

PIEDMONT GEOTECHNICAL CONSULTANTS, INC.

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June 13, 2011

Kimley-Horn and Associates, Inc.
817 West Peachtree Street, NW
The Biltmore, Suite 601
Atlanta, Georgia 30308

Attention: Mr. Mark Kilby, P.E.

Subject: Borrow Site Evaluation
Rehabilitation of Glen Emerald Dam
DeKalb County, Georgia
PGC Project Number 109036.01

Dear Mark:

Piedmont Geotechnical Consultants, Inc. (PGC) appreciates the opportunity to submit our evaluation of two selected borrow sites located within the existing Glen Emerald Park. The primary purpose of our evaluation was to determine the suitability of materials soils at these sites for use as fill for the dam.

PROJECT INFORMATION

New structural fill will be required to replace materials undercut at the downstream toe of the dam and for extending the downstream slope to cover the new drainage system components. Other areas of relatively minor fill may be required for such items as reshaping the upper portion of the upstream slope and crest, backfilling around spillway channel, filling stump holes on the crest, etc. Quantities of fill material needed for the project have been estimated to be about 8,500 cubic yards.

Two borrow areas have selected along the east side of the lake. For purposes of this report, we have designated these as "Area 1" and "Area 2". Both areas were delineated on plans which are attached. Area 1 is within an existing field on the south end of the park. This area is generally open except for wooded areas around its perimeter. The field is maintained as a play or recreation area. The topography of this area is generally flat with a cut slope around its northern half and a moderate slope off its southern end. Area 2 is located near the upper end of the lake and is wooded with large hardwoods and pines with thick underbrush. Topography of this area is moderately to steeply sloping from the park down to the lake.

METHODS OF EXPLORATION

To evaluate the subsurface conditions, the designated areas were explored by a combination of a visual site reconnaissance and excavating 15 test pits to depths of 2 to 10 feet below grades. Test pits TP-1 through TP-8 were excavated in Area 2, and test pits TP-9 through TP-15 were excavated in Area 1. The test pits were excavated using a small tracked excavator and were observed by an engineer who classified the materials encountered in general accordance with the Unified Soil Classification System (USCS). Detailed descriptions of the materials encountered at each test pit location and their locations are shown on the Summary of Test Pits and Test Pit Location Plans attached. Area 1 is shown on Figure 1 and Area 2 is shown on Figure 2.

Seven bulk samples were collected from soils that visually appeared well to marginally suited for the project for additional laboratory testing. From the collected samples, representative samples of the most common materials likely to be encountered were subjected to additional laboratory testing to better qualify their physical properties. These tests included gradation tests, in-situ moisture tests, Atterberg Limits and standard Proctor compaction tests.

SUBSURFACE CONDITIONS

Area 1: Seven test pits (designated TP-9 through TP-15) were excavated within or near the delineated area shown on the plan provided to us. All test pits initially encountered a thin veneer of topsoil with a thickness of about 2 to 4 inches thick. The test pits excavated in the northeastern half of the selected borrow area (TP-9, TP-10 and TP-11) typically encountered a thin layer of residual soil described as silty sand (SM) over partially weathered rock at shallow depths between 1.5 and 2 feet. The test pits excavated in the southwestern half of the borrow area (TP-12 through TP-15) typically encountered deeper profiles of silty clayey medium to fine sands (SC) and sandy clayey silts (MH) to depths between 3 and 10 feet. Test pits TP-12 and TP-13 initially encountered previously placed fill materials from the ground surface to depths of 3 and 8 feet, respectively. The fill was classified as silty clayey medium to fine sand (SC) with a zone of silty sand (SM) from 3 to 8 feet at test pit TP-13. The fill was underlain by residual soils classified as clayey silts (MH) which extended to a depth of 5 feet below existing grade at test pit TP-12 and in excess of 10 feet below existing grade at test pit TP-13. Test pits TP-14 and T-15 encountered residual soils from the ground surface to depths of 6 and 4 feet, respectively. The residuum was typically classified as slightly clayey medium to fine sand (SM) with a zone from 3 to 4 feet of silty sand (SM) at test pit TP-14. Beneath the residual soils at test pits TP-12, TP-13 and TP-15, partially weathered rock was encountered at depths of 5, 6 and 4 feet, respectively.

Based on our visual observation of the surrounding topography, it generally appears that soils were cut from the northern end of the borrow area and placed in the southwestern quadrant of the borrow area.

Area 2: Eight test pits (designated TP-1 through TP-8) were excavated within or near the delineated areas shown on the plan provided to us. All test pits initially encountered a zone of topsoil with thicknesses between 6 and 12 inches. The test pits excavated along the higher side of the slope or in the flat area east of its crest (TP-1, TP-2, TP-3 and TP-8) encountered 3 to 6 feet of residual soils classified as silty clayey medium to fine sand (SC). This zone was underlain by silty sand (SM) with excessive rock pieces or partially weathered rock. The test pits excavated along the middle of the slope (TP-4, TP-5, TP-6 and TP-7) typically encountered a thin veneer of residual soil with excessive rock pieces overlying large rock pieces, refusal material or partially weathered rock.

CONCLUSIONS AND RECOMMENDATIONS

Based on the laboratory test results, the materials classified as silty clayey sand (SC) at Area 1 and 2 is most suitable for use as select fill for the project. A profile of clayey silt (MH) which is also suitable for use as select fill was encountered at depth in test pits TP-12 and TP-13. Silty sands (SM) with excessive rock, partially weathered rock and rock were also encountered in defined portions of the borrow areas. These soils will not be suitable for dam construction.

We typically estimate each foot per acre excavated will produce about 1000 yd³ to 1200 yd³ of compacted in-place soils. We expect there to be about 2,000 yd³ to 2,500 yd³ of soil within Area 1 provided that area can be extended slightly to the southwest and 1,000 yd³ to 1,500 yd³ from Area 2 provided that area can be extended slightly to the east. To obtain these quantities, a large footprint will need to be cleared and root raked as the useful profile is relatively thin. The loading operator will also need to be selective with his excavating techniques. Over excavation should be avoided. The compaction equipment used at the project will need to be large enough that it is capable of breaking up isolated weathered rock fragments that will get mixed in the "cut". Where these chunks cannot be adequately broken down, they will need to be removed. Based on the in-situ moisture results, the in-place soils are very near or slightly below their optimum moisture content. Moisture conditioning will be needed to raise the moisture levels to above optimum prior to compaction. This is often accomplished by the use of a water truck and disking the applied water into the fill prior to compaction. Careful stripping and root raking will also be needed so the thin profile of useable soil is not wasted. We anticipate that manual root removal measures will be needed at the site during fill placement.

CLOSURE

We sincerely appreciate the opportunity to provide geotechnical services for this project. Should you have any questions, please do not hesitate to contact us.

Sincerely,

Piedmont Geotechnical Consultants, Inc.



Scott Edwards, P.E.

Senior Geotechnical Engineer



W. Michael Ballard, P.E.

Senior Registered Engineer

Attachments:

Figure 1: Test Pit Location Plan Area 1

Figure 2: Test Pit Location Plan Area 2

Summary of Test Pits

Laboratory Test Results

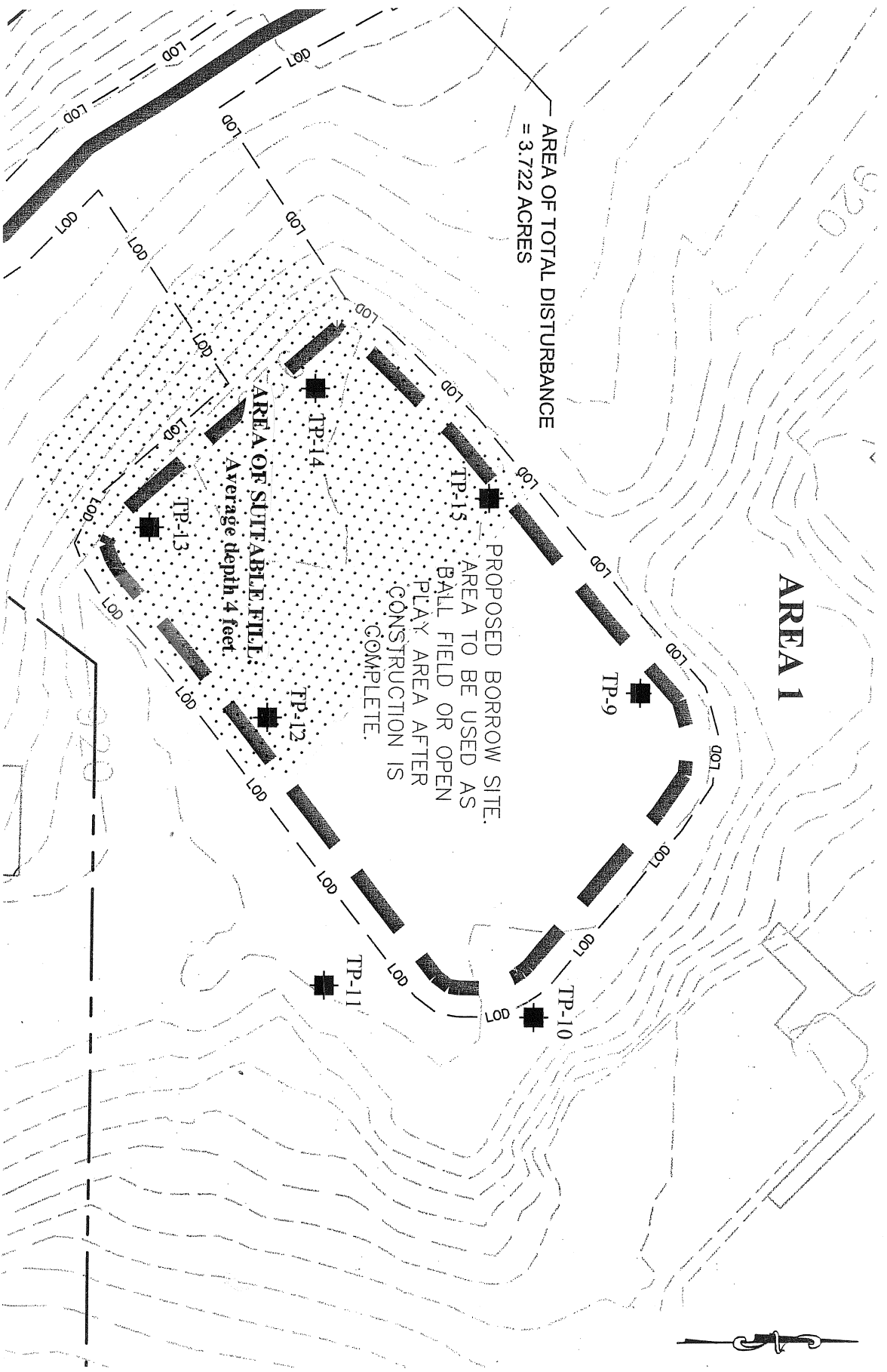


FIGURE 1: TEST PIT LOCATION PLAN

LEGEND:

■ TEST PIT LOCATION

SCALE: 1" = 50'

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ROSWELL, GA 30077

GLEN EMERALD LAKE DAM
BORROW STUDY
DEKALB COUNTY, GEORGIA
PGCI PROJECT NO. 109036.01

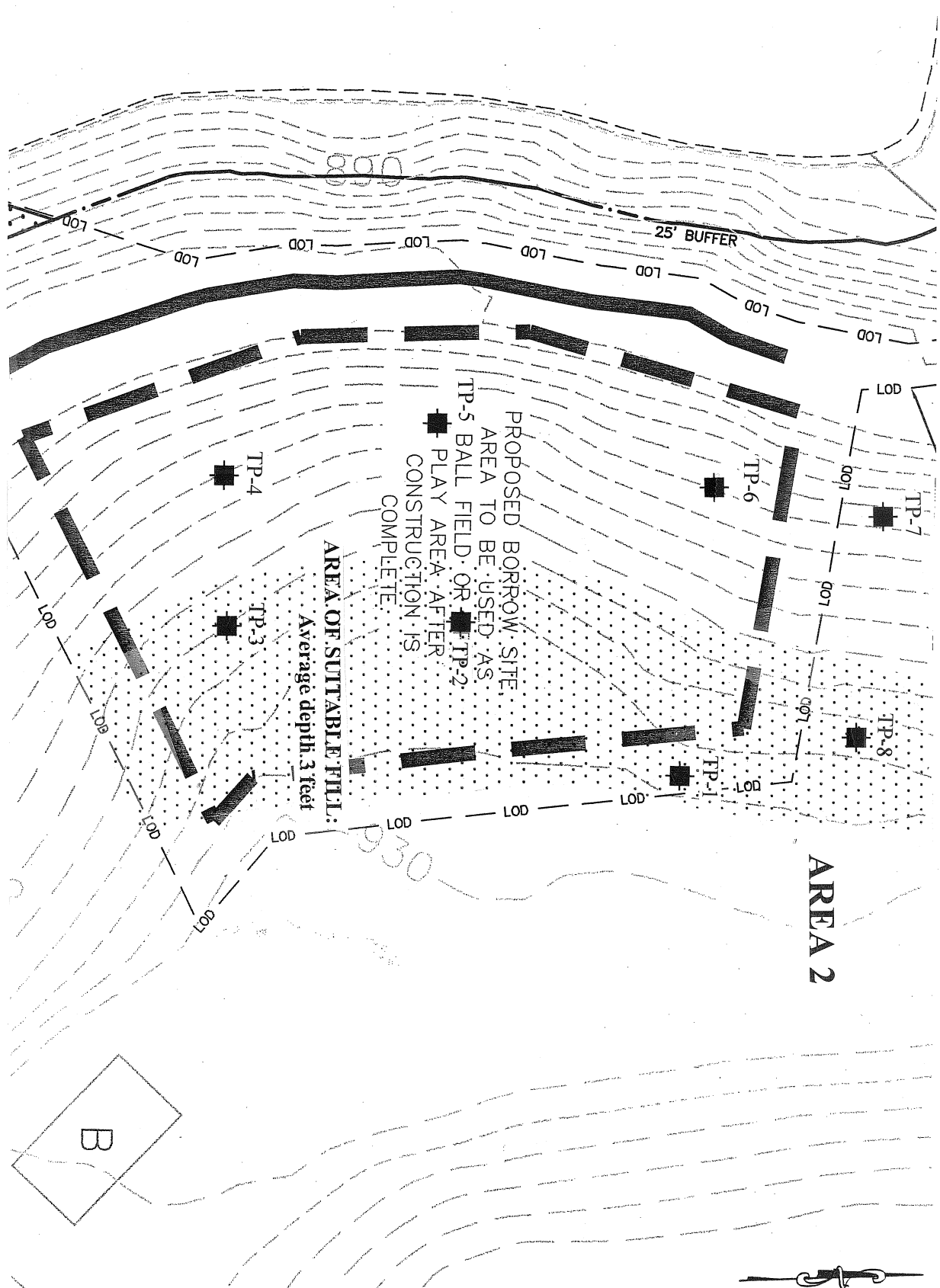


FIGURE 2: TEST PIT LOCATION PLAN

LEGEND:

■ TEST PIT LOCATION

SCALE: 1" = 50'

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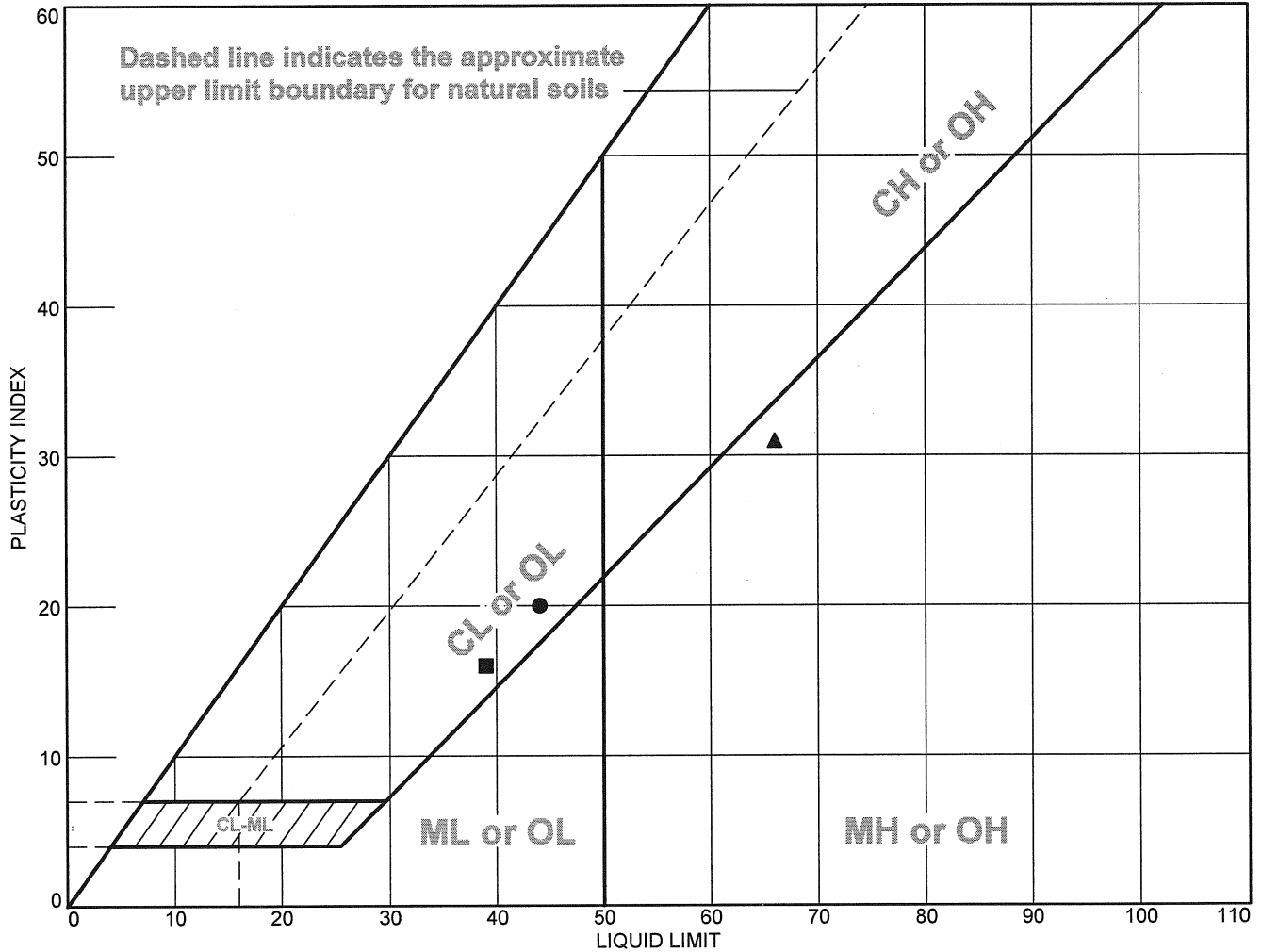
GLEN EMERALD LAKE DAM
 BORROW STUDY
 DEKALB COUNTY, GEORGIA
 PGCI PROJECT NO. 109036.01

**SUMMARY OF TEST PITS
BORROW STUDY
GLEN EMERALD DAM
PGC PROJECT NO. 109036.01**

Location	Depth	Soil Description
TP-1	0 – 9" 9" – 2' 2' – 5' 5' – 7.5' 7.5' 7.5'	TOPSOIL: 9 inches RESIDUUM: Dark brown silty clayey medium to fine SAND (SC) Red brown silty clayey medium to fine SAND (SC) Tan brown silty medium to fine SAND (SM), with weathered rock pieces PARTIALLY WEATHERED ROCK Test pit terminated at 7.5 feet.
TP-2	0 – 9" 9" – 4' 4' – 6' 6' 6'	TOPSOIL: 9 inches RESIDUUM: Red brown silty clayey medium to fine SAND (SC) Red brown silty medium to fine SAND (SM), with weathered rock pieces PARTIALLY WEATHERED ROCK Test pit terminated at 6 feet.
TP-3	0 – 9" 9" – 6' 6' – 7' 7' 7'	TOPSOIL: 9 inches RESIDUUM: Red brown silty clayey medium to fine SAND (SC) Tan brown silty medium to fine SAND (SM), with weathered rock pieces PARTIALLY WEATHERED ROCK: Test pit terminated at 7 feet.
TP-4	0 – 12" 12" – 2' 2' – 4' 4'	TOPSOIL: 12 inches RESIDUUM: Red brown silty medium to fine SAND (SM), with rock pieces Large rock pieces Test pit refusal at 4 feet.
TP-5	0 – 12" 12" – 2.5' 2.5' – 4' 4'	TOPSOIL: 12 inches RESIDUUM: Red brown silty medium to fine SAND (SM), with rock pieces Tan brown silty medium to fine SAND (SM), with large rock pieces Test pit refusal at 4 feet.
TP-6	0 – 9" 9" – 3' 3' 3'	TOPSOIL: 9 inches RESIDUUM: Red brown silty medium to fine SAND (SM) PARTIALLY WEATHERED ROCK Test pit terminated at 3 feet.
TP-7	0 – 6" 6" – 4' 4' – 5'	TOPSOIL: 6 inches RESIDUUM: Red brown silty medium to fine SAND (SM), some rock pieces Tan brown silty medium to fine SAND (SM), with weathered rock pieces

Location	Depth	Soil Description
	5'	Test pit terminated at 5 feet.
TP-8	0 – 8" 8" – 3' 3' – 6.5' 6.5' 6.5'	TOPSOIL: 8 inches RESIDUUM: Red brown silty clayey medium to fine SAND (SC) Tan brown silty medium to fine SAND (SM) PARTIALLY WEATHERED ROCK Test pit terminated at 6.5 feet.
TP-9	0 – 4" 4" – 2' 2' 2'	TOPSOIL: 4 inches RESIDUUM: Red brown silty medium to fine SAND (SM) PARTIALLY WEATHERED ROCK Test pit terminated at 2 feet.
TP-10	0 – 4" 4" – 1.5' 1.5' – 3' 3'	TOPSOIL: 4 inches RESIDUUM: Tan brown silty medium to fine SAND (SM), with rock pieces Tan orange brown silty medium to fine SAND (SM), with weathered rock pieces Test pit terminated at 3 feet.
TP - 11	0 – 2" 2" – 2' 2' 2'	TOPSOIL: 2 inches RESIDUUM: Red brown silty medium to fine SAND (SM), with partially weathered rock pieces PARTIALLY WEATHERED ROCK Test pit terminated at 2 feet.
TP-12	0 – 2" 2" – 3' 3' – 5' 5' – 6' 6'	TOPSOIL: 2 inches FILL: Red brown silty clayey medium to fine SAND (SC) RESIDUUM: Red brown sandy clayey SILT (MH) PARTIALLY WEATHERED ROCK Test pit terminated at 6 feet.
TP-13	0 – 4" 4" – 3' 3' – 8' 8' – 10' 10'	TOPSOIL: 4 inches FILL: Red brown silty clayey medium to fine SAND (SC) Tan red silty medium to fine SAND (SM) RESIDUUM: Red brown sandy clayey SILT (MH) Test pit terminated at 10 feet.
TP-14	0 – 2" 2" – 6' 6' 6'	TOPSOIL: 2 inches RESIDUUM: Red brown clayey silty medium to fine SAND (SC) PARTIALLY WEATHERED ROCK Test pit terminated at 6 feet.
TP-15	0 – 2" 2" – 3' 3' – 4' 4' 4'	TOPSOIL: 2 inches RESIDUUM: Red brown slightly clayey silty medium to fine SAND (SM) Tan orange brown silty medium to fine SAND (SM) PARTIALLY WEATHERED ROCK Test pit terminated at 4 feet.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Red brown silty clayey SAND(SC)	44	24	20	59.9	31.3	SC
■	Red brown silty clayey SAND(SC)	39	23	16	68.9	35.6	SC
▲	Red brown clayey sandy SILT(MH)	66	35	31	75.4	60.7	MH

Project No. 109036.01 **Client:**

Project: Glen Emerald Dam

● **Location:** TP-1 **Depth:** 2-5ft **Sample Number:** 1

■ **Location:** TP-12 **Depth:** 1-3ft **Sample Number:** 2

▲ **Location:** TP-12 **Depth:** 3-5ft **Sample Number:** 3

Remarks:

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Roswell, Georgia

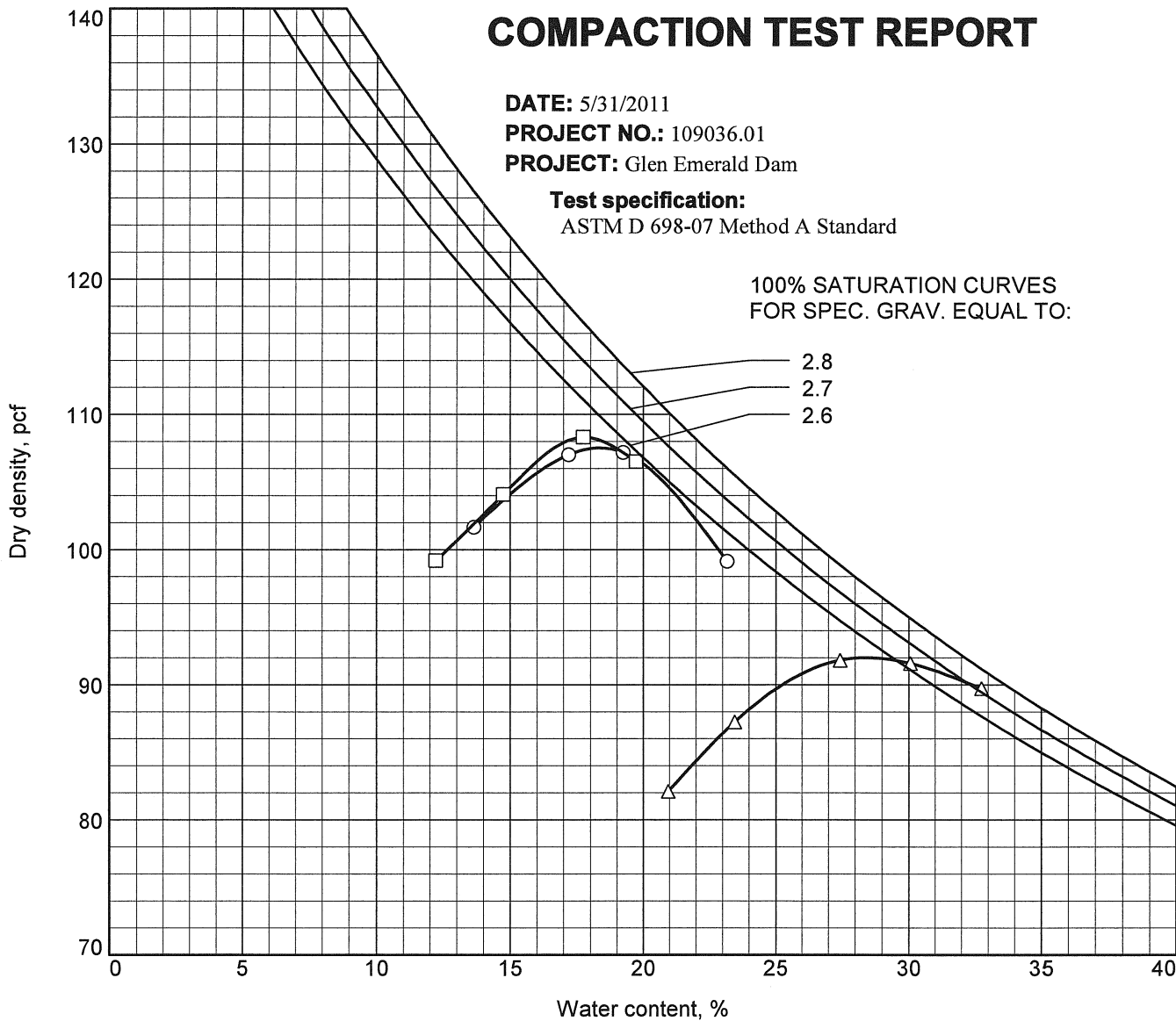
Figure 1

Tested By: KH _____

COMPACTION TEST REPORT

DATE: 5/31/2011
PROJECT NO.: 109036.01
PROJECT: Glen Emerald Dam

Test specification:
 ASTM D 698-07 Method A Standard



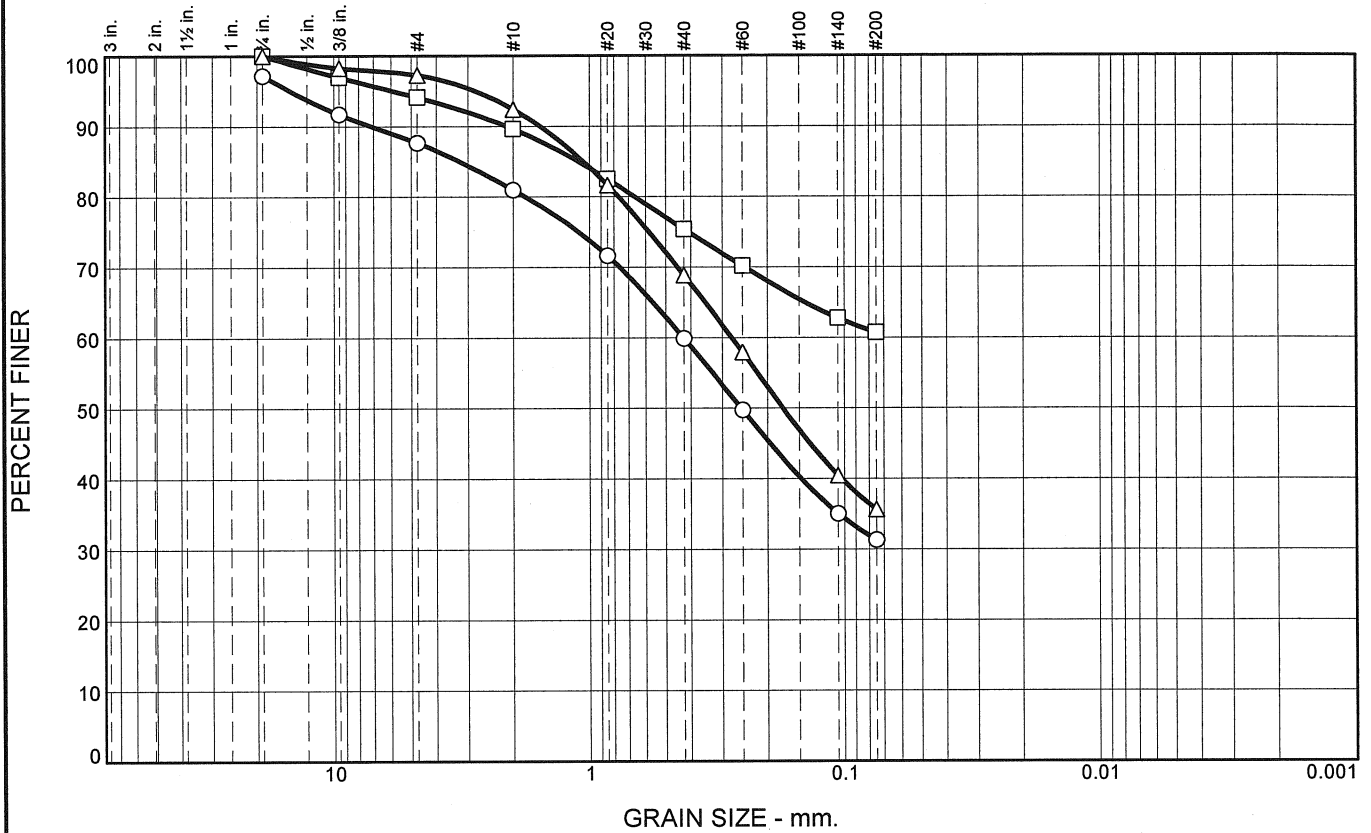
No.	LOCATION AND DESCRIPTION	REMARKS
○	Location: TP-1 Depth: 2-5ft Sample Number: 1 Red brown silty clayey SAND(SC)	
□	Location: TP-12 Depth: 1-3ft Sample Number: 2 Red brown silty clayey SAND(SC)	
△	Location: TP-12 Depth: 3-5ft Sample Number: 3 Red brown clayey sandy SILT(MH)	

No.	USCS	LL	PI	NAT. MOIST.	OVERSIZE	%< No.200	MAX. DRY DEN.	OPT. MOIST.
○	SC	44	20	17.8	%>#4=12.3	31.3 %	107.5	18.4 %
□	SC	39	16	18.1	%>#4=2.8	35.6 %	108.3	17.8 %
△	MH	66	31	28.4	%>#4=5.9	60.7 %	92.0	28.4 %

Figure 2

Tested By: KH

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○			56.4		31.3	SC	44	24	20
□	0.0	5.9	33.4		60.7	MH	66	35	31
△	0.0	2.8	61.6		35.6	SC	39	23	16

SIEVE inches size	PERCENT FINER		
	○	□	△
.75	97.2	100.0	100.0
.375	91.7	97.0	98.3
GRAIN SIZE			
D ₆₀	0.4271		0.2756
D ₃₀			
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	○	□	△
#4	87.7	94.1	97.2
#10	81.0	89.6	92.4
#20	71.6	82.5	81.7
#40	59.9	75.4	68.9
#60	49.8	70.2	57.9
#140	35.1	62.7	40.5
#200	31.3	60.7	35.6

○ Red brown silty clayey SAND(SC)
 □ Red brown clayey sandy SILT(MH)
 △ Red brown silty clayey SAND(SC)

REMARKS:
 ○
 □
 △

○ Location: TP-1 Depth: 2-5ft Sample Number: 1
 □ Location: TP-12 Depth: 3-5ft Sample Number: 3
 △ Location: TP-12 Depth: 1-3ft Sample Number: 2

**PIEDMONT
 GEOTECHNICAL CONSULTANTS
 Roswell, Georgia**

Client:
 Project: Glen Emerald Dam
 Project No.: 109036.01

**PIEDMONT GEOTECHNICAL
NATURAL MOISTURE CONTENT - ASTM 2216**

PROJECT NAME: Glen Emerald Dam
 PROJECT NUMBER: 109036.01
 DATE: 5/25/2011
 TESTED BY: KH
 CHECKED BY: SE

Sample ID:	TP-3	TP-3	TP-8	TP-13	TP-14
Sample Depth	9"-2'	4'-5'	1'-3'	4'-6'	2'-4'
Container ID:	B4	B2	B5	B1	Z6
Wet Soil and Container:	342.46	330.23	333.69	319.06	306.80
Dry Soil and Container:	298.93	283.92	291.28	281.27	268.86
Weight of Water:	43.53	46.31	42.41	37.79	37.94
Weight of Container:	49.43	49.46	49.45	49.31	49.28
Weight of Dry Soil:	249.50	234.46	241.83	231.96	219.58
Moisture Content:	17.4%	19.8%	17.5%	16.3%	17.3%

Sample ID:	TP-15	TP-1	TP-12	TP-12	
Sample Depth	1'-3'	2'-5'	1'-3'	3'-5'	
Container ID:	B3	B7	Z4	Z1	
Wet Soil and Container:	277.35	266.05	347.45	327.97	
Dry Soil and Container:	236.45	233.26	301.83	266.30	
Weight of Water:	40.90	32.79	45.62	61.67	
Weight of Container:	49.43	49.26	49.64	49.32	
Weight of Dry Soil:	187.02	184.00	252.19	216.98	
Moisture Content:	21.9%	17.8%	18.1%	28.4%	

Sample ID:					
Sample Depth					
Container ID:					
Wet Soil and Container:					
Dry Soil and Container:					
Weight of Water:					
Weight of Container:					
Weight of Dry Soil:					
Moisture Content:					