



01-0425

Corporate Environmental Programs
General Electric Company
100 Woodlawn Avenue, Pittsfield, MA 01201

Transmitted Via FedEx

September 10, 2001

Mr. Bryan Olson
EPA Project Coordinator
U.S. Environmental Protection Agency
EPA New England
One Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

**Re: GE-Pittsfield/Housatonic River Site
On-Plant Consolidation Areas (GECD210 and GECD220)
Geotechnical Testing of In-Place Consolidation Materials**

Dear Mr. Olson:

I. Introduction

This letter describes the scope and results of a recent geotechnical testing program performed by the General Electric Company (GE) at its Building 71 On-Plant Consolidation Area (OPCA) in Pittsfield, Massachusetts. The geotechnical testing program was designed and implemented by GE to: 1) determine the physical *in-situ* properties of the materials previously consolidated within the Building 71 OPCA in 2000; 2) provide confirmation that the methodology and techniques that have been used to consolidate materials in the OPCA are sufficient; and 3) verify the adequacy of certain assumptions related to the design/construction of the OPCAs (i.e., the strengths and long-term structural stability of the consolidated materials).

In its final conditional approval letter, dated January 30, 2001, for GE's OPCA Work Plan (including several amendments and modifications to the original plan), the U.S. Environmental Protection Agency (EPA) provided comments and recommendations related to, among other things, the strength of the consolidated materials and the stability of the OPCAs. In its response to that letter (GE letter dated March 9, 2001), as well as a subsequent letter dated July 26, 2001, relating to the conditions for consolidation of EPA-generated materials at the OPCAs, GE reiterated and summarized its positions related to the structural stability of the OPCAs, the appropriate criteria for materials subject to consolidation at the OPCAs, and the lack of need for more intensive testing of the materials prior to or following consolidation. GE believes that those prior responses were sufficient to address EPA's prior comments and concerns. Nevertheless, while neither required by EPA nor expected to warrant changes to future OPCA activities, GE voluntarily elected to perform a geotechnical testing program.

As described herein, the geotechnical program involved a series of field- and laboratory-based tests to estimate the *in-situ* physical properties (i.e., dry density, moisture content, particle size and gradation, and

relative plasticity) and related "strength" of the materials consolidated in 2000. Such materials are considered to be generally representative of the materials subject to future consolidation at the OPCAs, as they included soils generated during removal activities associated with the Allendale School Removal Action; sediments, bank soils, and vegetation generated during the Upper ½-Mile Reach Removal Action; building debris (e.g., steel, concrete, wood, etc.) generated during Building 71 demolition activities; and other miscellaneous debris.

The remainder of this letter describes the testing that was performed by GE, the results of these activities, and a summary of findings as they relate to future OPCA design and operational activities.

II. Summary of Testing Activities

On behalf of GE, Blasland, Bouck & Lee, Inc. (BBL) retained GeoTesting Express, Inc. located in Boxborough, Massachusetts to conduct the geotechnical testing activities. Field testing and sample collection (for subsequent laboratory analyses) was performed on June 27, 2001 at three separate locations (S-1 through S-3) within the approximately 1.5-acre Building 71 OPCA, as shown on Figure 1. These locations were selected to obtain general coverage of the area and provide for a representative evaluation of the materials currently present within the OPCA.

At each test location, the *in-situ* density of the consolidated materials was determined using a Troxler Nuclear Density Gauge in accordance with American Society for Testing and Materials (ASTM) Method D-2922/3017. In addition, as a supplement to this testing procedure, and in consideration of the possible heterogeneity of the consolidated materials (i.e., a mixture of soil, sediments, demolition debris, boulders, etc.), the material density was also determined using the in-place sand cone method (ASTM D-1556). The moisture contents of the consolidated materials were determined directly by the nuclear density gauge testing equipment, as well as through subsequent laboratory-based moisture content testing (see below). A summary of the field testing that was performed is provided in Table 1.

Following completion of the *in-situ* field testing, samples were collected at the same locations (i.e., S-1 through S-3) for subsequent laboratory analyses, involving moisture/density relationship testing using the Standard Proctor test (ASTM D-698), grain-size analysis (ASTM D-422), Atterberg limits (ASTM D-4318), soil classification (ASTM D-2487), moisture content (ASTM D-2216), and direct shear (ASTM D-3080). A summary of the laboratory testing performed is provided in Table 1. Attachment A contains the laboratory test results.

III. Summary of Test Results

The results of the field testing (i.e., in-situ density testing using the nuclear density gauge and sand cone methods) are summarized in Table 2. These results indicate a generally good correlation between the two test methods in terms of moisture content, dry density, and compaction, with the average test results (115.1 pounds per cubic foot (pcf) dry density, 18.4% moisture content, 96% compaction) consistent with values that would be expected for the compacted mixture of materials present within the OPCA. The small variations in the test results between the testing methods are more likely due to the heterogeneity of the fill material itself (rather than deviations in actual material compaction) and certain inherent limitations in the nuclear density gauge equipment (i.e., that instrument cannot account for buried oversized materials---such as construction debris, rocks, etc.---that may be present immediately below the

surface of the consolidated materials). As such, it is more appropriate to evaluate the testing parameter considering the results obtained from both testing methods (i.e., combined averages of the test results).

The results of laboratory testing are summarized in Tables 3 and 4. The grain-size and Atterburg Limits analyses indicated that the soil is classified as a non-plastic silty sand to silty sand with gravel. Table 4 presents the results of the Atterberg limits, Standard Proctor, and direct shear testing. Related to the general condition of the consolidated materials, the standard Proctor testing indicates a maximum dry density between 118.2 to 121.4 pounds per cubic foot (pcf) and an optimum moisture content between 11 to 12.6%.

Direct shear testing was performed at load pressures of 250, 1,875, and 3,125 pounds per square foot (psf). These values were selected to represent anticipated future site conditions (e.g., final height of consolidation material, final cover thickness, etc.). Note that prior to testing, the samples were re-compacted to replicate the *in-situ* densities determined from the field density testing. The direct shear test results indicate that the friction angle and cohesion of the soil range from 30.4 to 39.1 degrees and 125 to 311 psf, respectively.

IV. Summary

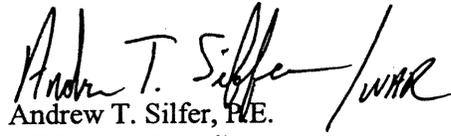
Based on the results of the field and laboratory testing, the materials currently consolidated within the Building 71 OPCA appear to have sufficient strength to support the anticipated final heights, slopes, and grading configuration for the OPCAs. The results related to the average in-place dry density (i.e., 115.1 pcf, which is 96% of the maximum dry density) also validate the material acceptance requirements, placement methods, and compaction techniques currently being used to consolidate the materials within the OPCA. As summarized in the OPCA work plan, the current consolidation activities generally include material placement in horizontal 12-inch-thick lifts, minimum of 5 passes with a roller, observation of soil conditions during placement to identify any material rutting, pumping, or heaving, and moisture conditioning (e.g., aerating, wetting, etc.) of materials during placement to provide a proper moisture condition for compaction. However, as GE has indicated to EPA in prior discussions, GE will continue to monitor and evaluate the placement activities and make any modifications to the material acceptance requirements and/or placement procedures as necessary to ensure continued stability. Also, GE will consider the need for additional testing similar to that described above following future consolidation periods at the OPCAs.

With respect to verifying certain technical assumptions associated with the design of the OPCAs, structural evaluations of the final OPCA configuration were previously conducted assuming an internal soil friction angle of 26 degrees and a 0 psf cohesion factor for the consolidation materials. Based on those conservative design assumptions, slope stability analyses indicated a factor of safety against failure of approximately 1.5 (typically the minimum acceptable value for slope stability). When re-evaluating the slope stability using the geotechnical testing results summarized in this letter (i.e., an average internal friction angle of 33.9 degrees and a cohesion factor of 227 psf), a factor of safety of approximately 2.0 results, which exceeds the safety factor calculated during the design. This result further supports the current material acceptance requirements and the placement methods and techniques currently being used to consolidate the materials within the OPCA.

Mr. Bryan Olson
September 10, 2001
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We trust that the contents of this letter address EPA concerns related to physical characteristics of the materials being consolidated at the OPCAs, and specifically the long-term stability of those materials. Please let me know if you have any questions about the geotechnical sampling program performed at the OPCAs, or wish to discuss the results further.

Sincerely,


Andrew T. Silfer, P.E.
GE Project Coordinator

43211662.doc

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Public Information Repositories
GE Internal Repositories

Tables

Table 1

General Electric Company
Pittsfield, Massachusetts
Building 71 On-Plant Consolidation Area

Summary of *In-Situ* and Laboratory Testing

Geotechnical Testing	ASTM Method
<i>In-Situ</i> Testing	
Troxler Nuclear Gauge	ASTM D-2922/3017
Sand Cone Method	ASTM D-1556
Laboratory Testing	
Standard Proctor	ASTM D-698
Grain-Size Analysis	ASTM D-422
Atterberg Limits	ASTM D-4318
Classification	ASTM D-2487
Moisture Content	ASTM D-2216
Direct Shear	ASTM D-3080

Notes:

- (1) ASTM - American Society for Testing and Materials.
- (2) GeoTesting Express, Inc. performed the *in-situ* testing on June 27, 2001. All laboratory testing was conducted in July 2001 at the GeoTesting Express, Inc. laboratory located in Boxborough, MA.
- (3) All the above-listed tests (both *in-situ* and laboratory) were performed at three locations (S-1, S-2, and S-3, as shown on Figure 1).

Table 2

General Electric Company
 Pittsfield, Massachusetts
 Building 71 On-Plant Consolidation Area

In-Situ Test Results

Sample Number	Nuclear Density Gauge (1)			In-Place Sand Cone Method (2)			
	Moisture Content [%]	Dry Density [pcf]	Compaction (4) [%]	Moisture Content [%]	Dry Density [pcf]	Wet Density [pcf]	Compaction (4) [%]
S-1	28.2	103.8	85.5	20.1	100.5	120.6	83
S-2	15.1	129.6	108.3	14.9	118.3	135.9	99
S-3	15.1	122.7	103.8	16.8	115.4	134.7	98
Average	19.5	118.7	99.2	17.3	111.4	130.4	93.3

Notes:

- (1) The ASTM D-2922 and D-3017 methods were used in conducting the nuclear density gauge testing.
- (2) The ASTM D-1556 method was used to perform the in-place sand cone method testing.
- (3) The average of results from Troxler Nuclear Density Gauge and Sand Cone Methods estimate a maximum dry density of 115.1 pcf and a moisture content of 18.4%.
- (4) The percent compaction is the ratio of the maximum dry density measured in the Standard Proctor test (Table 3) divided by the *in situ* dry density multiplied by 100.
- (5) GeoTesting Express, Inc. from Boxborough, MA performed the nuclear density gauge and in-place sand cone analyses on June 27, 2001.
- (6) ASTM - American Society for Testing and Materials.

Table 3

General Electric Company
Pittsfield, Massachusetts
Building 71 On-Plant Consolidation Area

Grain-Size Analysis Results

Sieve or Particle Size	Percent Passing (1)		
	Sample Number		
	S-1	S-2	S-3
3 inches	100	100	100
2 inches	100	97	100
1 inch	93	94	94
3/8 inch	82	86	87
#4	80	85	85
#10	76	80	80
#40	68	69	67
#60	62	62	59
#100	51	51	49
#200	40	38	34
0.046 mm	27	32	30
0.017 mm	16	21	19
0.005 mm	8	12	10
0.002 mm	5	7	6

Notes:

- (1) The ASTM D-422 method was used for the grain-size analyses.
- (2) Sample collection was performed on June 27,2001 by GeoTesting Express, Inc. from Boxborough, MA. The laboratory testing was performed in GeoTesting's laboratory in July 2001.
- (3) ASTM - American Society for Testing and Materials.

Table 4

General Electric Company
 Pittsfield, Massachusetts
 Building 71 On-Plant Consolidation Area

Laboratory Test Results

Sample Number	Plasticity (1)	Standard Proctor (2)		Direct Shear Test (3)	
		Maximum Dry Density [pcf]	Optimum Moisture Content [%]	Friction Angle [degrees]	Cohesion [psf]
S-1	None	121.4	11.0	39.1	244
S-2	None	119.7	12.0	30.4	311
S-3	None	118.2	12.6	32.1	125
Average	None	119.8	11.9	33.9	227

Notes:

- (1) The ASTM D-4318 method was used to estimate the plasticity of the material.
- (2) The ASTM D-698B method was used to estimate the maximum dry density and optimum moisture content using the Standard Proctor. Correction factors (following Practice D-4718) were used to account for the oversize fraction.
- (3) The ASTM D-3080 method was followed for direct shear testing. Soil was compacted based on *in-situ* conditions prior to testing, as determined using the nuclear density gauge test at each location.
- (4) Sample collection was performed on June 27, 2001 by GeoTesting Express, Inc. from Boxborough, MA. The laboratory testing was performed in GeoTesting's laboratory in July 2001.
- (5) ASTM - American Society for Testing and Materials.

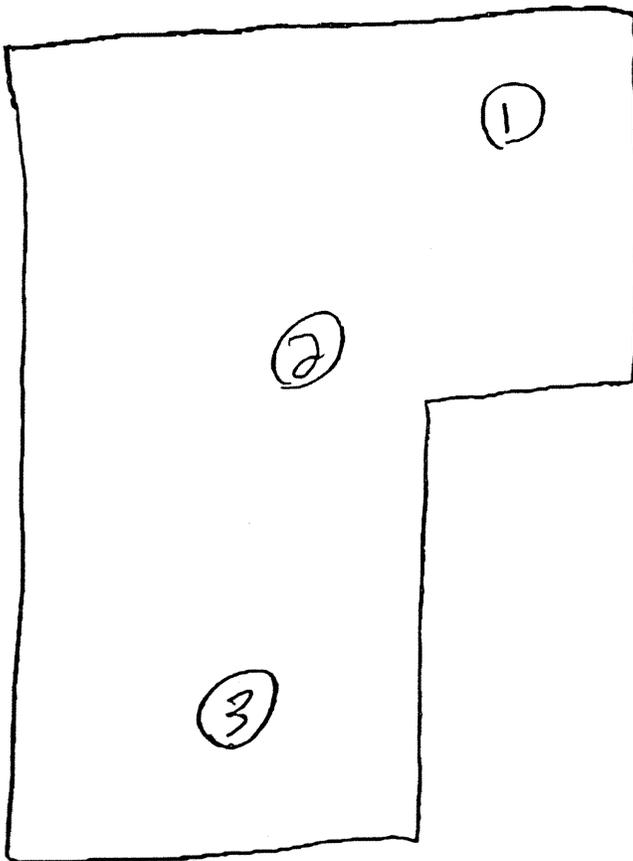
Figure 1

DAILY REPORT

Client: *PBL*
Project Name: *GE Landfill*
Location: *Pittsfield MA*
GTX #: *3500*

Date: *6-27-01*
Weather: *Sunny ~ 95°*
Technician: *KAM*

Description of Work: *Field Density*

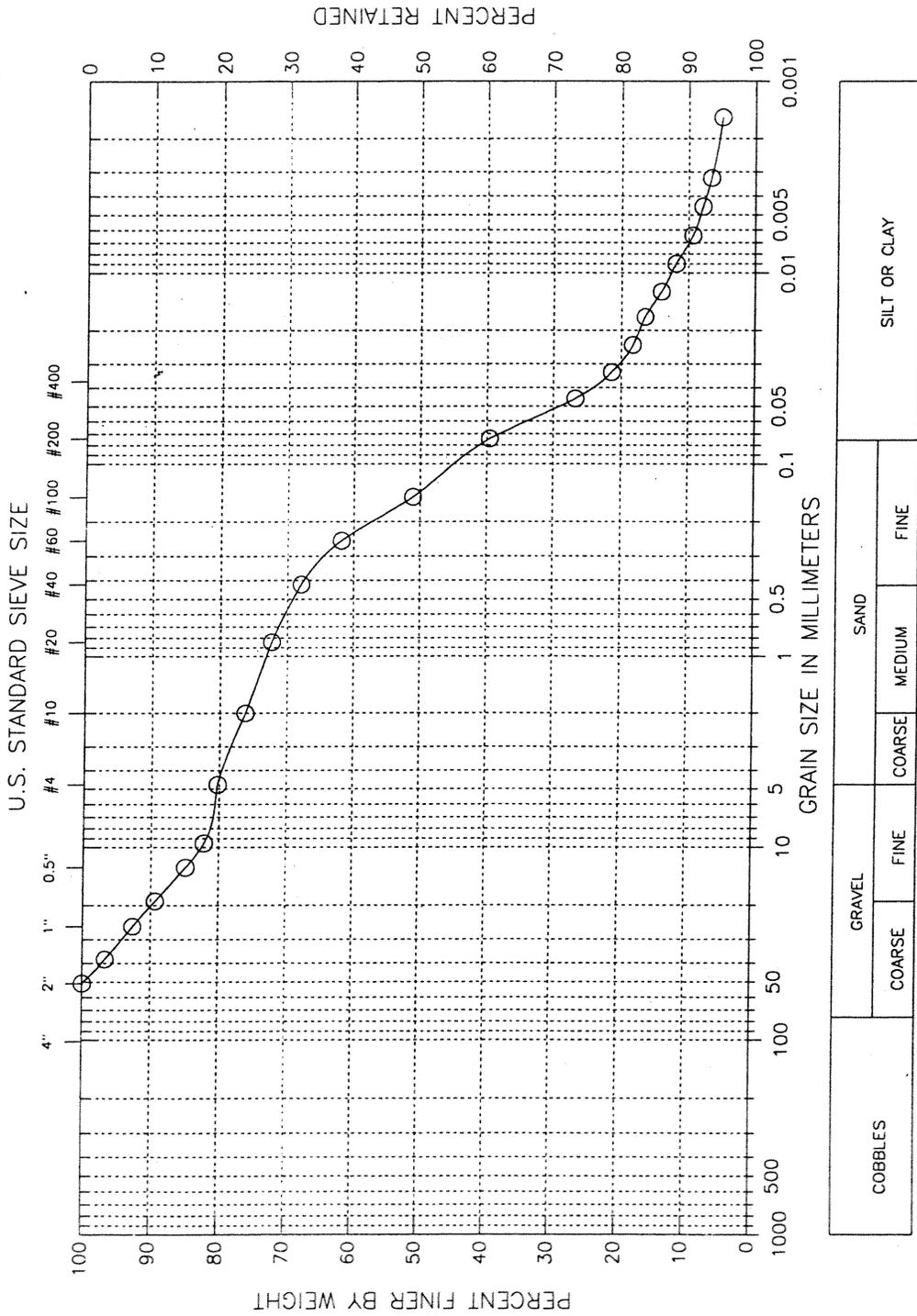


Technician: *KAM*

Attachment A
Laboratory Test Results

Project : GE Site
 Project No.: GTX3500
 Location: Pittsfield, MA
 Date : Fri Jul 20 2001

Boring No.: ---
 Sample No.: S-1
 Test Method ASTM D 422
 Filename : S1



Classification : (SM) Silty sand with gravel
 Visual Description : Moist, dark grayish brown silty sand with gravel

Remarks : ---

Figure 1

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-1
 Location : Pittsfield, MA
 Soil Description : Moist, dark grayish brown silty sand with gravel
 Remarks : ---

Depth : ---
 Test Date : 07/12/01
 Test Method : ASTM D 422

Filename : S1
 Elevation : ---
 Tested by : PMP/HLB/MS
 Checked by : JDT

HYDROMETER

Hydrometer ID : 88-18231
 Weight of air-dried soil = 60.5 gm
 Specific Gravity = 2.7

Hydroscopic Moisture Content :
 Weight of Wet Soil = 0 gm
 Weight of Dry Soil = 0 gm
 Moisture Content = 0

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
1.00	27.25	21.00	21.42	0.046	27	0.046
2.00	23.00	21.00	17.17	0.033	21	0.033
4.00	20.50	21.00	14.67	0.024	18	0.024
8.00	19.00	21.00	13.17	0.017	16	0.017
15.00	17.00	21.25	11.20	0.013	14	0.013
30.00	15.25	21.25	9.45	0.009	12	0.009
60.00	13.25	21.50	7.48	0.006	9	0.006
120.00	12.00	22.00	6.30	0.005	8	0.005
240.00	11.00	22.00	5.30	0.003	7	0.003
1110.00	10.00	19.75	4.01	0.002	5	0.002

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-1
 Location : Pittsfield, MA
 Soil Description : Moist, dark grayish brown silty sand with gravel
 Remarks : ---

Depth : ---
 Test Date : 07/12/01
 Test Method : ASTM D 422

Filename : S1
 Elevation : ---
 Tested by : PMP/HLB/MS
 Checked by : JDT

Sieve Mesh	Sieve Openings		Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
	Inches	Millimeters			
2"	2.000	50.80	0.00	0.00	100
1.5"	1.500	38.10	471.00	471.00	97
1"	1.012	25.70	583.00	1054.00	93
0.75"	0.748	19.00	480.00	1534.00	89
0.5"	0.500	12.70	646.00	2180.00	85
0.375"	0.374	9.51	387.00	2567.00	82
Total Dry Weight of Sample = 14395					

Sieve Mesh	Sieve Openings		Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
	Inches	Millimeters			
#4	0.187	4.75	1.51	1.51	80
#10	0.079	2.00	3.25	4.76	76
#20	0.033	0.84	3.12	7.88	72
#40	0.017	0.42	3.46	11.34	68
#60	0.010	0.25	4.81	16.15	62
#100	0.006	0.15	8.57	24.72	51
#200	0.003	0.07	9.14	33.86	40
Pan			31.48	65.34	0
Total Dry Weight of Sample = 186.08					

D85 : 12.8654 mm
 D60 : 0.2287 mm
 D50 : 0.1395 mm
 D30 : 0.0517 mm
 D15 : 0.0143 mm
 D10 : 0.0070 mm

Soil Classification
 ASTM Group Symbol : SM
 ASTM Group Name : Silty sand with gravel
 AASHTO Group Symbol : A-4(0)
 AASHTO Group Name : Silty Soils

ATTERBERG LIMITS

PROJECT GE Site	PROJECT NUMBER GTX3500	TESTED BY PMP/HLB/MS	BORING NUMBER --
LOCATION Pittsfield, MA	CHECKED BY JDT		SAMPLE NUMBER S-1
SAMPLE DESCRIPTION Moist, dark grayish brown silty sand with gravel		DATE Fri Jul 20 2001	FILENAME S1

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER					
WT. WET SOIL + TARE					
WT. DRY SOIL + TARE					
WT. WATER					
TARE WT.					
WT. DRY SOIL					
WATER CONTENT, w_N (%)					
NUMBER OF BLOWS, N					
ONE-POINT LIQUID LIMIT, LL					

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER					
WT. WET SOIL + TARE					
WT. DRY SOIL + TARE					
WT. WATER					
TARE WT.					
WT. DRY SOIL					
WATER CONTENT (%)					

Determined to be Non-plastic.

SUMMARY OF RESULTS

NATURAL WATER CONTENT, w (%)	15.9
LIQUID LIMIT, LL	
PLASTIC LIMIT, PL	
PLASTICITY INDEX, PI	
LIQUIDITY INDEX, LI^*	

$LI^* = (w - PL) / PI$

PLASTICITY CHART

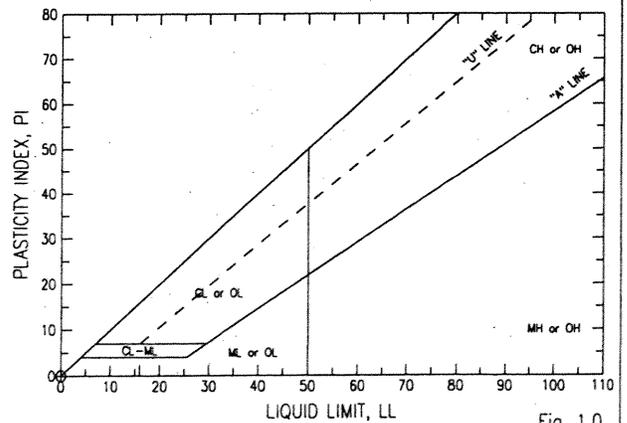
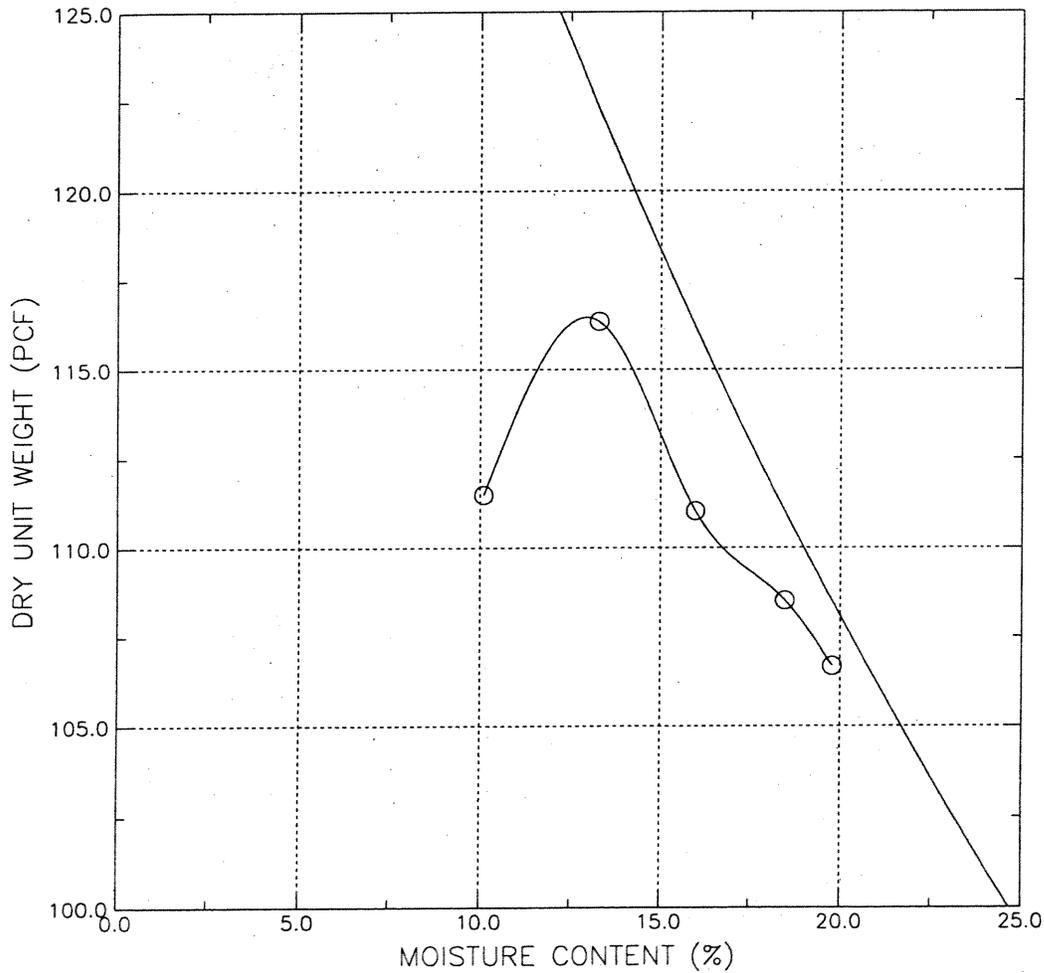


Fig. 1.0

Boring No. : --
Sample No. : S-1
Test Method : ASTM D 698
Filename : S1

Project : GE Site
Project No. : GTX3500
Location : Pittsfield, MA
Test Date : 07/12/01

Moisture-Density Relationship



Sample Description : Moist, dark grayish brown silty sand with gravel
Compaction Test Designation : ASTM D698-B
Maximum Dry Density : 116.5 PCF
Optimum Moisture Content : 12.9 %
Corrected Maximum Dry Density : 121.4 PCF
Corrected Optimum Moisture Content : 11.0%

Figure 1

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-1
 Location : Pittsfield, MA
 Soil Description : Moist, dark grayish brown silty sand with gravel
 Remarks : ---

Filename : S1
 Elevation : ---
 Tested by : PMP/HLB/MS
 Checked by : JDT

COMPACTION TEST

Mold ID :
 Method Used : ASTM D698-B
 Volume of Mold : 0.0333 ft³
 Mass of Mold : 4241 gm
 Specific Gravity : 2.65

Moisture Content ID	Mass of Container (gm)	Mass of Container + Moist Soil (gm)	Mass of Container + Dry Soil (gm)	Mass of Mold + Specimen (gm)	Moisture Content (%)	Dry Density (PCF)
LIAM	8.05	240.79	219.45	6095.00	10.1	111.5
GTX1	8.06	269.62	238.93	6232.00	13.3	116.3
REASON	8.08	235.19	203.90	6186.00	16.0	111.0
ACE	8.03	248.97	211.39	6183.00	18.5	108.5
STANLEY	8.11	253.77	213.20	6171.00	19.8	106.7
Optimum Dry Density		= 116.5 PCF				
Optimum Moisture Content		= 12.9 %				

Oversize correction (18% > 3/8 inch sieve):

Corrected Maximum Dry Density : 121.4 PCF
 Corrected Optimum Moisture Content : 11.0%

Direct Shear Test of Soils Under Consolidated Drained Conditions by ASTM D 3080

Client: Blasland, Bouck & Lee, Inc.
Project Name: GE Site
Project Location: Pittsfield, MA

GTX#: 3500
Report Date: 07/27/01
Page: 1 of 2

Soil: Sample 1 (S-1)

Sample Description	Classification	ASTM D 4318			ASTM D 1557	
		Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Corrected Maximum Dry Density, pcf	Corrected Optimum Moisture Content, %
Moist, dark grayish brown silty sand with gravel	SM	NP	NP	NP	121.4	11.0

Test Equipment: Top and bottom box (circular) = 2.50 in diameter. Load cells and LVDTs connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 4.91 in², soil height = 1 inch

Test Condition: inundated

Sample Type and Preparation:

Remolded to the in-place density (103.8 pcf) and moisture content (28.2%) as determined by the Nuclear Gauge on 06/17/01. All particles greater than 3/8 inch sieved out prior to testing.

Parameter	Point 1	Point 2	Point 3
Initial Moisture Content, %	29.1	29.1	29.1
Initial Dry Density, pcf	103	103	103
Percent Compaction, %	99.2	99.2	99.2
Nominal Rate of Horizontal Displacement, in/min	0.008	0.008	0.008
Normal Compressive Stress, psf	250	1875	3125
Peak Shear Stress, psi	359	1981	3256
Final Moisture Content, %	21.2	22.8	21.5

Friction Angle: 39.1 degrees
Cohesion: 244 psf

Comments: Tested By: jdt

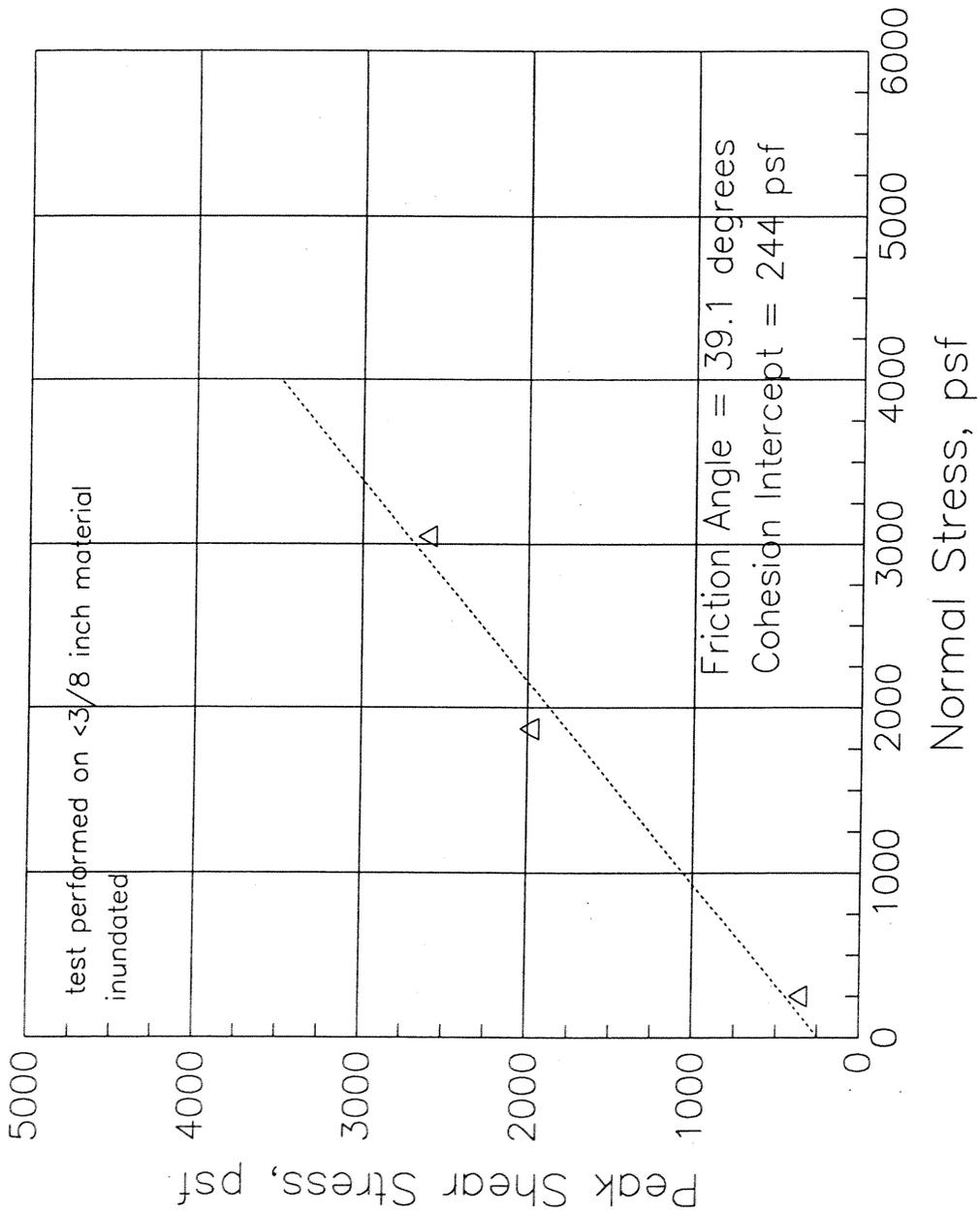
Checked By: gtt

peak shear stress vs normal load plot is presented in Figure 1

Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

Direct Shear Test Series by ASTM D3080

Sample 1: compacted to the in-place density and moisture content using Nuclear Gauge value



Blasland, Bouck & Lee, Inc.
GTX-3500

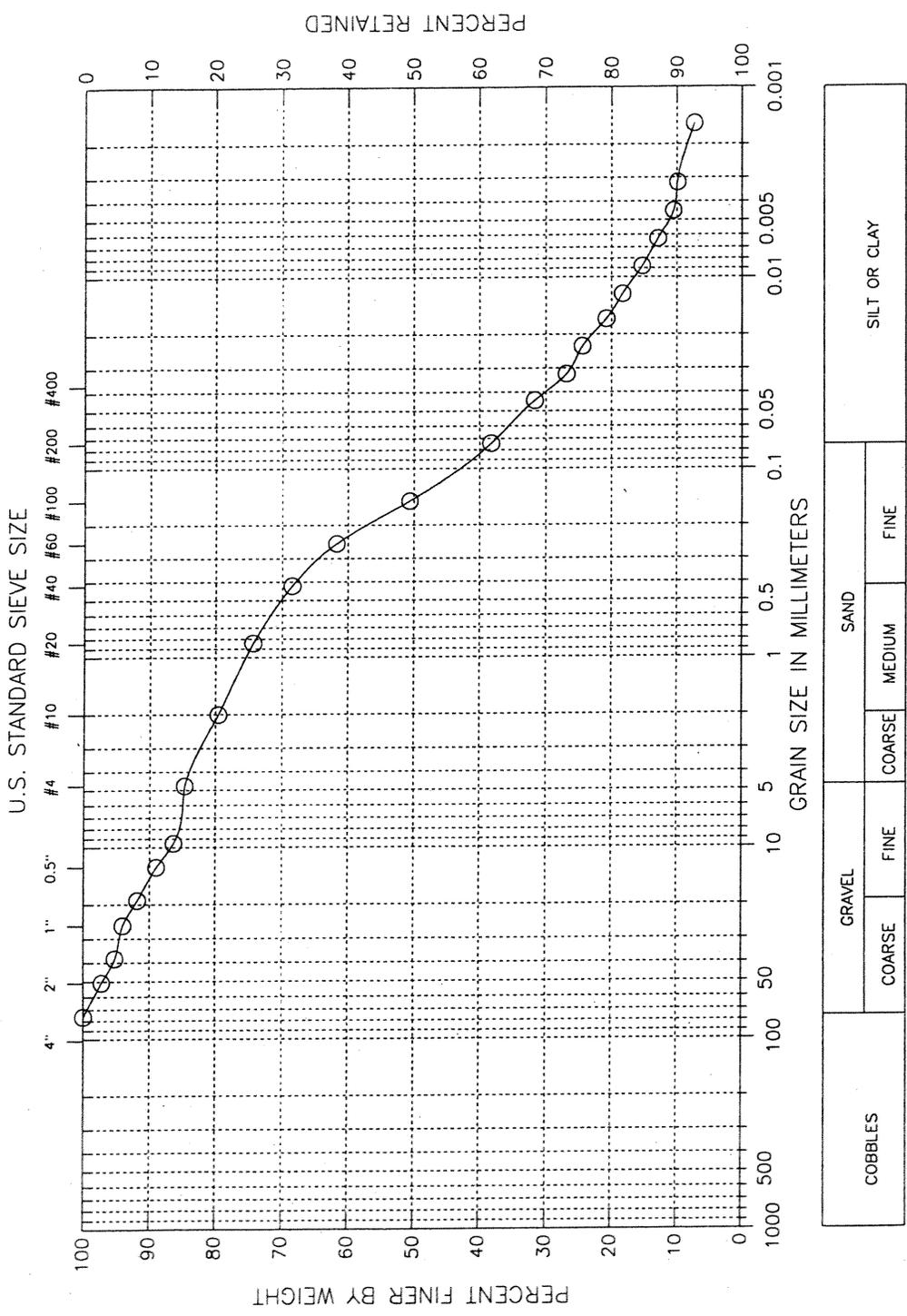
GE Site
Pittsfield, MA

Tested by: jdt Checked by: gtt
Date: 07/27/01 Rev No: 1

Figure No: 1
Page 2 of 2

Boring No.: ---
 Sample No.: S-2
 Test Method ASTM D 422
 Filename : S2

Project : GE Site
 Project No.: GTX3500
 Location: Pittsfield, MA
 Date : Fri Jul 20 2001



Classification :
 (SM) Silty sand with gravel
 Visual Description :
 Moist, dark grayish brown silty sand w/ gravel

Remarks :

Figure 2

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-2
 Location : Pittsfield, MA
 Soil Description : Moist, dark grayish brown silty sand w/ gravel
 Remarks :

Depth : ---
 Test Date : 07/12/01
 Test Method : ASTM D 422

Filename : S2
 Elevation : ---
 Tested by : PMP/HLB/MS
 Checked by : JDT

HYDROMETER

Hydrometer ID : 583901
 Weight of air-dried soil = 65.02 gm
 Specific Gravity = 2.69

Hydroscopic Moisture Content :
 Weight of Wet Soil = 0 gm
 Weight of Dry Soil = 0 gm
 Moisture Content = 0

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
1.00	31.00	21.75	26.09	0.044	32	0.044
2.00	27.00	21.75	22.09	0.032	27	0.032
4.00	25.00	21.75	20.09	0.023	24	0.023
8.00	22.00	21.75	17.09	0.017	21	0.017
15.00	20.00	21.75	15.09	0.012	18	0.012
30.00	17.50	22.25	12.63	0.009	15	0.009
60.00	15.50	22.25	10.63	0.006	13	0.006
120.00	13.50	22.50	8.67	0.004	11	0.004
240.00	13.00	22.50	8.17	0.003	10	0.003
1088.00	11.00	20.00	6.01	0.002	7	0.002

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-2
 Location : Pittsfield, MA
 Soil Description : Moist, dark grayish brown silty sand w/ gravel
 Remarks :

Filename : S2
 Elevation : ---
 Test Date : 07/12/01
 Test Method : ASTM D 422
 Tested by : PMP/HLB/MS
 Checked by : JDT

COARSE SIEVE SET

Sieve Mesh	Sieve Openings		Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
	Inches	Millimeters			
3"	2.996	76.10	0.00	0.00	100
2"	2.000	50.80	424.00	424.00	97
1.5"	1.500	38.10	313.00	737.00	95
1"	1.012	25.70	180.00	917.00	94
0.75"	0.748	19.00	341.00	1258.00	92
0.5"	0.500	12.70	434.00	1692.00	89
0.375"	0.374	9.51	405.00	2097.00	86

Total Dry Weight of Sample = 15369

FINE SIEVE SET

Sieve Mesh	Sieve Openings		Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
	Inches	Millimeters			
#4	0.187	4.75	1.38	1.38	85
#10	0.079	2.00	4.18	5.56	80
#20	0.033	0.84	4.26	9.82	74
#40	0.017	0.42	4.76	14.58	69
#60	0.010	0.25	5.54	20.12	62
#100	0.006	0.15	9.06	29.18	51
#200	0.003	0.07	10.13	39.31	38
Pan			31.27	70.58	0

Total Dry Weight of Sample = 189.76

- D85 : 5.4465 mm
- D60 : 0.2305 mm
- D50 : 0.1436 mm
- D30 : 0.0396 mm
- D15 : 0.0084 mm
- D10 : 0.0033 mm

Soil Classification

ASTM Group Symbol : SM
 ASTM Group Name : Silty sand with gravel
 AASHTO Group Symbol : A-4(0)
 AASHTO Group Name : Silty Soils

ATTERBERG LIMITS

PROJECT GE Site	PROJECT NUMBER GTX3500	TESTED BY PMP/HLB/MS	BORING NUMBER --
LOCATION Pittsfield, MA		CHECKED BY JDT	SAMPLE NUMBER S-2
SAMPLE DESCRIPTION Moist, dark grayish brown silty sand w/ gravel		DATE Fri Jul 20 2001	FILENAME S2

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER					
WT. WET SOIL + TARE					
WT. DRY SOIL + TARE					
WT. WATER					
TARE WT.					
WT. DRY SOIL					
WATER CONTENT, W_N (%)					
NUMBER OF BLOWS, N					
ONE-POINT LIQUID LIMIT, LL					

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER					
WT. WET SOIL + TARE					
WT. DRY SOIL + TARE					
WT. WATER					
TARE WT.					
WT. DRY SOIL					
WATER CONTENT (%)					

Determined to be Non-plastic.

SUMMARY OF RESULTS

NATURAL WATER CONTENT, W (%)	15.2
LIQUID LIMIT, LL	
PLASTIC LIMIT, PL	
PLASTICITY INDEX, PI	
LIQUIDITY INDEX, LI*	

*LI = (W - PL)/PI

PLASTICITY CHART

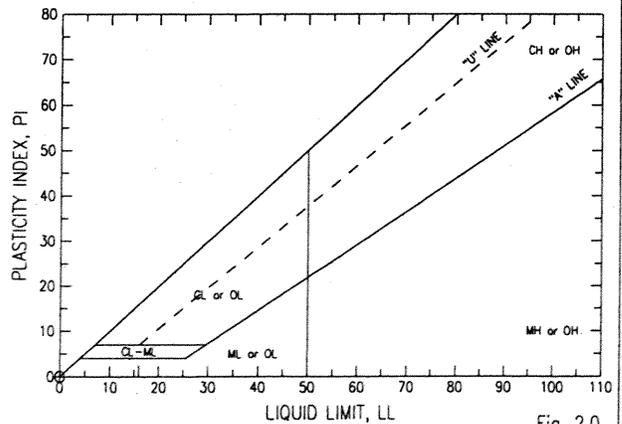
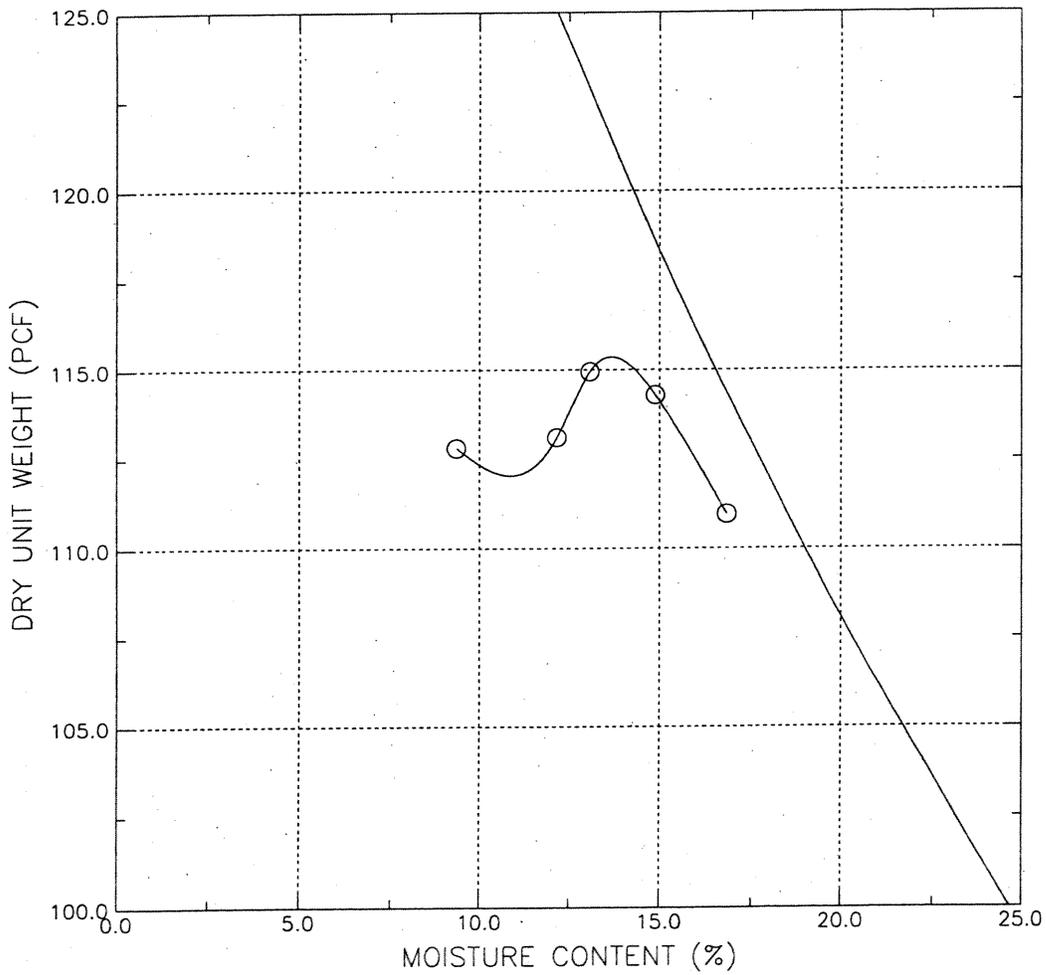


Fig. 2.0

Boring No. : --
Sample No. : S-2
Test Method : ASTM D 698
Filename : S2

Project : GE Site
Project No. : GTX3500
Location : Pittsfield, MA
Test Date : 07/12/01

Moisture-Density Relationship



Sample Description : Moist, dark grayish brown silty sand w/ gravel
Compaction Test Designation : ASTM D698-B
Maximum Dry Density : 115.4 PCF
Optimum Moisture Content : 13.7 %
Corrected Maximum Dry Density : 119.7 PCF
Corrected Optimum Moisture Content : 12.0%

Figure 2

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-2
 Location : Pittsfield, MA
 Soil Description : Moist, dark grayish brown silty sand w/ gravel
 Remarks :

Depth : ---
 Test Date : 07/12/01
 Test Method : ASTM D 698

Filename : S2
 Elevation : ---
 Tested by : PMP/HLB/MS
 Checked by : JDT

COMPACTION TEST

Mold ID :
 Method Used : ASTM D698-B
 Volume of Mold : 0.0333 ft³
 Mass of Mold : 4241 gm
 Specific Gravity : 2.65

Moisture Content ID	Mass of Container (gm)	Mass of Container + Moist Soil (gm)	Mass of Container + Dry Soil (gm)	Mass of Mold + Specimen (gm)	Moisture Content (%)	Dry Density (PCF)
china	8.15	218.75	200.75	6104.00	9.3	112.8
itchy	9.69	291.91	261.31	6157.00	12.2	113.1
xxx	8.05	277.69	246.54	6204.00	13.1	114.9
jimi	8.15	293.65	256.68	6224.00	14.9	114.3
shooter	8.24	294.26	253.05	6199.00	16.8	111.0
Optimum Dry Density		= 115.4 PCF				
Optimum Moisture Content		= 13.7 %				

Oversize correction (14% > 3/8 inch sieve):

Corrected Maximum Dry Density : 119.7 PCF
 Corrected Optimum Moisture Content : 12.0%

Direct Shear Test of Soils Under Consolidated Drained Conditions by ASTM D 3080

Client: Blasland, Bouck & Lee, Inc.
Project Name: GE Site
Project Location: Pittsfield, MA

GTX#: 3500
Report Date: 07/27/01
Page: 1 of 2

Soil: Sample 2 (S-2)

Sample Description	Classification	ASTM D 4318			ASTM D 1557	
		Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Corrected Maximum Dry Density, pcf	Corrected Optimum Moisture Content, %
Moist, dark grayish brown silty sand with gravel	SM	NP	NP	NP	119.7	12.0

Test Equipment: Top and bottom box (circular) = 2.50 in diameter. Load cells and LVDTs connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 4.91 in², soil height = 1 inch

Test Condition: inundated

Sample Type and Preparation:

Remolded to the in-place density (129.6 pcf) and moisture content (15.1%) as determined by the Nuclear Gauge on 06/17/01. All particles greater than 3/8 inch sieved out prior to testing.

Parameter	Point 1	Point 2	Point 3
Initial Moisture Content, %	14.5	15.8	16.0
Initial Dry Density, pcf	130	129	128
Percent Compaction, %	100	99.2	99.0
Nominal Rate of Horizontal Displacement, in/min	0.008	0.008	0.008
Normal Compressive Stress, psf	250	1875	3125
Peak Shear Stress, psi	499	1315	2197
Final Moisture Content, %	20.3	19.6	19.1

Friction Angle: 30.4 degrees
Cohesion: 311 psf

Comments: Tested By: jdt

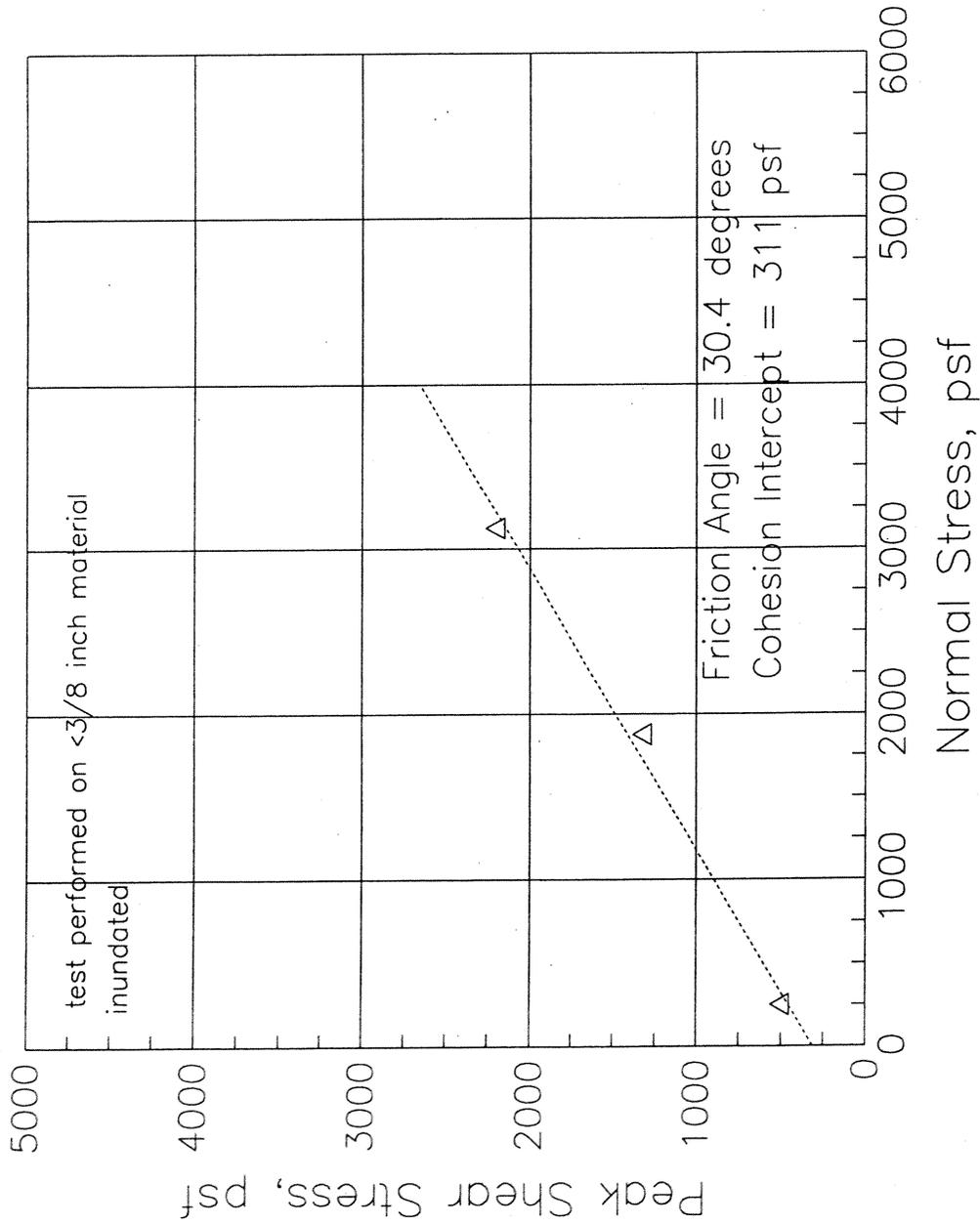
Checked By: gtt

peak shear stress vs normal load plot is presented in Figure 1

Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

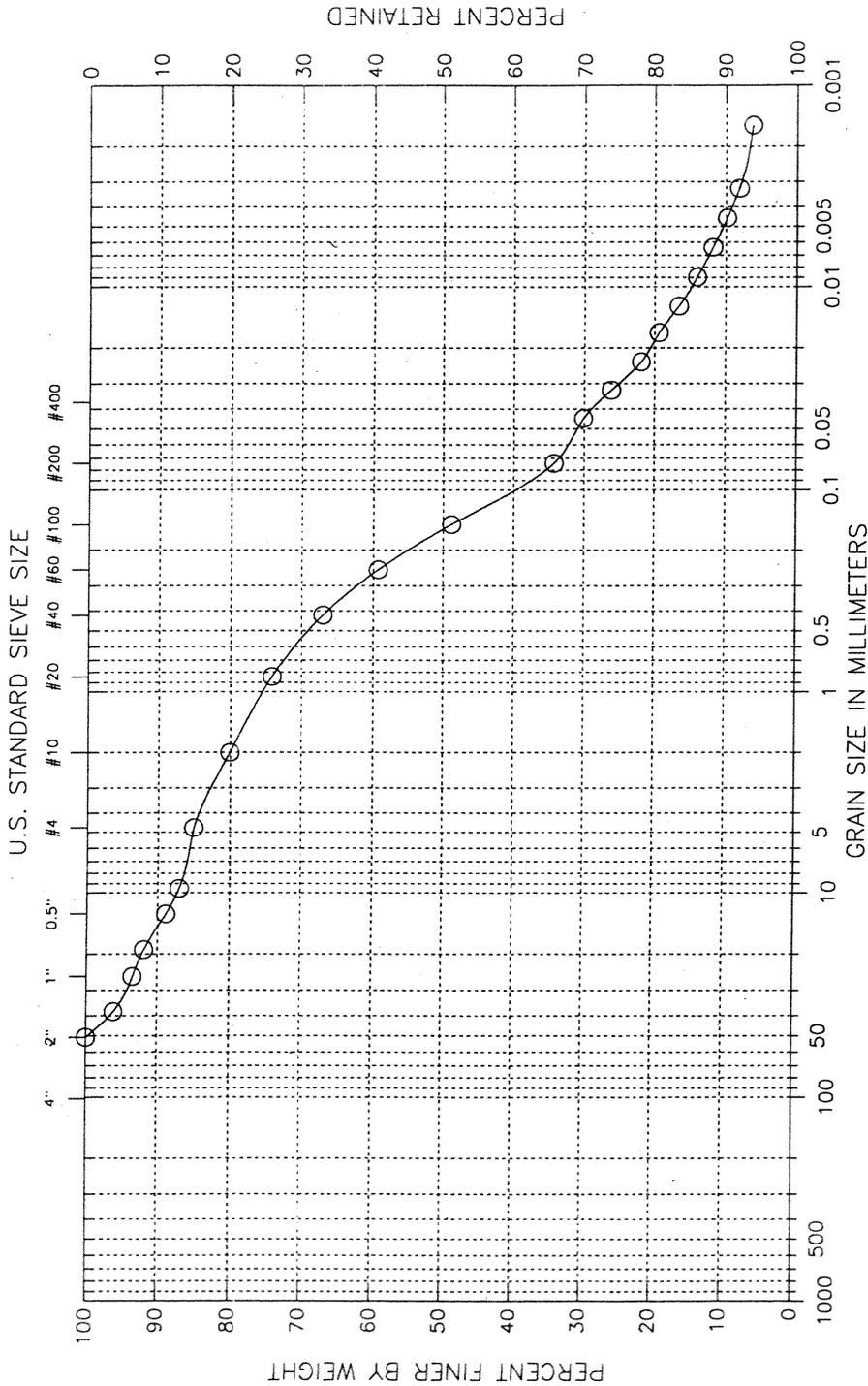
Direct Shear Test Series by ASTM D3080

Sample 2: compacted to the in-place density and moisture content using Nuclear Gauge value



Project : GE Site
 Project No.: GTX3500
 Location: Pittsfield, MA
 Date : Fri Jul 20 2001

Boring No.: --
 Sample No: S-3
 Test Method ASTM D 422
 Filename : S3



Classification :
 (SM) Silty sand
 Visual Description :
 Moist, olive gray silty sand

Remarks :

Figure 3

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-3
 Location : Pittsfield, MA
 Soil Description : Moist, olive gray silty sand
 Remarks :

Depth : ---
 Test Date : 07/12/01
 Test Method : ASTM D 422

Filename : S3
 Elevation : ---
 Tested by : PMP/HLB/MS
 Checked by : JDT

HYDROMETER

Hydrometer ID : 583901
 Weight of air-dried soil = 70.83 gm
 Specific Gravity = 2.65

Hydroscopic Moisture Content :
 Weight of Wet Soil = 0 gm
 Weight of Dry Soil = 0 gm
 Moisture Content = 0

Elapsed Time (min)	Reading	Temperature (deg. C)	Corrected Reading	Particle Size (mm)	Percent Finer (%)	Adjusted Particle Size
1.00	31.50	21.75	26.59	0.045	30	0.045
2.00	28.00	21.75	23.09	0.032	26	0.032
4.00	24.25	21.75	19.34	0.023	22	0.023
8.00	22.00	21.75	17.09	0.017	19	0.017
15.00	19.50	21.75	14.59	0.012	17	0.012
30.00	17.25	21.75	12.34	0.009	14	0.009
60.00	15.25	22.25	10.38	0.006	12	0.006
120.00	13.50	22.50	8.67	0.005	10	0.005
240.00	12.00	22.50	7.17	0.003	8	0.003
1099.00	10.50	20.00	5.51	0.002	6	0.002

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-3
 Location : Pittsfield, MA
 Soil Description : Moist, olive gray silty sand
 Remarks :

Depth : ---
 Test Date : 07/12/01
 Test Method : ASTM D 422

Filename : S3
 Elevation : ---
 Tested by : PMP/HLB/MS
 Checked by : JDT

COARSE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
2"	2.000	50.80	0.00	0.00	100
1.5"	1.500	38.10	603.00	603.00	96
1"	1.012	25.70	420.00	1023.00	94
0.75"	0.748	19.00	251.00	1274.00	92
0.5"	0.500	12.70	486.00	1760.00	89
0.375"	0.374	9.51	291.00	2051.00	87

Total Dry Weight of Sample = 15793

FINE SIEVE SET

Sieve Mesh	Sieve Openings Inches	Millimeters	Weight Retained (gm)	Cumulative Weight Retained (gm)	Percent Finer (%)
#4	0.187	4.75	1.51	1.51	85
#10	0.079	2.00	3.77	5.28	80
#20	0.033	0.84	4.49	9.77	74
#40	0.017	0.42	5.44	15.21	67
#60	0.010	0.25	5.85	21.06	59
#100	0.006	0.15	7.99	29.05	49
#200	0.003	0.07	11.01	40.06	34
Pan			26.05	66.11	0

Total Dry Weight of Sample = 171.04

- D85 : 4.7287 mm
- D60 : 0.2622 mm
- D50 : 0.1582 mm
- D30 : 0.0442 mm
- D15 : 0.0102 mm
- D10 : 0.0047 mm

Soil Classification

ASTM Group Symbol : SM
 ASTM Group Name : Silty sand
 AASHTO Group Symbol : A-2-4(0)
 AASHTO Group Name : Silty Gravel and Sand

ATTERBERG LIMITS

PROJECT GE Site	PROJECT NUMBER GTX3500	TESTED BY PMP/HLB/MS	BORING NUMBER --
LOCATION Pittsfield, MA	CHECKED BY JDT		SAMPLE NUMBER S-3
SAMPLE DESCRIPTION Moist, olive gray silty sand	DATE Fri Jul 20 2001	FILENAME S3	

LIQUID LIMIT DETERMINATIONS

CONTAINER NUMBER					
WT. WET SOIL + TARE					
WT. DRY SOIL + TARE					
WT. WATER					
TARE WT.					
WT. DRY SOIL					
WATER CONTENT, w_N (%)					
NUMBER OF BLOWS, N					
ONE-POINT LIQUID LIMIT, LL					

PLASTIC LIMIT DETERMINATIONS

CONTAINER NUMBER					
WT. WET SOIL + TARE					
WT. DRY SOIL + TARE					
WT. WATER					
TARE WT.					
WT. DRY SOIL					
WATER CONTENT (%)					

Determined to be Non-plastic.

SUMMARY OF RESULTS

NATURAL WATER CONTENT, w (%)	16.6
LIQUID LIMIT, LL	
PLASTIC LIMIT, PL	
PLASTICITY INDEX, PI	
LIQUIDITY INDEX, LI^*	

$$*LI = (w - PL) / PI$$

PLASTICITY CHART

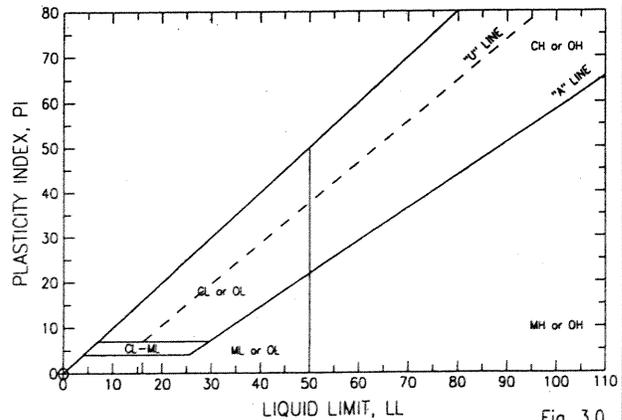
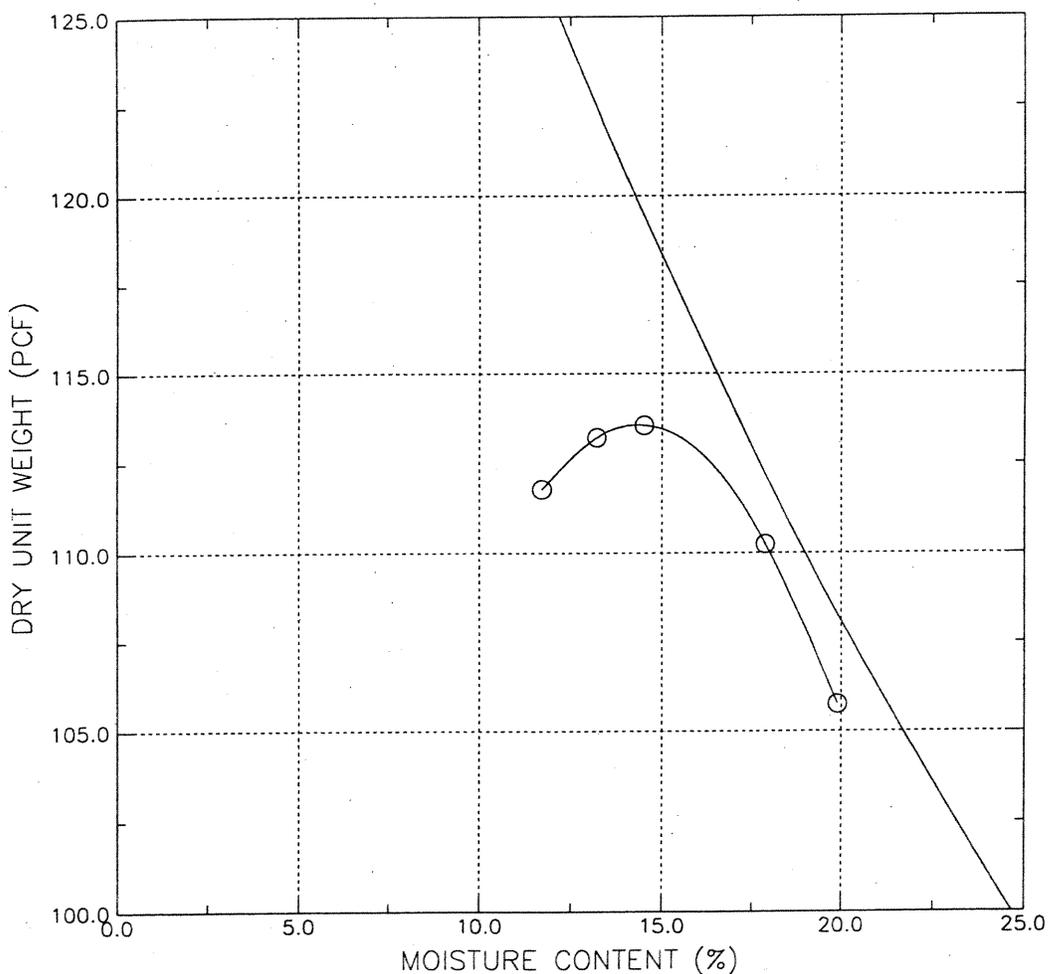


Fig. 3.0

Boring No. : --
Sample No. : S-3
Test Method : ASTM D 698
Filename : S3

Project : GE Site
Project No. : GTX3500
Location : Pittsfield, MA
Test Date : 07/12/01

Moisture-Density Relationship



Sample Description : Moist, olive gray silty sand
Compaction Test Designation : ASTM D698-B
Maximum Dry Density : 113.6 PCF
Optimum Moisture Content : 14.3 %
Corrected Maximum Dry Density : 118.2 PCF
Corrected Optimum Moisture Content : 12.6%

Figure 3

GEOTECHNICAL LABORATORY TEST DATA

Project : GE Site
 Project No. : GTX3500
 Boring No. : --
 Sample No. : S-3
 Location : Pittsfield, MA
 Soil Description : Moist, olive gray silty sand
 Remarks :

Depth : ---
 Test Date : 07/12/01
 Test Method : ASTM D 698

Filename : S3
 Elevation : ---
 Tested by : PMP/HLB/MS
 Checked by : JDT

COMPACTION TEST

Mold ID :
 Method Used : ASTM D698-B
 Volume of Mold : 0.0333 ft³
 Mass of Mold : 4241 gm
 Specific Gravity : 2.65

Moisture Content ID	Mass of Container (gm)	Mass of Container + Moist Soil (gm)	Mass of Container + Dry Soil (gm)	Mass of Mold + Specimen (gm)	Moisture Content (%)	Dry Density (PCF)
l1124	9.64	216.79	195.08	6127.00	11.7	111.8
k4	9.71	215.41	191.40	6177.00	13.2	113.2
cmw14	8.04	242.56	212.84	6205.00	14.5	113.5
fool	8.18	230.40	196.68	6204.00	17.9	110.2
sx19	9.72	265.40	222.97	6156.00	19.9	105.7

Optimum Dry Density = 113.6 PCF
 Optimum Moisture Content = 14.3 %

Oversize correction (13% > 3/8 inch sieve):
 Corrected Maximum Dry Density : 118.2 PCF
 Corrected Optimum Moisture Content : 12.6%

Direct Shear Test of Soils Under Consolidated Drained Conditions by ASTM D 3080

Client: Blasland, Bouck & Lee, Inc.
Project Name: GE Site
Project Location: Pittsfield, MA

GTX#: 3500
Report Date: 07/27/01
Page: 1 of 2

Soil: Sample 3 (S-3)

Sample Description	Classification	ASTM D 4318			ASTM D 1557	
		Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Corrected Maximum Dry Density, pcf	Corrected Optimum Moisture Content, %
Moist, olive gray silty sand	SM	NP	NP	NP	118.2	12.6

Test Equipment: Top and bottom box (circular) = 2.50 in diameter. Load cells and LVDTs connected to data acquisition system for shear force, normal load, horizontal and vertical displacement; surface area = 4.91 in², soil height = 1 inch

Test Condition: inundated

Sample Type and Preparation: Remolded to the in-place density (122.7 pcf) and moisture content (15.1%) as determined by the Nuclear Gauge on 06/17/01. All particles greater than 3/8 inch sieved out prior to testing.

Parameter	Point 1	Point 2	Point 3
Initial Moisture Content, %	14.6	14.9	14.9
Initial Dry Density, pcf	123	123	123
Percent Compaction, %	100	100	100
Nominal Rate of Horizontal Displacement, in/min	0.008	0.008	0.008
Normal Compressive Stress, psf	250	1875	3125
Peak Shear Stress, psi	308	1230	2115
Final Moisture Content, %	21.2	22.8	21.5

Friction Angle: 32.1 degrees
Cohesion: 125 psf

Comments: Tested By: jdt

Checked By: gtt

peak shear stress vs normal load plot is presented in Figure 1

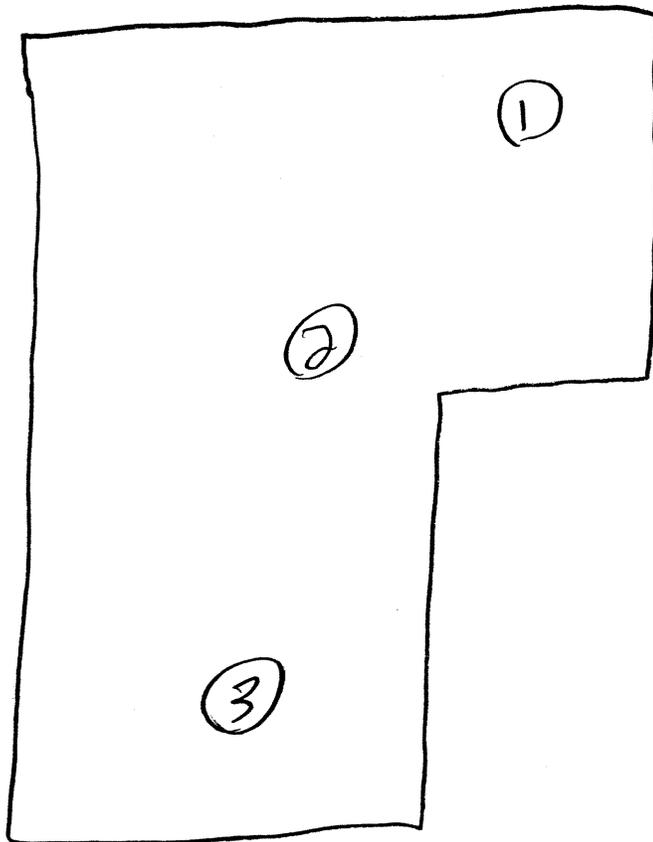
Notes: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

DAILY REPORT

Client: *PBL*
Project Name: *GE Landfill*
Location: *Pittsfield MA*
GTX #: *3500*

Date: *6-27-01*
Weather: *Sunny ~ 95°*
Technician: *KAM*

Description of Work: *Field Density*



Technician: *KAM*