918 **Date Drilled:** 4/20/10

Reference: Rosewood Beach
Highland Park, IL

Comments:

Equipment: ☒ CME 45B ☐ CME 55 ☐ Hand Auger ☐ Other

depth, ft.	CLASSIFICATION Elevation 589.3' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
1	Brown fine-medium sand,some coarse sand & gravel,damp - Fill		5.9		
2	Brown-dark brown-black silt,some clay, trace sand & gravel,damp,loose - Fill	5	17.1		
3					
4	Brown clay,some silt,trace sand & gravel, damp,hard				
5	End of Boring	11	16.4	116.4	4.4
6					
7					
8					
9					
10					

○ unconfined compressive strength, tons/sq ft
● penetrometer reading, tons/sq ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft
△ moisture content, %
10 20 30 40

Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.

General Notes

SAMPLE CLASSIFICATION

Soil sample classification is based on the Unified Soil Classification System, the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), ASTM D-2488, the Standard Test Method for Classification of Soils for Engineering Purposes, ASTM D-2487(when applicable), and the modifiers noted below.

CONSISTENCY OF COHESIVE SOILS

Term	Qu -tons/sq. ft.	N (unreliable)
Very Soft	0.00 - 0.25	0 - 2
Soft	0.26 - 0.49	3 - 4
Stiff	0.50 - 0.99	5 - 8
Tough	1.00 - 1.99	9 - 15
Very Tough	2.00 - 3.99	16 - 30
Hard	4.00 - 7.99	30 +
Very Hard	8.00 +	

RELATIVE DENSITY OF GRANULAR SOILS

Term	N - blows/foot
Very Loose	0 - 4
Loose	5 - 9
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	50 +

IDENTIFICATION AND TERMINOLOGY

Term		Size Range
Boulder		over 8 in.
Cobble		3 in. to 8 in.
Gravel	-coarse	1 in. to 3 in.
	-medium	3/8 in. to 1 in.
	-fine	#4 sieve to 3/8 in.
Sand	-coarse	#10 sieve to #4 sieve
	-medium	#40 sieve to #10 sieve
	-fine	#200 sieve to #40 sieve
Silt		0.002 mm to #200 sieve
Clay		smaller than 0.002 mm

Modifying Term	Percent by Weight
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

Moisture Condition

Dry
Damp
Very Damp
Saturated

DRILLING, SAMPLING & SOIL PROPERTY SYMBOLS

CF - Continuous Flight Auger
HS - Hollow Stem Auger
HA - Hand Auger
RD - Rotary Drilling
AX - Rock Core, 1-3/16 in. diameter
BX - Rock Core, 1-5/8 in. diameter
NX - Rock Core, 2-1/8 in. diameter
S - Sample Number
T - Type of Sample
J - Jar
AS - Auger Sample
SS - Split-spoon (2 in. O.D. with 1-3/8 in. I.D.)
ST - Shelby Tube (2 in. O.D. with 1-7/8 in. I.D.)
R - Recovery Length, in.
B - Blows/ 6 in. interval, Standard Penetration Test (SPT)
N - Blows/ foot to drive 2 in. O.D. split-spoon sampler with 140 lb. hammer falling 30 in., (STP)
Pen. - Pocket Penetrometer reading, tons/ sq. ft.
W - Water Content, % of dry weight
Uw - Dry Unit Weight of soil, lbs./ cu. ft.
Qu - Unconfined Compressive Strength, tons/ sq. ft.
Str - % Strain at Qu.
WL - Water Level
WD - While Drilling
AD - After Drilling
DCI - Dry Cave-in
WCI - Wet Cave-in
LL - Liquid Limit, %
PL - Plastic limit, %
PI - Plasticity Index (LL-PL)
LI - Liquidity Index [(W-PL)/PI]